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ANATOMY (Oral Presentations)

Abstract - Anat -01

Sex Difference of the Skull

Maya Vinothini.M

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai - 600077*

The human skull is a bony structure, part of the skeleton, that is in the human head and which supports the structures of the face and forms a cavity for the brain. In the past, specifically in the mid-nineteenth century, anthropologists found it crucial to distinguish between male and female skulls. An anthropologist of the time, McGrigor Allan, argued that the female brain was similar to that of an animal. This allowed anthropologists to declare that women were in fact more emotional and less like their rational male counterparts. Research today shows that while in early life there is little difference between male and female skulls, in adulthood male skulls tend to be larger and more robust than female skulls, which are lighter and smaller, with a cranial capacity about 10 percent less than that of the male. However, new studies show that women's skulls are thicker and thus men may be more susceptible to head injury than women. It has been claimed that the larger male brain is an effect of having larger body size, and that after correction, the difference disappears. Male skulls can have more prominent supraorbital ridges, a more prominent glabella, and more prominent temporal lines. Female skulls generally have rounder orbits, and narrower jaws. Male skulls on average have larger, broader palates, squarer orbits, larger mastoid processes, larger sinuses, and larger occipital condyles than those of females. Male mandibles typically have squarer chins and thicker, rougher muscle attachments than female mandibles. Surgical alteration of sexually dimorphic skull features may be carried out as a part of Facial feminization surgery, a set of reconstructive surgical that can alter male facial features to bring them closer in shape and size to typical female facial features. These procedures can be an important part of the treatment of transgender women for gender dysphoria.



Abstract - Anat -02

Maxillary Ostia.

Jaya Baarathi . J

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai - 600077*

The maxillary sinus was first discovered and illustrated by Nathaniel Highmore, the British surgeon and anatomist who described it in detail in his 1651 treatise. Found in the body of the maxilla, this sinus has three recesses: an alveolar recess pointed inferiorly, bounded by the alveolar process of the maxilla; a zygomatic recess pointed laterally, bounded by the zygomatic bone; and an infraorbital recess pointed superiorly, bounded by the inferior orbital surface of the maxilla. The medial wall is composed primarily of cartilage. The ostia for drainage are located high on the medial wall and open into the semilunar hiatus of the lateral nasal cavity; because of the position of the ostia, gravity cannot drain the maxillary sinus contents when the head is erect. The ostium of the maxillary sinus is high up on the medial wall and on average is 2.4 mm in diameter; with a mean volume of about 10 ml. Stand near the person during an extraoral examination to visually inspect and bilaterally palpate the maxillary sinuses.



Abstract - Anat -03

Fascial spaces

Nabeel Ahmed. N

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

Fascial spaces are potential spaces that exist between the fascia and underlying organs and other tissues. In health, these spaces do not exist, and they are only created by pathology. The opening of fascial spaces may be facilitated by pathogenic bacteria release of enzymes which cause tissue lysis. The spaces filled with loose areolar connective tissue may also be termed clefts. Other contents such as salivary glands, blood vessels, nerves or lymph nodes are dependent upon the location of the space. Generally, the spread of infection is determined by barriers such as muscle, bone and fascia. Pus moves by the path of least resistance, In the head and neck, potential spaces are primarily defined by the complex attachment of muscles, especially mylohyoid, buccinator, masseter, medial pterygoid, superior constrictor and orbicularis oris. Facial spaces (also termed facial tissue spaces or tissue spaces), are spaces that exist between the fascia and underlying organs and other tissues .Facial spaces are normally filled with loose connective tissue which readily breakdown invaded by infection and leads to large swelling. There are 16 facial spaces in the head and neck region. These spaces are only created by pathology. E.g. the spread of pus or cellulites in an infection. The facial spaces can also be opened during the dissection of a cadaver. The facial spaces are different from the fascia itself, which are bands of connective tissues that surrounds structures, e.g. muscles. The opening of facial spaces may be facilitated by pathogenic bacterial release of enzymes which cause tissue lysis(e.g. hyaluronidase and collagenase). The spaces filled with loose areolar connective tissue may also be termed clefts. Other contents such as salivary glands ,nerves, blood vessels or lymph nodes are dependent upon the location of the space. Those containing neurovascular tissue (nerves and blood vessels) may also be termed compartments. Infections involving facial spaces of the head and neck may give varying signs and symptoms depending upon the space(s) involved. . The spread of infection is determined by barriers such as muscle, bone and fascia. Trismus (difficulty opening the mouth) is a sign that the muscles of mastication (the muscles that move the jaw) are involved.Dysphagia (difficulty swallowing) and dyspnoea(difficulty breathing) may be a sign that the airway is being compressed by the swelling.



Abstract - Anat -04

Maxillary sinus

Rajasekaran .S

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai - 600077*

The pyramid-shaped maxillary sinus (or antrum of Highmore) is the largest of the paranasal sinuses, and drains into the middle meatus of the nose. Its nasal wall, or base, presents, in the disarticulated bone, a large, irregular aperture, communicating with the nasal cavity. In the articulated skull this aperture is much reduced in size by the bones. The sinus communicates through an opening into the semilunar hiatus on the lateral nasal wall. On the posterior wall are the alveolar canals, transmitting the posterior superior alveolar vessels and nerves to the molar teeth. The maxillary sinus can normally be seen above the level of the premolar and molar teeth in the upper jaw. This dental x-ray film shows how, in the absence of the second premolar and first molar, the sinus became pneumatized and expanded towards the crest of the alveolar process (location at which the bone meets the gum tissue). The floor is formed by the alveolar process of the maxilla, and, if the sinus is of an average size, is on a level with the floor of the nose; if the sinus is large it reaches below this level. Projecting into the floor of the antrum are several conical processes, corresponding to the roots of the first and second maxillary molar teeth; in some cases the floor can be perforated by the apices of the teeth.



Abstract - Anat -05

Accessory lingual foramen

Shanker.G

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

The lingual foramen in the midline of the mandible causes confusion in terminology, incidence of occurrence and contents. A survey of 100 dried mandibles showed the foramen to be present in 92 specimens. The contents of the foramen were found to be an artery, which was an anastomosis of the sublingual branches of the right and left lingual arteries. Wire markers were placed in the foramen and the genial tubercles were covered with lead foil to illustrate the radiographic relationship between them. The radio-opacity peripheral to the foramen as seen on a radiograph is produced by the wall of the canal and not the genial tubercles as previously reported. While the foramen is not seen on many radiographs of the lower incisor region, this can be accounted for by a change in orientation of the x-ray beam. A pilot study revealed an incidence of 49% of the lingual foramen on periapical radiographs of the mandibular incisor region in an adult population.



Abstract - Anat -06

Craniosynostosis

Smriti Robert

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

Craniosynostosis is a birth defect that causes one or more sutures on a baby's head to close earlier than normal. The skull of an infant or young child is made up of bony plates that allow for growth of the skull. The borders at which these plates intersect are called sutures or suture lines. The sutures between these bony plates normally close by the time the child is 2 or 3 years old. Early closing of a suture causes the baby to have an abnormally shaped head. It is a condition in which one or more of the fibrous sutures in an infant skull prematurely fuses by turning into bone (ossification), thereby changing the growth pattern of the skull. Because the skull cannot expand perpendicular to the fused suture, it compensates by growing more in the direction parallel to the closed sutures. Sometimes the resulting growth pattern provides the necessary space for the growing brain, but results in an abnormal head shape and abnormal facial features. In cases in which the compensation does not effectively provide enough space for the growing brain, craniosynostosis results in increased intracranial pressure leading possibly to visual impairment, sleeping impairment, eating difficulties, or an impairment of mental development combined with a significant reduction in IQ. The cause of craniosynostosis is unknown. Genes may play a role. However, there is usually no family history of the condition. One type that is passed down through families (inherited) can occur with other health problems, such as seizures, decreased intelligence, and blindness. Genetic disorders commonly linked to craniosynostosis include Crouzon, Apert, Carpenter, Chotzen, and Pfeiffer syndromes. However, most children with craniosynostosis are otherwise healthy and have normal intelligence. Symptoms depend on the type of craniosynostosis. They may include: No "soft spot" (fontanelle) on the newborn's skull. A raised hard ridge along the affected sutures, Unusual head shape, Slow or no increase in the head size over time as the baby grows. There are different types of craniosynostosis like Sagittal synostosis (scaphocephaly) is the most common type. It affects the main suture on the very top of the head. The early closing forces the head to grow long and narrow, instead of wide. Babies with this type tend to have a broad forehead. It is more common in boys than girls. Frontal plagiocephaly is the next most common type. It affects the suture that runs from ear to ear on the top of the head. It is more common in girls. Metopic synostosis is a rare form that affects the suture close to the forehead. The child's head shape may be described as trigonocephaly. It may range from mild to severe. It is estimated that craniosynostosis affects 1 in 2,000 to 2,500 live births worldwide. Sagittal synostosis is the most common phenotype, representing 40 to 55% of nonsyndromic cases. The second most common type is the coronal synostosis representing 20 to 25%. The metopic synostosis comes third with 5 to 15% and the lambdoid synostosis is only seen in 0 to 5% of nonsyndromic cases. In about 5 to 15% more than one suture is affected, which is referred to as complex craniosynostosis. This is generally part of a syndrome.



Abstract - Anat -07

Stem cell

Teresa Mao

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

Stem cells are undifferentiated biological cells that can differentiate into specialized cells and can divide to produce more stem cells. They are found in multi cellular organisms. In mammals, there are two broad types of stem cells: embryonic stem cells, which are isolated from the inner cell mass of blastocysts, and adult stem cells, which are found in various tissues. In adult organisms, stem cells and progenitor cells act as a repair system for the body, replenishing adult tissues. In a developing embryo, stem cells can differentiate into all the specialized cells ectoderm, endoderm and mesoderm but also maintain the normal turnover of regenerative organs, such as blood, skin, or intestinal tissues. Stem cells are undifferentiated biological cells that can differentiate into specialized cells and can divide (through mitosis) to produce more stem cells. They are found in multicellular organisms . In mammals, there are two broad types of stem cells embryonic stem cells, which are isolated from the inner cell mass of blastocysts and adult stem cells , which are found in various tissues. In adult organisms, stem cells and progenitor cells act as a repair system for the body, replenishing adult tissues. In a developing embryo, stem cells can differentiate into all the specialized cells—ectoderm, endoderm and mesoderm (see induced pluripotent stem cells)—but also maintain the normal turnover of regenerative organs, such as blood, skin, or intestinal tissues. Stem cells can also be taken from umbilical cord blood just after birth. Of all stem cell types, autologous harvesting involves the least risk. By definition, autologous cells are obtained from one's own body, just as one may bank his or her own blood for elective surgical procedures .Adult stem cells are frequently used in medical therapies, for example in bone marrow transplantation . Stem cells can now be artificially grown and transformed (differentiated) into specialized cell types with characteristics consistent with cells of various tissues such as muscles or nerves. Embryonic cell lines and autologous embryonic stem cells generated through therapeutic cloning have also been proposed as promising candidates for future therapies. Research into stem cells grew out of findings by Ernest A. McCulloch and James .E. Till at the University of Toronto in the 1960s.



Abstract - Anat -08

Bony Bridge on Atlas,

Dhaleekkha Keerbananthan

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai - 600077*

In the atlas vertebra, the retroarticular canal and the lateral bridge are examples of bony outgrowth or exostosis which may cause external pressure on the vertebral artery as it passes from the foramen transversarium of the vertebra to the foramen magnum of the skull. If this pressure is severe enough, as may occur during the extreme rotatory movements carried out during therapeutic manipulation of the cervical spine, the vertebral artery may be compressed. There are few studies of the lateral bridge of the atlas reported in the literature as a variety of the 'posterior glenoid process' (the retroarticular canal), which he termed the 'gleno-transverse bony arch'. As its name implies, it is a lateral outgrowth of bone from the superior articular facet or lateral mass to the posterior root of the transverse process of the atlas. The retroarticular canal is formed by an exostosis passing from the posterior surface of the lateral mass to the posterior margin of the vertebral artery groove of the atlas. Thus the lateral bridge forms another arch, secondary to the retroarticular canal, through which the vertebral artery must pass.



Abstract - Anat -09

Development of tooth and its disorders

Mohamed Parshan

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

The development of teeth and of the face is regulated by genes, but the genetic programme is very sensitive to disturbances in the environment such as exposure to infection or toxic chemicals, including drugs. The specific genetic abnormalities underlying some developmental disorders are now known, and for several others a strong genetic association has been established, even though the genes have yet to be identified. However, there remain many where the causes appear complex and multifactorial, involving the interaction of genetic and environmental factors. Disorders of development of teeth may be prenatal or postnatal in origin and may be inherited or acquired. Their recognition and evaluation require a thorough knowledge of the normal chronology of the human dentition and of the normal development and structure of the teeth. Disorders of development of teeth may be due to abnormalities in the differentiation of the dental lamina and the tooth germs, causing anomalies in the number, size, and form of teeth (abnormalities of morpho differentiation) or to abnormalities in the formation of the dental hard tissues resulting in disturbances in tooth structure. It is more common in females and there are also racial differences. For example, the prevalence of missing mandibular permanent central incisors is much more common in Japanese and Swedish populations than in other groups studied. Hypodontia may be symmetrical when particular teeth or groups of teeth are involved or haphazard when no pattern is discernible. Although it is very unusual for deciduous teeth to be congenitally absent, it is likely that in such cases the permanent successional tooth will also fail to form. Although the genetic basis of hypodontia is not yet understood, several regulatory genes involved in tooth development have been identified and it is likely that mutations in these result in tooth agenesis. These control or regulatory genes are not unique to tooth development but are the same genes that control the development of the face and of many other tissues and organs in the embryo. Thus, hypodontia may be associated with other craniofacial anomalies and developmental syndromes.



Abstract - Anat -10

Facial scan could reveal genetic disorder

Sindhuja.J

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai - 600077*

It analyses the shape of the eyes, nose, mouth and ears to pinpoint the genetic condition a child might be suffering from. Its creator, Professor Peter Hammond, of Great Ormond Street Hospital, believes it could eventually lead to quicker diagnosis of hundreds of genetic disorders. When the computer is fed a picture of a patient with an unknown condition, it filters through its database looking for similar images and presents the doctor with a handful of possible conditions. Professor Hammond believes the programme could speed up diagnosis, saving both parents and children from the trauma of test after test. In all, there are around 700 genetic disorders that leave their mark on the face include Williams and Smith-Magenis syndromes. Williams syndrome affects one in 10,000 babies and leads to heart problems and learning difficulties. Sufferers typically have an 'elfin' face. Smith-Magenis syndrome which, at one in 25,000 births, also causes learning difficulties. Facial signs include a pushed up upper lip and a flattened bridge of the nose.



Abstract - Anat -11

Development of tooth and its disorders

Mohamed Parshan

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

Tooth development or odontogenesis is the complex process by which teeth form from embryonic cells, grow, and erupt into the mouth. Although many diverse species have teeth, non-human tooth development is largely the same as in humans. For human teeth to have a healthy oral environment, enamel, dentin, cementum and the periodontium must all develop during appropriate stages of fetal development. Primary (baby) teeth start to form between the sixth and eighth week of prenatal development, and permanent teeth begin to form in the twentieth week. Anodontia is a complete lack of tooth development, and hypodontia is a lack of some tooth development. Anodontia is rare, most often occurring in a condition called Hypohidrotic ectodermal dysplasia, while hypodontia is one of the most common developmental abnormalities, affecting 3.5–8.0% of the population (not including third molars). The absence of third molars is very common, occurring in 20–23% of the population, followed in prevalence by the second premolar and lateral incisor. Hypodontia is often associated with the absence of a dental lamina, which is vulnerable to environmental forces, such as infection and chemotherapy medications, and is also associated with many syndromes, such as Down syndrome and Crouzon syndrome.



Abstract - Anat -12

Inter parietal bone

Lynson Jay Nallthambi

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

An interparietal bone (os interparietale or Inca bone or os Inca. Var.) is a dermal bone situated between the parietal and supraoccipital. In humans, it corresponds to the upper portion of the squama of the occipital bone that lies superior to the highest nuchal line and is completely fused to the supraoccipital. However, in some individuals this portion remains separate from the rest of the occipital bone throughout life. In such cases, this separate bone is particularly referred as Inca bone. Inca bones in humans were first found in the skulls of contemporary indigenous peoples of the southern Andes as well as in those of mummies of the Inca civilization. In many other mammals, this bone is completely fused to the supraoccipital as in humans. However in some mammals (for example, rodents, rabbits, and artiodactyls), this bone remains separate from the supraoccipital bone. Classic comparative anatomy have regarded the interparietal as being lost in various mammalian lineages since the interparietal and supraoccipital fuse with each other in the early ontogenetic period in many mammals, but recent study has shown that its presence is confirmed in all extant mammalian orders, particularly in the embryonic period.



Abstract - Anat -13

Development of face and its anomalies

Priyanka S.R

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

The facial prominences are five swellings that appear in the fourth week and come from the first and second pharyngeal arch. They are basically made of mesenchyme that comes from the neural crest. The maxillary prominences are next to the stomodeum and the mandibular prominences are under it. The frontonasal prominence is a single structure and is ventral to the forebrain. Also, a couple of nasal placodes originated from the ectoderm, invaginate and form the nasal cavities. At the same time, the mesenchymal cells proliferate around the placodes, and the sides of these swellings form the medial and lateral nasal prominences. Each of these prominences is separated from the maxillary prominence by the nasolacrimal groove. Next, maxillary prominences continue growing. They merge laterally with the mandibular prominences and forms the cheeks. At the midline they compress the medial nasal prominences and fuses. This forms the upper lip. The intermaxillary segment is formed by the growing and merging of the nasal swellings and it gives rise to the primary palate, the philtrum of the lip, and the premaxillary part of the maxilla in which the four incisors grow. The formation of each region of the face is due to the migration of the neural crest cells that come from the ectoderm. Any deviation from the development of face causes facial anomalies. The anomalies are Treacher collins syndrome which leads to absence of cheek bones and cleft lip and cleft palate.



Abstract - Anat -14

Cleft lip and Cleft palate

Sudharsana.A

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

Cleft lip (cheiloschisis) and cleft palate (palatoschisis), which can also occur together as cleft lip and palate, are variations of a type of clefting congenital deformity caused by abnormal facial development during gestation. A cleft is a fissure or opening—a gap. It is the non-fusion of the body's natural structures that form before birth. Approximately 1 in 700 children born have a cleft lip or a cleft palate or both. In decades past, the condition was sometimes referred to as harelip, based on the similarity to the cleft in the lip of a hare, but that term is now generally considered to be offensive. Clefts can also affect other parts of the face, such as the eyes, ears, nose, cheeks, and forehead. In 1976, Paul Tessier described fifteen lines of cleft. Most of these craniofacial clefts are even rarer and are frequently described as Tessier clefts using the numerical locator devised by Tessier. A cleft lip or palate can be successfully treated with surgery, especially so if conducted soon after birth or in early childhood.



Abstract - Anat -15

Sexual Dimorphism in mandibular canine

Sukanya .D

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

Teeth are an excellent material for genetic, odontological and forensic investigations and research purpose. From all the teeth, the mandibular canines are found to exhibit sexual dimorphism. However, very few studies have been published on maxillary canine's measurements. Teeth are well preserved after death and they exhibit remarkable sexual dimorphism. Hence, they provide excellent materials for forensic investigations intended for identification of sex. Present study was undertaken on permanent mandibular canines of 90 male and 90 female subjects of age group 17-23 years. The mesiodistal width for right and left mandibular canines and intercanine distance were measured. Subsequently, canine index was calculated for both sides. Significant sexual dimorphism was found in all parameters except intercanine distance. All the results were compared with previous studies and discussed in the light of genetic, evolutionary and metabolic reasons for sexual dimorphism, Human teeth are the hardest and chemically the most stable tissues in the body, and are extremely durable even at high temperatures. Teeth can be identified even when the rest of the body has undergone decomposition. They are therefore invaluable for identification on fragmentary adult skeleton. Teeth are readily accessible for examination and since no two teeth have similar morphology, they form an excellent forensic tool for sex determination. The identification of sex is of significance in case of major disasters where bodies are often damaged beyond recognition. Of all the teeth in the human dentition, canines are the least frequently extracted teeth (possibly because of the relatively decreased incidence of caries and periodontal disease).¹ Mandibular canines are considered to be the key teeth for sexual dimorphism.² Also, canines are reported to withstand extreme conditions and have been recovered from human remains even in air disasters and hurricanes.¹ Tooth size standards based on odontometric investigations can be used in age and sex determination as human teeth exhibit sexual dimorphism.³ Males possess larger tooth crowns than females in contemporary human populations. This may be due to a longer period of amelogenesis for both deciduous and permanent dentitions in males.⁴ Few studies have established that the mesiodistal diameter of lower canine is less in females than males and they have established variations. Hence, the present study aimed to measure the mesiodistal diameter of both mandibular canines so as to establish canine measurement variations in sex determination.



Abstract - Anat -16

TMJ Disorders

Soumya Abraham

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai - 600077*

Temporomandibular joint dysfunction (sometimes abbreviated to TMD or TMJD and also termed temporomandibular joint dysfunction syndrome, temporomandibular disorder or many other names), is an umbrella term covering pain and dysfunction of the muscles of mastication (the muscles that move the jaw) and the temporomandibular joints (the joints which connect the mandible to the skull). The most important feature is pain, followed by restricted mandibular movement, and noises from the temporomandibular joints (TMJ) during jaw movement. Although TMD is not life threatening, it can be detrimental to quality of life, because the symptoms can become chronic and difficult to manage. TMD is thought to be very common. About 20-30% of the adult populations are affected to some degree. Usually people affected by TMD are between 20 and 40 years of age, and it is more common in females than males. TMD is the second most frequent cause of orofacial pain after dental pain (i.e. toothache). Common treatments that are used include provision of occlusal splints, psychosocial interventions like cognitive behavioral therapy, and medications like analgesics (pain killers) or others. Most sources now agree that no irreversible treatment should be carried out for TMD.



ANATOMY (Poster Presentations)

Abstract - Anat -01

Mandibular block

Vignesh & George Jacob

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

Mandibular nerve block involves blockage of the auriculotemporal, inferior alveolar, buccal, mental, incisive, mylohyoid, and lingual nerves. It results in anesthesia of the following areas: Ipsilateral mandibular teeth up to the midline, Buccal and lingual hard and soft tissue on the side of the block, Anterior two-thirds of the tongue, Floor of the mouth, Skin over the jaw, the posterior part of the cheek, and the temporal area. Mandibular nerve block is a safe procedure. The process of obtaining informed consent should include discussion of the risk of temporary numbness and paresthesia in the involved region. The mandibular nerve is the largest division of the trigeminal nerve, with sensory roots from the trigeminal ganglion and motor roots from the pons and the medulla. The 2 roots exit the cranium via the foramen ovale and unite just outside the cranium to form the mandibular nerve. After giving off 2 branches, the mandibular nerve bifurcates into anterior and posterior divisions. The mandibular nerve area is generally blocked by using more specific nerve blocks rather than by performing a complete nerve block. The mandibular nerve block has a success rate of 95%-98%, whereas the IAN block is successful in only 65%-85% of cases. Complication is an allergic reaction may develop to the preservatives added to the local anesthetic (eg, methylparaben or sodium metabisulfite) or to an ester-group local anesthetic.



Abstract - Anat -02

Development Of Mandible

Naveen Benson.X, Nivethithan.T

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

The mandible is the largest and strongest bone of the face, serves for the reception of the lower teeth. It consists of a curved, horizontal portion, the body, and two perpendicular portions, the rami, which unite with the ends of the body nearly at right angles. The ossification of the mandible refers to the Human mandible laying down new bone material in the fibrous membrane covering the outer surfaces of Meckel's cartilage. These cartilages form the cartilaginous bar of the mandibular arch, and are two in number, a right and a left. Their proximal or cranial ends are connected with the ear capsules, and their distal extremities are joined to one another at the symphysis by mesodermal tissue. Ossification takes place in the membrane covering the outer surface of the ventral end of Meckel's cartilage and each half of the bone is formed from a single center which appears, near the mental foramen, about the sixth week of fetal life. By the tenth week the portion of Meckel's cartilage which lies below and behind the incisor teeth is surrounded and invaded by the membrane bone. At birth the bone consists of two parts, united by a fibrous symphysis, in which ossification takes place during the first year.



Abstract - Anat -03

Disorders of Tooth and Jaw

Ajay .C & Bineesh.B

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

Your teeth are made of a hard, bonelike material. Inside the tooth are nerves and blood vessels. You need your teeth for many activities you may take for granted. These include eating, speaking and even smiling. But tooth disorders are nothing to smile about. They include problems such as cavities (also known as tooth decay), infections, and injuries. The most familiar symptom of a tooth problem is a toothache. Others include worn-down or loose teeth. It's important that you see a dentist if you have any problems with your teeth. Fortunately, you can prevent many tooth disorders by taking care of your teeth and keeping them clean. A broken jaw is a break in the jaw bone. A dislocated jaw means the lower part of the jaw has moved out of its normal position at one or both joints where the jaw bone connects to the skull (temporomandibular joints). Pierre Robin syndrome is a condition present at birth, in which the infant has a smaller than normal lower jaw, a tongue that falls back in the throat, and difficulty breathing.



Abstract -Anat -04

Pharyngeal Arches

Dinesh V.P & Balamurugan.R

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai - 600077*

In the development of vertebrates, the pharyngeal arches are primordia for a multitude of structures. In the human embryo, they develop during the fourth week as a series of mesodermal outpouchings on both sides of the developing pharynx. In fish, the branchial arches support the gills. Pharyngeal pouches form on the endodermal side between the arches, and pharyngeal grooves form from the lateral ectodermal surface of the neck region to separate the arches.^[2] Each pharyngeal arch has a cartilaginous stick, a muscle component that differentiates from the cartilaginous tissue, an artery, and a cranial nerve. Each of these is surrounded by mesenchyme. Arches do not develop simultaneously but instead possess a "staggered" development. The pouches line up with the clefts, and these thin segments become gills in fish. In mammals the endoderm and ectoderm not only remain intact but also continue to be separated by a mesoderm layer. There are six pharyngeal arches, but in humans the fifth arch exists only transiently during embryologic growth and development. Since no human structures result from the fifth arch, the arches in humans are I, II, III, IV, and VI. More is known about the fate of the first arch than the remaining four. The first three contribute to structures above the larynx, whereas the last two contribute to the larynx and trachea.



Abstract -Anat -05

Disorders of Tmj

Madhumala.S & Helen Joice.S

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

Temporomandibular joint dysfunction (sometimes abbreviated to TMD or TMJD and also termed temporomandibular joint dysfunction syndrome, temporomandibular disorder or many other names), is an umbrella term covering pain and dysfunction of the muscles of mastication (the muscles that move the jaw) and the temporomandibular joints (the joints which connect the mandible to the skull). The most important feature is pain, followed by restricted mandibular movement, and noises from the temporomandibular joints (TMJ) during jaw movement. Although TMD is not life threatening, it can be detrimental to quality of life, because the symptoms can become chronic and difficult to manage. TMD is thought to be very common. About 20-30% of the adult populations are affected to some degree. Usually people affected by TMD are between 20 and 40 years of age, and it is more common in females than males. TMD is the second most frequent cause of orofacial pain after dental pain. TMD is a symptom complex rather than a single condition, and it is thought to be caused by multiple factors. Common treatments that are used include provision of occlusal splints, psychosocial interventions like cognitive behavioural therapy, and medications like analgesics (pain killers) or others. Most sources now agree that no irreversible treatment should be carried out for TMD.



Abstract -Anat -06

Muscles of Mastication

Kavitha.M, Vidya.K

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

There are four classical muscles of mastication. During mastication, three muscles of mastication are responsible for adduction of the jaw, and one (the lateral pterygoid) helps to abduct it. All four move the jaw laterally. Other muscles, usually associated with the hyoid such as the sternohyomastoid, are responsible for opening the jaw in addition to the lateral pterygoid. The muscles involved are masseter, the temporalis, the medial pterygoid & The lateral pterygoid. Unlike most of the other facial muscles, which are innervated by the facial nerve, the muscles of mastication are all innervated by the trigeminal nerve. More specifically, they are innervated by the mandibular branch, or V₃. This is a testament to their shared embryological origin from the first branchial arch. In humans, the mandible, or lower jaw, is connected to the temporal bone of the skull via the temporomandibular joint, an extremely complex joint which permits movement in all planes. The muscles of mastication originate on the skull and insert into the mandible, thereby allowing for jaw movements during contraction. The mandible is the only bone that moves during mastication and other activities, such as talking. While these four muscles are the primary participants in mastication, other muscles are usually if not always helping the process, such as those of the tongue and the cheeks.



Abstract -Anat -07

Muscles of Mastication and

Cleft Palate

Dhivya Lakshmi.M & Bhavani.K,

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

Cleft palate (palatoschisis), which can also occur together as cleft lip and cleft palate, are variations of a type of clefting congenital deformity caused by abnormal facial development during gestation. A cleft is a fissure or opening—a gap. Clefts can also affect other parts of the face, such as the eyes, ears, nose, cheeks, and forehead. In 1976, Paul Tessier described fifteen lines of cleft. Most of these craniofacial clefts are even rarer and are frequently described as Tessier clefts using the numerical locator devised by Tessier. A cleft palate can be successfully treated with surgery, especially so if conducted soon after birth or in early childhood. Cleft palate is a condition in which the two plates of the skull that form the hard palate are not completely joined. Cleft palate occurs in about one in 700 live births worldwide. Palate cleft can occur as complete or incomplete. When cleft palate occurs, the uvula is usually split. It occurs due to the failure of fusion of the lateral palatine processes, the nasal septum, and/or the median palatine processes. Genetic factors contributing to cleft lip and cleft palate formation have been identified for some syndromic cases, but knowledge about genetic factors that contribute to the more common isolated cases of cleft lip/palate is still patchy. Cleft palate can also be corrected by surgery, usually performed between 6 and 12 months.



Abstract -Anat -08

Treacher Collin Syndrome

Janani Nandakumar & Divya.R

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

Treacher Collins syndrome (TCS), also known as Treacher Collins–Franceschetti syndrome, or mandibulofacial dysostosis is a rare autosomal dominant congenital disorder characterized by craniofacial deformities, such as absent cheekbones. Treacher Collins syndrome is found in about 1 in 50,000 births. The typical physical features include downward slanting eyes, micrognathia (a small lower jaw), conductive hearing loss, underdeveloped zygoma, drooping part of the lateral lower eyelids, and malformed or absent ears. Mutations in the TCOF1, POLR1C, or POLR1D gene can cause Treacher Collins syndrome. The presentation of symptoms in people with Treacher Collins Syndrome varies. Some individuals may be so mildly affected that they remain undiagnosed; others can have severe facial involvement and life-threatening airway compromise. Most of the features of TCS are bilateral and are already recognizable at birth. The most life threatening problem of individuals with TCS is a constricted airway, since this can give problems with breathing. Surgery to restore a normal structure of the face is normally performed at defined ages, depending on the development state.



Abstract -Anat -09

Cardiac Pain in Left Lower Jaw

Mahalakshmi.S & Narmatha Dvi.S

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

Cardiac pain is difficult because the brain does not identify cardiac pain with the same accuracy. It is more common for heart-related discomfort to affect the lower jaw than the upper jaw. It cannot be emphasized as it does when pain of other body areas are involved. Sometimes heart pain can radiate to the jaw and teeth enough that a heart attack can have symptoms other than chest pain, and these symptoms should be checked immediately. Pain in the upper teeth also can indicate other conditions, such as a sinus infection. It's important to get evaluated by your doctor to know the cause of your symptoms. This is caused by misalignment of the teeth, or by manipulation of the jaw in an abnormal fashion. Jaw pain has been shown to be an early symptom of a heart attack. When a heart attack is going to occur, a person may notice a dull, throbbing pain on the lower left of the jaw. The pain may radiate throughout the jaw, moving to different places, and it may also get more and less painful over time.



Abstract -Anat -10

Sagittal section of head and neck

Senthurja T & Nisha G

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

Head and neck anatomy focuses on the structures of the head and neck of the human body, including the brain, bones, muscles, blood vessels, nerves, glands, nose, mouth, teeth, tongue, and throat. It is an area frequently studied in depth by surgeons, dentists, dental technicians, and speech language pathologists. The head is positioned upon the superior portion of the vertebral column, attaching the skull upon C-1 (the first cervical vertebra known as the atlas). The skeletal section of the head and neck forms the superior segment of the axial skeleton and comprises skull, hyoid bone, auditory ossicles, and cervical spine. The skull can be further subdivided into: (a) cranium (8 bones: frontal, 2-parietal, occipital, 2-temporal, sphenoid, ethmoid), and (b) facial bones (14 bones: 2-zygomatic, 2-maxillary, 2-palatine, 2-nasal, 2-lacrimal, vomer, 2-inferior conchae, mandible). As the fetus develops, the facial bones usually form into pairs, and then fuse together. As the cranium fuses, sutures are formed that resemble stitching between bone plates. In a newborn, the junction of the parietal bones with the frontal and occipital bones, form the anterior (front) and posterior (back) fontanelle, or soft spots. The separation of the cranial bone plates at time of birth facilitate passage of the head of the fetus through the mother's birth canal, or pelvic girdle. The parietal bones, and occipital bone can overlap each other in the birth canal, and form the unusual looking "cone head" appearance in a newborn when delivered in a natural, or vaginal, delivery. The occipital bone articulates with the atlas near the foramen magnum. The atlas articulates with the occipital condyle superiorly and the axis inferiorly. The spinal cord passes through the foramen magnum providing continuity for the central nervous system (CNS). Articulation of the neck includes: flexion, extension, (nodding yes), and rotation (shaking head no)



Abstract -Anat -11

Dangerous Area of the Face

Zainab Nahdhiya Mariyam.S, Muthu Rizwana S.N

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

The danger area of the face consists of the area from the corners of the mouth to the bridge of the nose, including the nose and maxilla. Due to the special nature of the blood supply to the human nose and surrounding area, it is possible (although very rare) for retrograde infections from the nasal area to spread to the brain. This is possible because of venous communication (via the ophthalmic veins) between the facial vein and the cavernous sinus. The cavernous sinus lies within the cranial cavity, between layers of the meninges and is a major conduit of venous drainage from the brain. It is a common misconception that the veins of the head do not contain one-way valves like other veins of the circulatory system. In fact, it is not the absence of venous valves but the existence of communications between the facial vein and cavernous sinus and the direction of blood flow that is important in the spread of infection from the face. Most people, but not all, have valves in the veins of the face. Failure of CN III will result in loss of function of the following muscles: medial rectus, superior rectus, inferior rectus, as well as muscles that are responsible for opening the eyelid: levator palpebrae superioris muscle and the superior tarsal muscle. CN III damage also results in loss of parasympathetic innervation of the eye.



Abstract -Anat -12

Danger Space

Gnanika.C & Keerthana.S

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai – 600077*

The danger space is a region of the neck. The danger space is a potential space located behind the true retropharyngeal space, which connects the deep cervical spaces to the mediastinum. It is bounded superiorly by the skull base, anteriorly by the alar fascia and posteriorly by the prevertebral fascia. It comes to an end at the level of the diaphragm. The retropharyngeal space is found anterior to the danger space, or danger zone, between the buccopharyngeal fascia and alar fascia. There exists a midline raphe in this space so some infections of this space appear unilateral. It was first characterized in 1938. It gets its common name from the risk that an infection in this space can spread directly to the thorax, it is sometimes also referred to as the Alar space. It is a median space without a midline raphe and hence infection can spread easily to either side. In healthy patients, it is indistinguishable from the retropharyngeal space. It is only visible when distended by fluid or pus, below the level of T1-T6, since the retropharyngeal space variably ends at this level. The sympathetic trunk courses through this space. Infectious infiltration from the retropharyngeal, parapharyngeal, or prevertebral spaces are the primary routes to the danger space.



Abstract -Anat -13

Facial Asymmetry

Ansu Chackochan & Sonu Elsa john

*Saveetha Dental College & Hospitals
Saveetha University, Chennai – 600077*

Facial asymmetry is common in humans. Significant facial asymmetry is associated with functional as well as esthetic problems. The etiology includes congenital disorders, acquired diseases, and traumatic and developmental deformities. The causes of many cases of developmental facial asymmetry are indistinct. Assessment of facial asymmetry consists of a patient history, physical examination, and medical imaging. Medical imaging is helpful for objective diagnosis and measurement of the asymmetry, as well as for treatment planning. Components of soft tissue, dental and skeletal differences contributing to facial asymmetry are evaluated. Frequently dental malocclusion, canting of the occlusal level and midline shift are found. Management of facial asymmetry first aims at correcting the underlying disorder. Orthognathic surgery is performed for the treatment of facial asymmetry combined with dental occlusal problems. A symmetrical facial midline, harmonious facial profile and dental occlusion are obtained from treatment. Additional surgical procedures may be required to increase or reduce the volume of skeletal and soft tissue components on both sides to achieve better symmetry.



Abstract -Anat -14

Waldyers Ring

Savitha.G & Kowsalya.K

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai - 600077*

Waldeyer's ring is also referred as Waldeyer's Pirogov tonsillar ring or pharyngeal lymphoid ring. In anatomy, Waldeyer's ring refers to lymphoid tissue ring that are present in pharynx and at the back of oral cavity. Waldeyer's ring was term introduced and described by a German anatomist named Heinrich Wilhelm Gottfried von Waldeyer Hartz. The lymphoid tissue of Waldeyer's ring is located at the gateway of the respiratory and alimentary tract and belongs to the mucosa-associated lymphoid tissue (MALT). As tonsils are the first site of encounter with inhaled and ingested micro-organisms, they are considered the first line of defense against exogenous aggressors. The generation of B cells in the germinal centers of the tonsil is one of the most essential tonsillar functions. Waldeyer's tonsillar ring (also pharyngeal lymphoid ring or Waldeyer's lymphatic ring) is an anatomical term collectively describing the annular arrangement of lymphoid tissue in the pharynx. Waldeyer's ring circumscribes the naso- and oropharynx, with some of its tonsillar tissue located above and some below the soft palate (and to the back of the oral cavity). Waldeyer's ring was named after the nineteenth century German anatomist Heinrich Wilhelm Gottfried von Waldeyer-Hartz. The ring consists of the (from superior to inferior): 1 pharyngeal tonsils (or nasopharyngeal tonsil(s), due to the location; also known as 'adenoid(s)' when inflamed/swollen. 2 tubal tonsil (bilaterally, where each Eustachian tube opens into the nasopharynx). 2 palatine tonsils (commonly called "the tonsils" in the vernacular, less commonly termed "faucial tonsils"; located in the oropharynx; also see tonsillitis and tonsillectomy) 1 lingual tonsils (on the posterior tongue). There also normally is a good amount of mucosa-associated lymphoid tissue (MALT) present between all these tonsils (intertonsillar) around the ring, and more of this lymphoid tissue can variably be found more or less throughout at least the naso- and oropharynx. The palatine tonsils, nasopharyngeal tonsil (adenoid) and lingual tonsil constitute the major part of Waldeyer's ring or nasal-associated lymphoid tissue (NALT), with the tubal tonsils and lateral pharyngeal bands as less prominent components. The lymphoid tissue of Waldeyer's ring is located at the gateway of the respiratory and alimentary tract and belongs to the mucosa-associated lymphoid tissue (MALT). As tonsils are the first site of encounter with inhaled and ingested micro-organisms, they are considered the first line of defense against exogenous aggressors. The generation of B cells in the germinal centers of the tonsil is one of the most essential tonsillar functions. This manuscript aims to review the anatomy and current knowledge on the immunologic function of the Waldeyer's ring.



Abstract -Anat -15

Meninges And Dural Venous Sinus

Tharangini .R & Shruti.I

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai - 600077*

The cranial meninges are coverings of the brain that lie immediately internal to the cranium. The meninges protect the brain; form the supporting framework for arteries, veins, and venous sinuses; and enclose a fluid-filled cavity, the subarachnoid space. The meninges are composed of three membranous connective tissue layers: Dura mater (dura), Arachnoid mater and Pia mater (pia): delicate internal vascular layer. The arachnoid and pia are continuous membranes that make up the leptomeninges. The arachnoid is separated from the pia by the subarachnoid space, which contains cerebrospinal fluid (CSF). This is a clear liquid similar in constitution to blood; it provides nutrients but has less protein and a different ion concentration. CSF is formed predominantly by the choroid plexuses within the four ventricles of the brain. CSF leaves the ventricular system of the brain and enters the subarachnoid space, where it cushions and nourishes the brain. The dural venous sinuses are endothelial-lined spaces between the periosteal and meningeal layers of the dura. They form where dural infoldings attach. Large veins from the surface of the brain and from the diploë empty into these sinuses, and all blood from the brain and from the diploë ultimately drains through them into the internal jugular veins (IJVs).



Abstract -Anat -16

Facial Anomalies

Buvanyasankari Malaiman & Rajeswari Ramah.R,

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai - 600077*

Facial anomalies are a diverse group of deformities in the growth of the head and facial bones. Anomaly is a medical term meaning "irregularity" or "different from normal." These abnormalities are congenital (present at birth) and there are numerous variations--some are mild and some are severe and require surgery. Most medical professionals agree that there is no single factor that causes these types of abnormalities. Instead, there are many factors that may contribute to their development, including the Combination of genes, Environmental, Folic acid deficiency etc. Some of the most common types of craniofacial anomalies include Cleft lip and/or cleft palate, Craniosynostosis, Hemifacial microsomia, Vascular malformation, Hemangioma, Deformational (or positional) plagiocephaly. Congenital anomalies (CA) are a major cause of infant mortality and childhood morbidity, affecting 2-3% of all babies. Approximately 1% of these newborns have syndromes or multiple anomalies; facial anomalies are often a component part. Syndromes are composed of multiple malformations thought to be etiologically and/or pathogenetically related.



BIO CHEMISTRY (Oral Presentations)

Abstract -Bio -01

Saliva as Diagnostic tool

Jothika Mohan

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

The most commonly used laboratory diagnostic procedures involve the analyses of the cellular and chemical constituents of blood. Other biologic fluids are utilized for the diagnosis of disease, and saliva offers some distinctive advantages. Whole saliva can be collected non-invasively, and by individuals with limited training. No special equipment is needed for collection of the fluid. Diagnosis of disease *via* the analysis of saliva is potentially valuable for children and older adults, since collection of the fluid is associated with fewer compliance problems as compared with the collection of blood. Further, analysis of saliva may provide a cost-effective approach for the screening of large populations. Saliva can be considered as gland-specific saliva and whole saliva. Gland-specific saliva can be collected directly from individual salivary glands: parotid, submandibular, sublingual, and minor salivary glands. Secretions from both the submandibular and sublingual salivary glands enter the oral cavity through Wharton's duct, and thus the separate collection of saliva from each of these two glands is difficult (Navazesh, 1993). The collection and evaluation of the secretions from the individual salivary glands are primarily useful for the detection of gland-specific pathology, *i.e.*, infection and obstruction



Abstract -Bio -02

Xeroderma Pigmentosa

Rowena Anna Mathew

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

Xeroderma pigmentosum, which is commonly known as XP, is an inherited condition characterized by an extreme sensitivity to ultraviolet (UV) rays from sunlight. This condition mostly affects the eyes and areas of skin exposed to the sun. Some affected individuals also have problems involving the nervous system. The signs of xeroderma pigmentosum usually appear in infancy or early childhood. Many affected children develop a severe sunburn after spending just a few minutes in the sun. The sunburn causes redness and blistering that can last for weeks. Other affected children do not get sunburned with minimal sun exposure, but instead tan normally. By age 2, almost all children with xeroderma pigmentosum develop freckling of the skin in sun-exposed areas (such as the face, arms, and lips); this type of freckling rarely occurs in young children without the disorder. In affected individuals, exposure to sunlight often causes dry skin (xeroderma) and changes in skin coloring (pigmentation). This combination of features gives the condition its name, xeroderma pigmentosum. People with xeroderma pigmentosum have a greatly increased risk of developing skin cancer. Without sun protection, about half of children with this condition develop their first skin cancer by age 10. Most people with xeroderma pigmentosum develop multiple skin cancers during their lifetime. These cancers occur most often on the face, lips, and eyelids. Cancer can also develop on the scalp, in the eyes, and on the tip of the tongue. Studies suggest that people with xeroderma pigmentosum may also have an increased risk of other types of cancer, including brain tumors. Additionally, affected individuals who smoke cigarettes have a significantly increased risk of lung cancer. The eyes of people with xeroderma pigmentosum may be painfully sensitive to UV rays from the sun. If the eyes are not protected from the sun, they may become bloodshot and irritated, and the clear front covering of the eyes (the cornea) may become cloudy. In some people, the eyelashes fall out and the eyelids may be thin and turn abnormally inward or outward. In addition to an increased risk of eye cancer, xeroderma pigmentosum is associated with noncancerous growths on the eye. Many of these eye abnormalities can impair vision. About 30 percent of people with xeroderma pigmentosum develop progressive neurological abnormalities in addition to problems involving the skin and eyes. These abnormalities can include hearing loss, poor coordination, difficulty walking, movement problems, loss of intellectual function, difficulty swallowing and talking, and seizures. When these neurological problems occur, they tend to worsen with time.



Abstract -Bio -03

Insulin Resistance In Type II Diabetes Mellitus

B.Pujitha

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

Diabetes mellitus type 2 (formerly noninsulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes) is a metabolic disorder that is characterized by high blood sugar in the context of insulin resistance and relative lack of insulin. This is in contrast to diabetes mellitus type 1, in which there is an absolute lack of insulin due to breakdown of islet cells in the pancreas.¹ The classic symptoms are excess thirst, frequent urination, and constant hunger. Type 2 diabetes makes up about 90% of cases of diabetes with the other 10% due primarily to diabetes mellitus type 1 and gestational diabetes. Obesity is thought to be the primary cause of type 2 diabetes in people who are genetically predisposed to the disease. Type 2 diabetes is initially managed by increasing exercise and dietary changes. If blood sugar levels are not adequately lowered by these measures, medications such as metformin or insulin may be needed. In those on insulin, there is typically the requirement to routinely check blood sugar levels. Rates of type 2 diabetes have increased markedly since 1960 in parallel with obesity: As of 2010 there are approximately 285 million people with the disease compared to around 30 million in 1985. Long-term complications from high blood sugar can include heart disease, strokes, diabetic retinopathy where eyesight is affected, kidney failure which may require dialysis, and poor blood flow in the limbs leading to amputations. The acute complication of ketoacidosis, a feature of type 1 diabetes, is uncommon. However, nonketotic hyperosmolar coma may occur. Type 2 diabetes is typically a chronic disease associated with a ten-year-shorter life expectancy. This is partly due to a number of complications with which it is associated, including: two to four times the risk of cardiovascular disease, including ischemic heart disease and stroke; a 20-fold increase in lower limb amputations, and increased rates of hospitalizations. In the developed world, and increasingly elsewhere, type 2 diabetes is the largest cause of nontraumatic blindness and kidney failure. It has also been associated with an increased risk of cognitive dysfunction and dementia through disease processes such as Alzheimer's disease and vascular dementia. Other complications include: acanthosis nigricans, sexual dysfunction, and frequent infection.



Abstract -Bio -04

DNA fingerprinting

Pavithra Thirugnanam

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

DNA profiling (also called DNA testing, DNA typing, or genetic fingerprinting) is a technique employed by forensic scientists to assist in the identification of individuals by their respective DNA profiles. DNA profiles are encrypted sets of numbers that reflect a person's DNA makeup, which can also be used as the person's identifier. DNA profiling should not be confused with full genome sequencing. It is used in, for example, parental testing and criminal investigation. DNA fingerprinting is a way of identifying a specific individual, rather than simply identifying a species or some particular trait. It is also known as genetic fingerprinting or DNA profiling. As a technology, it has been around since at least 1985, when it was announced by its inventor, Sir Alec Jeffreys. DNA fingerprinting is currently used both for identifying paternity or maternity and for identifying criminals or victims. There is discussion of using DNA fingerprinting as a sort of personal identifier as well, although the viability of this is debatable. The vast majority of a human's DNA will match exactly that of any other human, making distinguishing between two people rather difficult. DNA fingerprinting uses a specific type of DNA sequence, known as a microsatellite, to make identification much easier. Microsatellites are short pieces of DNA which repeat many times in a given person's DNA. In a given area, microsatellites tend to be highly variable, making them ideal for DNA fingerprinting. By comparing a number of microsatellites in a given area, one can identify a person relatively easily. The sections of DNA used in DNA fingerprinting, although highly variable, are passed down from parents to their children. Although not all of the sections will necessarily be passed on, no child has pairs that their parents do not have. This means that by comparing large groups of these sections, paternity, maternity, or even both, may be determined. DNA fingerprinting has a high success rate and a very low false-positive rate, making it an extremely popular form of paternity and maternity verification. In forensics, DNA fingerprinting is very attractive because it doesn't require actual fingerprints, which may or may not be left behind, and may or may not be obscured. Because all of the DNA sections are contained in every cell, any piece of a person's body, from a strand of hair to a skin follicle to a drop of blood, may be used to identify them using DNA fingerprinting. This is useful in the case of identifying a criminal, because even a drop of blood or skin left at the crime scene may be enough to establish innocence or guilt, and it is virtually impossible to remove all physical trace of one's presence.



BIOCHEMISTRY (Poster Presentations)

Abstract -Bio -01

Cell cycle

Batna Keerthi and Arunsree.V.M

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

The cell cycle, or cell-division cycle, is the series of events that take place in a cell leading to its division and duplication (replication) that produces two daughter cells. In cells without a nucleus (prokaryotic), the cell cycle occurs via a process termed binary fission. In cells with a nucleus (eukaryotes), the cell cycle can be divided in three periods: interphase—during which the cell grows, accumulating nutrients needed for mitosis preparing it for cell division and duplicating its DNA and the mitotic (M) phase, during which the cell splits itself into two distinct cells, often called "daughter cells" and the final phase, cytokinesis, where the new cell is completely divided. The cell-division cycle is a vital process by which a single-celled fertilized egg develops into a mature organism, as well as the process by which hair, skin, blood cells, renewed. The most basic function of the cell cycle is to duplicate accurately the vast amount of DNA in the chromosomes and then segregate the copies precisely into two genetically identical daughter cells. These processes define the two major phases of the cell cycle. DNA duplication occurs during S phase (S for synthesis), which requires 10–12 hours and occupies about half of the cell-cycle time in a typical mammalian cell. After S phase, chromosome segregation and cell division occur in M phase (M for mitosis), which requires much less time (less than an hour in a mammalian cell). M phase involves a series of dramatic events that begin with nuclear division, or mitosis. As discussed in detail in Chapter 18, mitosis begins with chromosome condensation: the duplicated DNA strands, packaged into elongated chromosomes, condense into the much more compact chromosomes required for their segregation. The nuclear envelope then breaks down, and the replicated chromosomes, each consisting of a pair of sister chromatids, become attached to the microtubules of the mitotic spindle. As mitosis proceeds, the cell pauses briefly in a state called metaphase, when the chromosomes are aligned at the equator of the mitotic spindle, poised for segregation.



Abstract -Bio -02

Multiple Myeloma

Sharon Elizabeth and V.Manjusha

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

Multiple myeloma is a clonal plasma cell malignancy that accounts for slightly more than 10% of all hematologic cancers. Multiple myeloma is a disease caused by plasmacytosis, paraprotein production, bone lesions, hypercalcemia, susceptibility to infections, and renal impairment. The pathophysiologic phenomena of the clinical features include suppression of humoral- and cell-mediated immunity, elevation of IL-6, abnormalities of the bone marrow microenvironment, and increased osteoclastic activity. Various predictors of prognosis include albumin, β 2-microglobulin, and chromosomal karyotype. With modern, intensive therapy including autologous hematopoietic stem cell transplantation, the median survival is approximately 5 yr. The disease is malignant, incurable and eventually relapses; requiring salvage therapy. The development of newer agents such as thalidomide, bortezomib, and lenalidomide—drugs that interfere with several of the complex pathophysiologic steps—has improved the outlook of relapsed disease significantly. Current studies are focused on these use of these novel agents earlier in the course of therapy, development of newer targeted therapies, and the use of gene expression profiling to individualize therapy. The evolution of drug therapy and stem-cell transplantation for the treatment of myeloma, as well as the development of new agents, is of great significance. Multiple myeloma's cause is unknown. Certain risk factors slightly increase a person's chances of developing multiple myeloma. The risk factors are: Being over age 65, Being male, Being African-American and Having a family member affected by multiple myeloma. A significant number of people with certain conditions will develop multiple myeloma. These conditions are Monoclonal gammopathy of uncertain significance (MGUS) Solitary plasmacytoma. Rather than being causes of multiple myeloma, these conditions may be early forms of multiple myeloma. Early on, multiple myeloma may cause no symptoms. As multiple myeloma progresses, plasma cells accumulate in the bones, causing these symptoms: Bone pain due to lytic bone diseases, Weakness and fatigue due to anemia, Weight loss, Confusion, excessive thirst, constipation due to hypercalcemia, Kidney problems and Infections due to non-functioning immunoglobulins.



Abstract -Bio -03

Hair And Nail Disorders

Anisha D JeyaKumar and Benita

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

Hair disorders include a variety of problems, such as dermatitis, psoriasis, infections, hair loss, and excessive hair growth. Just as there are numerous disorders, there are a variety of factors that create or allow for hair disorders. Genetics, hormonal shifts, illnesses, unhealthy dieting habits and certain drugs may all affect the regular growth of your hair. Nail disorders, such as fungi, bacterial infections and irregular splitting, color or texture are relatively frequent. This is primarily because your nails are constantly exposed. In addition, they tend to undergo quite a lot of abuse. Tight shoes, bad posture, improper nail filing techniques, poor hygiene, genetics and allergens can all encourage nail problems. Minor problems like curving nails can have greater consequences if, for example, they lead to infections.



Abstract -Bio -04

Tobacco Abuse

R.Subiksha And Kritika Rajan

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

The health effects of smoking are the circumstances, mechanisms, and factors of tobacco consumption on human health. Epidemiological research has been focused primarily on cigarette tobacco smoking, which has been studied more extensively than any other form of consumption. Smoke contains several carcinogenic pyrolytic products that bind to DNA and cause many genetic mutations. There are more than 45 known or suspected chemical carcinogens in cigarette smoke. Tobacco also contains nicotine, which is a highly addictive psychoactive drug. When tobacco is smoked, nicotine causes physical and psychological dependency. Tobacco use is a significant factor in miscarriages among pregnant smokers, and it contributes to a number of other threats to the health of the fetus such as premature births and low birth weight and increases by 1.4 to 3 times the chance for Sudden Infant Death Syndrome (SIDS) A tobacco addiction can be one of the most difficult addictions to manage, despite the ease and accessibility of treatment options. Many users find that even after nicotine cravings have passed, the tactile pleasure and ritual associated with smoking are factors that can lead to relapse. However, there are several different treatment options for those battling a tobacco addiction: The Patch-A nicotine replacement therapy (NRT), the nicotine patch is a small, bandage-like sticker that the user applies to the arm or back. The patch delivers low levels of nicotine to the body to help wean the body off of the substance gradually. Nicotine Gum-Another form of NRT, nicotine gum can help users who need the oral fixation associated with smoking or chewing. It also delivers small doses of nicotine to help the user manage cravings. Spray or Inhaler-Tobacco addiction can also be managed with nicotine nasal spray or a nicotine inhaler. Medications-Some doctors recommend the use of medication to help with tobacco addictions. Certain antidepressants or antihypertensive drugs might be effective in helping the brain manage cravings.



Abstract -Bio -05

Nano Robots

Meenakshi priyanka and Emily Jennifer

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

Nano-robots are controllable machines at the nano (10⁻⁹) meter or molecular scale that are composed of nano-scale components. With the modern scientific capabilities, it has become possible to attempt the creation of nanorobotic devices and interface them with the macro world for control. There are countless such machines that exist in nature and there is an opportunity to build more of them by mimicking nature. Even if the field of nanorobotics is fundamentally different than that of macro robots due to the differences in scale and material, there are many similarities in design and control techniques that eventually could be projected and applied. A roadmap towards the progression of this field is proposed and some design concept and philosophies are illustrated. Two types of control mechanisms are given with examples and further hybrid mechanisms are proposed. There are many applications for nanorobotic systems and its biggest impact would be in the area of medicine. A nanorobot is a tiny machine designed to perform a specific task or tasks repeatedly and with precision at nanoscale dimensions, that is, dimensions of a few nanometers (nm) or less, where 1 nm = 10⁻⁹ meter. Nanorobots have potential applications in the assembly and maintenance of sophisticated systems. Nanorobots might function at the atomic or molecular level to build devices, machines, or circuits, a process known as molecular manufacturing. Nanorobots might also produce copies of themselves to replace worn-out units, a process called self-replication. Nanorobots are of special interest to researchers in the medical industry. This has given rise to the field of nanomedicine. It has been suggested that a fleet of nanorobots might serve as antibodies or antiviral agents in patients with compromised immune systems, or in diseases that do not respond to more conventional measures. There are numerous other potential medical applications, including repair of damaged tissue, unblocking of arteries affected by plaques, and perhaps the construction of complete replacement body organs. A major advantage of nanorobots is thought to be their durability. In theory, they can remain operational for years, decades, or centuries. Nanoscale systems can also operate much faster than their larger counterparts because displacements are smaller; this allows mechanical and electrical events to occur in less time at a given speed.



Abstract -Bio -06

Genetic Engineering And Cloning

Priyalakshmi and Shagana

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

Genetic engineering, also called genetic modification, is the direct manipulation of an organism's genome using biotechnology. New DNA may be inserted in the host genome by first isolating and copying the genetic material of interest using molecular cloning methods to generate a DNA sequence, or by synthesizing the DNA, and then inserting this construct into the host organism. Genes may be removed, or "knocked out", using a nuclease. Gene targeting is a different technique that uses homologous recombination to change an endogenous gene, and can be used to delete a gene, remove exons, add a gene, or introduce point mutations. Genetic engineering (GE) is the manipulation of genetic material (ie, DNA or genes) in a cell or an organism in order to produce desired characteristics and to eliminate unwanted ones. GE includes a range of different techniques with many different uses, and can be applied to plants, animals and humans. For example, the genetic modification of food is a form of GE that involves manipulating the cells of plants such as maize, to increase the yields, make it more nutritious and to make it drought- and disease-resistant. However, the most contentious type of GE is definitely related to its applications in humans. GE in humans has opened up a Pandora's box of possibilities as it can be used for both the miraculous and the sinister. The cloning of Dolly the sheep in 1996 was a very important event. Until then, the cloning of a human was only possible in theory. Recent films and TV programmes such as *Gattaca*, *Mutant X*, *Dark Angel* and books such as *Brave New World* all focus on possible consequences of this technology. Probably, exactly the same as you. But, despite all the movies and TV programmes that have explored the possibility of exact clones, it is highly unlikely that a clone of you would look exactly the same and would certainly not act exactly the same. A clone is not completely genetically identical, as there are small differences in the genetic make-up just as there are with identical twins. Despite the fact that identical twins come from the same egg, after a while one begins to notice the differences between them in order to tell them apart.



Abstract -Bio -07

Insulin

Swetha Sridharan and Sowmiya.A

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

Insulin is the internal secretion of the pancreas formed by groups of cells called the islets of Langerhans. It is the hormone needed to enable glucose to enter the cells and provide energy. Insulin is also important in keeping blood glucose levels within the acceptable limits. Insulin is injected into the body by people with type 1 diabetes in whom the cells that produce insulin have been destroyed. This is the most common form of diabetes in children and young adults, and they depend on insulin for survival. Insulin may also be used by people with type 2 diabetes, where the body needs more insulin than it can produce. Since the landmark discovery of insulin by Frederick Banting and Charles Best in 1922, huge steps have been made in research and development regarding its preparation. Early preparations of insulin were purified quite crudely from pancreas tissue extracted from animals - either pigs or cattle. Today, insulin is mostly made biosynthetically by recombinant DNA technology or 'genetic engineering'. *Animal insulin*-Until the 1980s, all insulin was extracted from the pancreases of cattle and pigs. The sequence of amino acids (the building blocks that make up the protein) is slightly different in insulins from the different species. Compared to human insulin, porcine (pork) insulin has one different amino acid and bovine (beef) insulin three different amino acids. These very slight differences do not affect the way in which the insulin works inside the human body. Pork insulin is structurally closer to human insulin than is beef insulin. These days, animal insulins are made from highly purified pancreas extracts and are marketed as 'natural' insulins. *Human insulin*-Human insulin is not prepared from human pancreas tissue. Rather than being extracted from human pancreases, commercially available human insulin is manufactured through recombinant DNA technology, in which the gene for making human insulin is transferred into simple cells such as bacteria or baker's yeast. The insulin made by those cells is identical to insulin made by the human pancreas. Unlike animal insulins, recombinant DNA human insulins can be made in unlimited supply, since they do not depend on the supply of bovine and porcine pancreases.



Abstract Bio -08

Erosion of Tooth Due To Soft Drinks

Vishali Prakash and Vyshali.S

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

Acid erosion, also known as dental erosion, is the irreversible loss of tooth structure due to chemical dissolution by acids not of bacterial origin. Dental erosion is the most common chronic disease of children ages 5–17,^[1] although it is only relatively recently that it has been recognised as a dental health problem. There is generally widespread ignorance of the damaging effects of acid erosion; this is particularly the case with erosion due to fruit juices, because they tend to be seen as healthy. Erosion is found initially in the enamel and, if unchecked, may proceed to the underlying dentin. Acid erosion, also known as dental erosion, is the irreversible loss of tooth structure due to chemical dissolution by acids not of bacterial origin. Dental erosion is the most common chronic disease of children ages 5–17,^[1] although it is only relatively recently that it has been recognised as a dental health problem.^[2] There is generally widespread ignorance of the damaging effects of acid erosion; this is particularly the case with erosion due to fruit juices, because they tend to be seen as healthy.^{[3][4]} Erosion is found initially in the enamel and, if unchecked, may proceed to the underlying dentin. The most common cause of erosion is by acidic foods and drinks. In general, foods and drinks with a pH below 5.0–5.7 have been known to trigger dental erosion effects.^[5] Numerous clinical and laboratory reports link erosion to excessive consumption of drinks. Those thought to pose a risk are soft drinks and fruit drinks, fruit juices such as orange juice (which contain citric acid) and carbonated drinks such as colas (in which the carbonic acid is not the cause of erosion, but citric and phosphoric acid). Additionally, wine has been shown to erode teeth, with the pH of wine as low as 3.0–3.8.^[5] Other possible sources of erosive acids are from exposure to chlorinated swimming pool water, and regurgitation of gastric acids.



Abstract -Bio -09

Chromosomal staining

Lee Pheyling and Chew xiu lin

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

A karyotype is the the number and appearance of chromosomes in the nucleus of a eukaryotic cell. The term is also used for the complete set of chromosomes in a species, or an individual organism. Giemsa banding is a technique used in cytogenetics to produce a visible karyotype by staining condensed chromosomes. It is useful for identifying genetic diseases through the photographic representation of the entire chromosome complement. Before applying stain to the chromosomes, they must first be treated with *trypsin*, which is a digestive fluid found in many animals. The trypsin will start to digest the chromosomes, allowing them to better receive the Giemsa stain. Giemsa stain was discovered by Gustav Giemsa, and is a mixture of methylene blue and the red acidic dye, eosin. Q-banding uses *quinicrine*, which is a mustard type solution. It produces results that are very similar to Giemsa, but has fluorescent qualities. DNA is made up of four base acids that appear in pairs — adenine paired with thymine, and cytosine with guanine. Giemsa stain creates chromosome banding patterns with dark areas rich in adenine and thymine. The light areas are rich with guanine and cytosine. These areas replicate early and are *euchromatic*. Euchromatic is a genetically active area that stains very lightly with dye treatments. Reverse-banding, or R-banding, produces chromosome banding patterns that are the opposite of G-banding. The darker areas are rich with guanine and cytosine. It also produces euchromatic parts with high concentrations of adenine and thymine. With C-banding, the Giemsa stain is used to study the *constitutive heterochromatin* and the centromere of a chromosome. Constitutive heterochromatins are areas near the center of the chromosome that contain highly condensed DNA that tend to be transcriptionally silent. The centromere is the region at the very center of the chromosome. T-banding allows scientists to study the telomeres of a chromosome. The telomeres are the caps that are on the each of the chromosomes. They contain repetitive DNA and are meant to prevent any deterioration from occurring. Once the chromosomes are stained with Giemsa, researchers can clearly see the alternating dark and light chromosome banding patterns that are produced. By counting the number of bands, the *karyotype* of a cell can be determined.



Abstract -Bio -10

Fat-soluble vitamin deficiency

Clindy Ling Huoy Tien and Lim Yee Ping

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

Fat-soluble vitamin deficiency is known to result in various complications that may be prevented if the problem is recognized and managed appropriately. In infants and children with chronic cholestasis, replacement therapy of the fat-soluble vitamins, vitamins A, D, E, and K, may prove extremely difficult because low concentrations of intraluminal bile acids lead to malabsorption of these compounds and other fat-soluble substances. Recent progress in the use of a water-soluble form of vitamin E, d-alpha-tocopheryl polyethylene glycol-1000 succinate, has enabled correction of vitamin E-deficiency states in these patients. It has also allowed for the admixture and coadministration of other fat-soluble vitamins and compounds in d-alpha-tocopheryl polyethylene glycol-1000 succinate to enhance their absorption. For managing vitamin K deficiency, similar success has been achieved using a vitamin K compound solubilized in glycocholate and lecithin. Vitamin A deficiency has been implicated in the higher incidence of childhood mortality and morbidity in Third World countries. Increased risk of childhood cancer has recently been associated with intramuscular injection of vitamin K to newborns. Finally, it is worth noting that among the pediatric population, exclusively breastfed infants, in general, are at risk for hypovitaminosis D, and at even greater risk in the absence of adequate exposure to sunlight or when the maternal diet is not sufficient to provide for vitamin D requirements. Because they dissolve in fat, vitamins A, D, E, and K are called *fat-soluble* vitamins. They are absorbed from the small intestines, along with dietary fat, which is why fat malabsorption resulting from various diseases (e.g., cystic fibrosis, ulcerative colitis, Crohn's disease) is associated with poor absorption of these vitamins. Fat-soluble vitamins are primarily stored in the liver and adipose tissues. With the exception of vitamin K, fat-soluble vitamins are generally excreted more slowly than water-soluble vitamins, and vitamins A and D can accumulate and cause toxic effects in the body.



Abstract -Bio -11

Fluoride in dentistry

Ivy Ooi En Ru

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

Despite great improvements in the oral health of populations across the world, problems still persist particularly among poor and disadvantaged groups in both developed and developing countries. According to the WHO Report 2003, dental caries remains a major public health problems in most industrialized countries, affecting 60-90% of schoolchildren and the vast majority of adults. Although it appears that dental caries is less common and less severe in developing countries of Africa, it is anticipated that the incidence of caries will increase in several countries of that continent, due to changing living conditions and dietary habits, and inadequate exposure to fluorides. Research on the oral health effects of fluoride started around 100 years ago; the focus has been on the link between water and fluorides and dental caries and fluorosis ; topical fluoride applications, fluoride toothpastes, and salt and milk fluoridation. Fluoride helps prevent cavities in two different ways: Fluoride concentrates in the growing bones and developing teeth of children, helping to harden the enamel on baby and adult teeth before they emerge. Fluoride helps to harden the enamel on adult teeth that have already emerged. Fluoride works during the demineralization and remineralization processes that naturally occur in your mouth. After you eat, your saliva contains acids that cause demineralization a dissolving of the calcium and phosphorous under the tooth's surface. At other times when your saliva is less acidic it does just the opposite, replenishing the calcium and phosphorous that keep your teeth hard. This process is called remineralization. When fluoride is present during remineralization, the minerals deposited are harder than they would otherwise be, helping to strengthen your teeth and prevent dissolution during the next demineralization phase.



Abstract -Bio -12

Test tube teeth

Misrath Banu and Hasmath Afreen

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

More complicated than they look, teeth are actually tiny organs. If tissue engineers can manufacture living replacement teeth, they would blaze a trail for engineering larger organs while leading dentistry into the age of regenerative medicine. We take them for granted until they are gone or require major repairs. And then the options are grim: do without lost teeth or replace them with inert prosthetic versions. In the Western world, an estimated 85 percent of adults have had some form of dental treatment. Seven percent have lost one or more teeth by age 17. After age 50, an average of 12 teeth stand to have been lost. In theory, a natural tooth made from the patient's own tissue and grown in its intended location would make the best possible replacement, although such bioengineered teeth have for many years been little more than a dream. Recently, however, progress in understanding how teeth first develop has combined with advances in stem cell biology and tissue engineering technology to bring us close to the realization of biological replacement teeth.



Abstract -Bio -13

JAUNDICE

Kunthavi Priya and Aysha Humairah

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

Jaundice is one of the most common conditions needing medical attention in newborn babies. Jaundice refers to the yellow colouration of the skin and the sclerae (whites of the eyes) caused by the accumulation of bilirubin in the skin and mucous membranes. Jaundice is caused by a raised level of bilirubin in the body, a condition known as hyperbilirubinaemia. Approximately 60% of term and 80% of preterm babies develop jaundice in the first week of life, and about 10% of breastfed babies are still jaundiced at 1 month. For most babies, jaundice is not an indication of an underlying disease, and this early jaundice (termed 'physiological jaundice') is generally harmless. Breastfed babies are more likely than bottle-fed babies to develop physiological jaundice within the first week of life. Prolonged jaundice – that is, jaundice persisting beyond the first 14 days – is also seen more commonly in these babies. Prolonged jaundice is generally harmless, but can be an indication of serious liver disease. Jaundice has many possible causes, including blood group incompatibility (most commonly Rhesus or ABO incompatibility), other causes of haemolysis (breaking down of red blood cells), sepsis (infection), liver disease, bruising and metabolic disorders. Deficiency of a particular enzyme, glucose-6-phosphate-dehydrogenase, can cause severe neonatal jaundice. Glucose-6-phosphate-dehydrogenase deficiency is more common in certain ethnic groups and runs in families. Bilirubin is mainly produced from the breakdown of red blood cells. Red cell breakdown produces unconjugated (or 'indirect') bilirubin, which circulates mostly bound to albumin although some is 'free' and hence able to enter the brain. Unconjugated bilirubin is metabolised in the liver to produce conjugated (or 'direct') bilirubin which then passes into the gut and is largely excreted in stool. The terms direct and indirect refer to the way the laboratory tests measure the different forms. Some tests measure total bilirubin and do not distinguish between the two forms. In young babies, unconjugated bilirubin can penetrate the membrane that lies between the brain and the blood (the blood–brain barrier). Unconjugated bilirubin is potentially toxic to neural tissue (brain and spinal cord). Entry of unconjugated bilirubin into the brain can cause both short-term and long-term neurological dysfunction (bilirubin encephalopathy). The term kernicterus is used to denote the clinical features of acute or chronic bilirubin encephalopathy, as well as the yellow staining in the brain associated with the former. The risk of kernicterus is increased in babies with extremely high bilirubin levels. Kernicterus is also known to occur at lower levels of bilirubin in term babies who have risk factors, and in preterm babies.



Abstract -Bio -14

Thalassemia

Monisha .R and kumara Vandana

*Saveetha Dental College & Hospitals,
Saveetha University, Chennai -600077*

Thalassemia is the name of a group of genetic blood disorders characterized by anemia due to enhanced red blood cell destruction. Hemoglobin, the oxygen-carrying component of the red blood cells consists of two different proteins, an alpha and a beta. If the body doesn't produce enough of either of these two proteins, the red blood cells become defective and cannot carry sufficient oxygen. The resulting anemia is usually severe with several health problems like enlarged spleen, bone deformities, fatigue and requires regular life-long transfusion, therapy and medical supervision. Thalassemias can't be prevented because they're inherited, "inherited" means they are passed on from parents to children. However, these bleeding disorders can be found before birth through prenatal tests. Thalassemia is a common inherited disease in the world. India accounts for 10% of the total world thalassemia population and approximately 1 in 30 in the general population is carrier of the mutated gene and the cases may increase as it is a hereditary disorder, so, it is important to take into consideration about this disorder as it may prove deadly one. And thus the intensity of this disorder can be lowered by diagnosing and taking proper treatments. Effect on RBCs The resulting anemia is usually severe with several health problems like enlarged spleen, bone deformities, fatigue and requires regular life-long transfusion, therapy and medical supervision. Thalassemia is an inherited autosomal recessive blood disease. In thalassemia, the genetic defect results in reduced rate of synthesis of one of the globin chains that make up hemoglobin. Deficient synthesis of hemoglobin occurs in thalassemia, a group of hereditary hemolytic anemias. The RBCs are small, pale & short lived Thalassemia is a quantitative problem of too few globins synthesized, whereas sickle-cell anemia (a hemoglobinopathy) is a qualitative problem of synthesis of an incorrectly functioning globin. Thalassemias usually result in underproduction of normal globin proteins, often through mutations in regulatory genes. Hemoglobinopathies imply structural abnormalities in the globin proteins themselves. The two conditions may overlap, however, since some conditions which cause abnormalities in globin proteins (hemoglobinopathy) also affect their production (thalassemia).



MICROBIOLOGY (Oral Presentation)

Abstract –Micro -01

Japanese B Encephalitis

Amani reddy

*Saveetha Dental College and Hospitals,
Saveetha University, Chennai – 77*

Japanese encephalitis (JE) virus is a single-stranded RNA virus that belongs to the genus *Flavivirus* and is closely related to West Nile and Saint Louis encephalitis viruses. Japanese B Encephalitis is a viral disease transmitted by mosquitoes. Over 50,000 cases are reported to occur each year. The disease is found in over 25 countries throughout the world. These are mainly in South East Asia as can be seen from the following list of endemic countries. The disease is transmitted through the bite of an infected female culex mosquito. In the majority of cases these may occur within rural areas of the endemic countries and especially in regions where pig farming is found. Transmission can occur in urban areas but this is uncommon. Patients with the disease usually present within the first week or two of having been bitten by an infected mosquito. They will usually develop distinct symptoms of a 'flu like illness with muscle pains and headache. Following this initial phase patients frequently present with vomiting and diarrhoea. These early gastrointestinal symptoms are then followed by more severe neurological signs as the virus effects the patients brain tissue. Seizures and paralysis are then seen and the condition carries a mortality rate of between 10% to 40%. In up to 80% of those who survive there may be residual neurological findings. The vaccine is now available in the US following extensive monitoring. Nevertheless, this figure of possible vaccine related reactions makes the vaccine unacceptable for wide spread use in the short term traveller and so it is only recommended for those felt to be at significant risk. This is usually only those who will be living for more than 1 month in the endemic countries mentioned earlier in this leaflet. An exception to this general rule may be for those travellers who will be highly exposed to mosquito bites in rural regions during exploration trips or extensive trekking holidays.



Abstract –Micro -02

Manifestation Of Swine Flu

Dhinapal

*Saveetha Dental College and Hospitals,
Saveetha University, Chennai -77*

Swine influenza is a highly contagious acute respiratory disease of pigs caused by a subtype of influenza A virus. In the spring of 2009, multiple cases of human-to-human transmission caused by a subtype known as H1N1 were documented. The disease has spread rapidly since then, with 254,206 cases having been documented worldwide as of September 7, 2009, and an estimated 2,837 deaths. A level 6 pandemic was raised by the World Health Organization. Patients with swine-origin influenza A virus (S-OIV) infection typically present with fever, cough, sore throat, chills, headache, rhinorrhea, shortness of breath, myalgias arthralgias, fatigue, vomiting, or diarrhea. Most patients have mild illness, but a small percentage of patients have a severe course that may result in respiratory failure and death. Laboratory findings in patients with S-OIV include lymphopenia, elevated serum lactate dehydrogenase level, and increased serum creatine kinase level. Thrombocytopenia has been observed in a small number of cases. The description of the radiologic manifestation of S-OIV has been limited to a few case reports. The reported findings were those of unilateral or bilateral; focal, multifocal, or diffuse; ground-glass opacities consolidation, or interstitial markings. Some cases had a predominant basal or axial distribution. The resemblance of the radiographic appearance of S-OIV with that of severe acute respiratory syndrome (SARS) has been raised. In one report, the radiographs suggested the presence of mediastinal lymphadenopathy. The neurological manifestations of classical H1N1 influenza virus infection have been discussed for a long time, and they can be direct or indirect. Indirect manifestations may have several causes. High fever in children infected with influenza might result in seizure, a severe manifestation in pediatrics. In cases with severe pneumonia and hypoxemia, alteration of consciousness can be expected.



Abstract –Micro -03

Biowarfare

Sangeetha chokalingam

*Saveetha dental college and hospitals,
Saveetha University, Chennai – 77*

Biological warfare (BW)—also known as germ warfare—is the use of biological toxins or infectious agents such as bacteria, viruses, and fungi with intent to kill or incapacitate humans, animals or plants as an act of war. Biological weapons (often termed "bio-weapons", "biological threat agents", or "bio-agents") are living organisms or replicating entities (viruses, which are not universally considered "alive") that reproduce or replicate within their host victims. Entomological (insect) warfare is also considered a type of biological weapon. Biological weapons may be employed in various ways to gain a strategic or tactical advantage over an adversary, either by threats or by actual deployments. Like some of the chemical weapons, biological weapons may also be useful as area denial weapons. These agents may be lethal or non-lethal, and may be targeted against a single individual, a group of people, or even an entire population. They may be developed, acquired, stockpiled or deployed by nation states or by non-national groups. In the latter case, or if a nation-state uses it clandestinely, it may also be considered bioterrorism. Offensive biological warfare, including mass production, stockpiling and use of biological weapons, was outlawed by the 1972 Biological Weapons Convention (BWC). A nation or group that can pose a credible threat of mass casualty has the ability to alter the terms on which other nations or groups interact with it. Biological weapons allow for the potential to create a level of destruction and loss of life far in excess of nuclear, chemical or conventional weapons, relative to their mass and cost of development and storage. Therefore, biological agents may be useful as strategic deterrents in addition to their utility as offensive weapons on the battlefield. As a tactical weapon for military use, a significant problem with a BW attack is that it would take days to be effective, and therefore might not immediately stop an opposing force. Some biological agents (smallpox, pneumonic plague) have the capability of person-to-person transmission via aerosolized respiratory droplets. This feature can be undesirable, as the agent(s) may be transmitted by this mechanism to unintended populations, including neutral or even friendly forces. While containment of BW is less of a concern for certain criminal or terrorist organizations, it remains a significant concern for the military and civilian populations of virtually all nations.



Abstract –Micro -04

Nosocomial Infections

Darshana maria

*Saveetha dental college and hospitals,
Saveetha University, Chennai – 77*

A hospital-acquired infection, also known as a HAI or in medical literature as a nosocomial infection, is an infection whose development is favored by a hospital environment, such as one acquired by a patient during a hospital visit or one developing among hospital staff. Such infections include fungal and bacterial infections and are aggravated by the reduced resistance of individual patients. Nosocomial infections can cause severe pneumonia and infections of the urinary tract, bloodstream and other parts of the body. Many types are difficult to attack with antibiotics, and antibiotic resistance is spreading to Gram-negative bacteria that can infect people outside the hospital. Among the categories of bacteria most known to infect patients are the category MRSA (resistant strain of *S. aureus*), member of Gram-positive bacteria and *Acinetobacter* (*A. baumannii*), which is Gram-negative. While antibiotic drugs to treat diseases caused by Gram-positive MRSA are available, few effective drugs are available for *Acinetobacter*. *Acinetobacter* bacteria are evolving and becoming immune to existing antibiotics, so in many cases, polymyxin-type antibacterials need to be used. Another growing disease, is the drug-resistant, Gram-negative *Klebsiella pneumoniae*. An estimated more than 20% of the *Klebsiella* infections are now resistant to virtually all modern antibiotics, and those supergerms are now spreading worldwide. One-third of nosocomial infections are considered preventable. The CDC estimates 2 million people in the United States are infected annually by hospital-acquired infections, resulting in 20,000 deaths. The most common nosocomial infections are of the urinary tract, surgical site and various pneumonias. Hospitals have sanitation protocols regarding uniforms, equipment sterilization, washing, and other preventive measures. Thorough hand washing and/or use of alcohol rubs by all medical personnel before and after each patient contact is one of the most effective ways to combat nosocomial infections. More careful use of antimicrobial agents, such as antibiotics, is also considered vital. Despite sanitation protocol, patients cannot be entirely isolated from infectious agents. Furthermore, patients are often prescribed antibiotics and other antimicrobial drugs to help treat illness; this may increase the selection pressure for the emergence of resistant strains.



Abstract –Micro -05

Building Better Bone Replacement With Bacteria

S.Priyanka

*Saveetha Dental College and Hospitals,
Saveetha University, Chennai – 77*

Bacteria that manufacture hydroxyapatite (HA) could be used to make stronger, more durable bone implants. Based on the use of Serratia bacteria, the research showed that the bacterial cells stuck tightly to surfaces such as titanium alloy, polypropylene, porous glass and polyurethane foam by forming a biofilm layer containing biopolymers that acted as a strong adhesive. The HA coating then builds up over the surface. For practical use, the HA layer must stick tightly, then the material is dried and heated to destroy the bacteria. A micro-manipulation technique used to measure the force needed to overcome the biogluce adhesion showed that dried biofilm stuck 20-times more tightly than fresh biofilm. When coated with HA the adhesion was several times more again. Slightly roughening the surface made the biogluce much more effective. Currently bone implant materials are made by spraying-on hydroxyapatite. This does not have good mechanical strength and the spraying only reaches visible areas. This biocoating method reaches all the hidden surfaces as the bacteria can "swim" into hidden nooks and crannies. Bacterial HA also has better properties than HA made chemically as the nanocrystals of HA produced by the bacteria are much smaller than HA crystals produced chemically, giving them a high mechanical strength. "The bacteria are destroyed by heating, leaving just the HA stuck to the surface with their own glue - rather akin to a burnt milk-saucepan," said Professor Macaskie, "We need to do more work actually to turn the materials into materials we can use in biomedicine and the environment. Then they need to be tested in real life situations with clinical and environmental trials."



Abstract –Micro -06

Methicillin Resistant Staphylococcus Aureus

Harshitha.

*Saveetha dental college and hospitals,
Saveetha University, Chennai – 77*

Methicillin-resistant Staphylococcus aureus (MRSA) is a bacterium responsible for several difficult-to-treat infections in humans. It is also called oxacillin-resistant Staphylococcus aureus (ORSA). MRSA is any strain of Staphylococcus aureus that has developed, through the process of natural selection, resistance to beta-lactam antibiotics, which include the penicillins (methicillin, dicloxacillin, nafcillin, oxacillin, etc.) and the cephalosporins. Strains unable to resist these antibiotics are classified as methicillin-sensitive Staphylococcus aureus, or MSSA. The evolution of such resistance does not cause the organism to be more intrinsically virulent than strains of Staphylococcus aureus that have no antibiotic resistance, but resistance does make MRSA infection more difficult to treat with standard types of antibiotics and thus more dangerous. MRSA is especially troublesome in hospitals, prisons and nursing homes, where patients with open wounds, invasive devices, and weakened immune systems are at greater risk of infection than the general public. Approximately 1-2% of people carry MRSA on their skin or in their nose. Infections caused by MRSA, for the most part, are not different from any other staph infection, although some strains of MRSA may be more aggressive than regular staph. The diagnosis of a MRSA infection requires laboratory testing. Your doctor might recommend laboratory testing of a wound that looks infected and is not healing properly in order to confirm whether it is caused by MRSA and to determine which antibiotics might be useful in treating it. Although MRSA cannot be effectively treated with antibiotics such as methicillin, nafcillin, cephalosporin or penicillin, it can usually be treated with an antibiotic called vancomycin. Recently, however, a few strains of Staphylococcus aureus have even developed some degree of resistance to vancomycin. The vancomycin-resistant strains may be more difficult to treat. Newer antibiotics are being developed to address this problem. Careful hand washing is the single most effective way to control spread of MRSA. Health care workers should wash their hands after contact with each patient. If the patient is known to have an MRSA infection, the health care worker should wear disposable gloves. Depending on the type of contact, a gown should also be worn. Patients must also wash their hands to avoid spreading the bacteria to others.



Abstract –Micro -07

A HIV Vaccine- The Way Forward

Kashish. J

*Saveetha Dental College and Hospitals,
Saveetha University, Chennai -77*

A vaccine stimulate the body's immune system to provide protection against infection or disease. Vaccines against HIV are being developed, and they are in various stages of clinical trial but at present none have proven effective. An HIV vaccine is a vaccine which would either protect individuals who do not have HIV from contracting that virus, or otherwise may have a therapeutic effect for persons who have or later contract HIV/AIDS. Currently, there is no effective HIV vaccine but many research projects managing clinical trials seek to create one. There is evidence that a vaccine may be possible. Work with monoclonal antibodies (MAb) has shown or proven that the human body can defend itself against HIV, and certain individuals remain asymptomatic for decades after HIV infection. Potential candidates for antibodies and early stage results from clinical trials have been announced. One HIV vaccine candidate which showed some efficacy was studied in RV 144, which was a trial in Thailand beginning in 2003 and first reporting a positive result in 2009. Many trials have shown no efficacy, including the STEP study and HVTN 505 trials. The availability of a safe, highly effective and accessible preventive HIV vaccine would be a valuable complement to other preventive interventions, significantly contributing to the interruption of the chain of transmission of HIV. Well conceived HIV immunization strategies could reach populations where other interventions are not sufficiently effective. Research on preventive HIV vaccines is providing new information on the possible use of vaccines as therapeutic interventions, to be used in association with antiretroviral therapies, which could lead to a lowering in the cost of the treatments and to an increase on their long-term efficacy. The cocktail of prescription drugs and frequent doctor's visits make fighting HIV and AIDS an incredibly expensive task. In the U.S. monthly treatment for HIV/AIDS ranges between \$2,000 and \$5,000 with lifetime treatment costs estimated at more than half a million dollars. It's a huge burden considering that 97% of people living with HIV reside in low-income and middle class countries (particularly in Sub-Saharan Africa). In the U.S. those living in poor communities are 2.5% as likely to be infected with HIV as those who live in wealthy areas. The Immunity Project wants to change all of that. The group of doctors and tech gurus think it may have created a vaccine to prevent HIV, and they intend on vaccinating anyone who wants it—for free.



MICROBIOLOGY (Poster Presentation)

Abstract –Micro -01

Dental Biofilm

Emilia, Pan Cher N Hwei

*Saveetha dental college and hospitals,
Saveetha University, Chennai -77*

Dental plaque is a yellowish biofilm that builds up on the teeth. Biofilms contain communities of disease-causing germs and their uncontrolled accumulation has been associated with cavities and gum disease (both gingivitis and periodontitis). Biofilms happily colonize many household surfaces in the bath and kitchen, including toilets, sinks, countertops, and cutting boards. Poor disinfection practices and ineffective cleaning products may increase the incidence of illnesses associated with pathogenic organisms encountered during normal household activity. Although gum disease can be controlled by proper oral hygiene (toothbrushing, flossing, rinsing), gingivitis (the mildest form) is still experienced by most of the US population at some point in life; a smaller proportion (30% to 40%) experience periodontitis (the severe form). Treatment of oral infections requires removal of the biofilm and calculus (tartar) from the teeth and gums by surgical or nonsurgical procedures, followed by antibiotic therapy. Unfortunately, these infections are not completely responsive to antibiotics. For this reason, oral infections are chronic diseases that require ongoing treatment and daily care by proper oral hygiene measures. Prevention is the best strategy. When good oral hygiene practices fail to prevent the development of biofilms, toothpastes and mouthwashes with chemotherapeutic agents can be used. These agents can kill microorganisms in the biofilm. Chlorhexidine, triclosan, and essential oils and minerals—agents proven to kill the harmful germs—can reduce the degree of plaque and gingivitis, while not allowing disease-causing microorganisms to colonize. Biofilms are highly resistant to antibiotics. Consequently, very high and/or long-term doses are often required to eradicate biofilm-related infections. Biofilms are responsible for diseases, such as Otitis media the most common acute ear infection in US children germs, Endocarditis infection of the inner surface of the heart and its valves, Cystic fibrosis a chronic disorder resulting in increased susceptibility to serious lung infections.



Abstract –Micro -02

Streptococcus Mutants In The Prevention Of Dental Caries

Sabeetha C

*Saveetha dental college and hospitals ,
Saveetha University, Chennai – 77*

There are many examples of positive and negative interactions between different species of bacteria inhabiting the same ecosystem. This observation provides the basis for a novel approach to preventing microbial diseases called replacement therapy. In this approach, a harmless effector strain is permanently implanted in the host's microflora. Once established, the presence of the effector strain prevents the colonization or outgrowth of a particular pathogen. In the case of dental caries, replacement therapy has involved construction of an effector strain called BCS3-L1, which was derived from a clinical *Streptococcus mutans* isolate. Recombinant DNA technology was used to delete the gene encoding lactate dehydrogenase in BCS3-L1 making it entirely deficient in lactic acid production. This effector strain was also designed to produce elevated amounts of a novel peptide antibiotic called mutacin 1140 that gives it a strong selective advantage over most other strains of *S. mutans*. In laboratory and rodent model studies, BCS3-L1 was found to be genetically stable and to produce no apparent deleterious side effects during prolonged colonization. BCS3-L1 was significantly less cariogenic than wild-type *S. mutans* in gnotobiotic rats, and it did not contribute at all to the cariogenic potential of the indigenous flora of conventional Sprague-Dawley rats. And, its strong colonization properties indicated that a single application of the BCS3-L1 effector strain to human subjects should result in its permanent implantation and displacement over time of indigenous, disease-causing *S. mutans* strains. Thus, BCS3-L1 replacement therapy for the prevention of dental caries is an example of biofilm engineering that offers the potential for a highly efficient, cost effective augmentation of conventional prevention strategies. It is hoped that the eventual success of replacement therapy for the prevention of dental caries will stimulate the use of this approach in the prevention of other bacterial diseases.



Abstract –Micro -03

Stem Cells

Lakshmi Tejaswi, Yeshi Khando

*Saveetha dental college and hospitals,
Saveetha University, Chennai -77*

Stem cell biology has come of age. Unequivocal proof that stem cells exist in the haematopoietic system has given way to the prospective isolation of several tissue-specific stem and progenitor cells, the initial delineation of their properties and expressed genetic programmes, and the beginnings of their utility in regenerative medicine. Perhaps the most important and useful property of stem cells is that of self-renewal. Stem cells are mother cells that have the potential to become any type of cell in the body. One of the main characteristics of stem cells is their ability to self-renew or multiply while maintaining the potential to develop into other types of cells. Stem cells can become cells of the blood, heart, bones, skin, muscles, brain etc. There are different sources of stem cells but all types of stem cells have the same capacity to develop into multiple types of cells. Pluripotent Stem Cells (PS cells) possess the capacity to divide for long periods and retain their ability to make all cell types within the organism. The best known type of pluripotent stem cell is the one present in embryos that helps babies grow within the womb. These are termed embryonic stem cells. These cells form at the blastocyst stage of development. A blastocyst is a hollow ball of cells that is smaller than a pinhead. The embryonic stem cells lie within this ball of cells. Recent research has enabled scientists to derive pluripotent cells from adult human skin cells. These are termed induced pluripotent stem cells or iPS cells. Fetal stem cells are obtained from tissues of a developing human fetus. These cells have some characteristics of the tissues they are taken from. For example, those taken from fetal muscles can make only muscle cells. These are also called progenitor cells. Adult stem cells are obtained from some tissues of the adult body. The most commonly used example is the bone marrow. Bone marrow is a rich source of stem cells that can be used to treat some blood diseases and cancers. Stem cell research is improving by leaps and bounds. These may soon become the basis for treating diseases such as Parkinson's disease, diabetes, heart failure, cerebral palsy, heart disease and host of other chronic ailments. Stem cells may also be used for screening new drugs and toxins and understanding birth defects without subjecting human volunteers to the toxins and drugs.



Abstract –Micro -04

Vaccine For Dental Caries

Reshma J Abraham, Gemina Hemagaran

*Saveetha dental college and hospitals,
Saveetha University, Chennai -77*

Dental caries continues to be a costly and prevalent oral disease. Research efforts towards developing a well tolerated and effective vaccine against dental caries were initiated following the demonstration of a specific bacterial aetiology for this disease. The cariogenic mutans streptococci are the principal bacteria causing this disease. Specific immune defence against these bacteria is provided mainly by secretory immunoglobulin (Ig) A antibodies present in saliva, which are generated by the common mucosal immune system. Progress in the development of a vaccine against dental caries has increased due to both advancements in molecular biology and our understanding of the mucosal immune system and mucosal vaccines. Advancements in molecular biology have facilitated the cloning and functional characterisation of virulence factors of the mutans streptococci, including the cell-surface fibrillar proteins, which mediate adherence to the tooth surface, and the glucosyl transferase enzymes, which synthesise adhesive glucans and allow microbial accumulation on the teeth. Current strategies for immunisation against dental caries are using these virulence factors as key antigens and incorporating them into novel mucosal vaccine systems and delivering them with or without adjuvants to mucosal IgA inductive sites. The most popular routes of mucosal immunisation are via the oral or nasal route. The mucosal immune system is functional in newborn infants, who develop salivary IgA antibodies as they become colonised by oral micro-organisms. Mucosal immunisation strategies result in the induction of salivary IgA antibody responses and pose fewer problems than parenteral injection of antigen. Therefore, mucosal immunisation of infants prior to the appearance of their first teeth may be a well tolerated and effective way to induce immunity against the colonisation of teeth by mutans streptococci and protection against subsequent dental caries. The purpose of this article is to provide an overview of the recent progress on the development of a vaccine against infection by *Streptococcus mutans* for the prevention of dental caries, with emphasis on the mucosal immune system and vaccine design.



PATHOLOGY – (Oral Presentations)

Abstract – Path - 01

Developmental anomalies of teeth

Dinesh Ram Raja

*Saveetha Dental College And Hospitals,
Saveetha University , Chennai – 600 077.*

Anomalies can be defined as the deviation or abnormal change that occurs. Anomalies that are seen in the teeth formation depends on so many factors such as alteration in the number, size, shape, position of teeth, pulp, enamel and dentin. Based on the alteration in the number of teeth it is of three types. Anodontia denotes congenital absence of all the teeth because of failure of development of tooth germs. It can be partial anodontia or total anodontia. Supernumerary teeth are additional number of teeth, over and above the usual number for the dentition and mesiodens is a supernumerary tooth that occurs in the anterior maxilla in the midline region near the maxillary central incisors. There may be one or more mesiodens.

Based on size alteration it is of two patterns. Macrodonia refers to teeth that are larger than normal. The disorder may affect a single tooth or maybe generalized to all teeth as in pituitary gigantism, microdonia refers to teeth that are smaller than normal. Localized microdonia often involves the maxillary lateral incisors or maxillary third molars. Based on alteration in shape. Fusion is a developmental union of two or more adjacent tooth germs. Germination is the incomplete attempt of a tooth germ to divide into two. The resultant tooth has two crowns or a large crown partially separated, and sharing a single root and root canal. Concrescence - A form of fusion occurring after root formation has been completed, resulting in teeth united by their cementum. It is developmental in origin. Dens in dente also known as dens invaginatus, is produced by an invagination of the calcified layers of a tooth into the body of the tooth. The invagination may be shallow and confined to the crown of the tooth or it may extend all the way to the apex. Dens evaginatus is a developmental condition affecting predominantly premolar teeth. Talon cusp is an accessory cusp located on the lingual surface of maxillary or mandibular teeth. Taurodontism have crowns of normal size and shape but have large rectangular bodies and pulp chambers which are dramatically increased in their apico-occlusal heights. Dilaceration is an abnormal bend in the root of a tooth. Developmental disturbances in structure of teeth includes amelogenesis imperfecta, enamel hypoplasia, dentinogenesis imperfecta, dentin dysplasia, regional odontodysplasia.



Abstract – Path 02

Ameloblastoma

Jyotsna

*Saveetha Dental College And Hospitals,
Saveetha University, Chennai – 600 077.*

Ameloblastoma is a benign tumor of odontogenic epithelium (ameloblasts, or outside portion, of the teeth during development) much more commonly appearing in the lower jaw than the upper jaw. This type of odontogenic neoplasm was designated as an adamantinoma in 1885 by the French physician Louis-Charles Malassez. It was finally renamed to the modern name ameloblastoma in 1930 by Ivey and Churchill. While these tumors are rarely malignant or metastatic (that is, they rarely spread to other parts of the body), and progress slowly, the resulting lesions can cause severe abnormalities of the face and jaw. Additionally, because abnormal cell growth easily infiltrates and destroys surrounding bony tissues, wide surgical excision is required to treat this disorder. If an aggressive tumor is left untreated, it can obstruct the nasal and oral airways making it impossible to breathe without oropharyngeal intervention. There are three main clinical subtypes of ameloblastoma: unicystic, multicystic, peripheral. The peripheral subtype composes 2% of all ameloblastomas. Of all ameloblastomas in younger patients, unicystic ameloblastomas represent 6% of the cases. Ameloblastoma also occurs in long bones, and another variant is Craniopharyngioma (Rathke's pouch tumour, Pituitary Ameloblastoma.). Histopathology will show cells that have the tendency to move the nucleus away from the basement membrane. This process is referred to as "Reverse Polarization". The follicular type will have outer arrangement of columnar or palisaded ameloblast like cells and inner zone of triangular shaped cells resembling stellate reticulum in bell stage. The central cells sometimes degenerate to form central microcysts. The plexiform type has epithelium that proliferates in a "Fish Net Pattern". The plexiform ameloblastoma shows epithelium proliferating in a 'cord like fashion', hence the name 'plexiform'. There are layers of cells in between the proliferating epithelium with a well-formed desmosomal junctions, simulating spindle cell layers. The six different histopathological variants of ameloblastoma are desmoplastic, granular cell, basal cell, plexiform, follicular, and acanthomatous. The acanthomatous variant is extremely rare. One-third of ameloblastomas are plexiform, one-third are follicular. Other variants such as acanthomatous occur in older patients.



Abstract – Path - 03

Life After Death – Necrosis

Rahmath Fathima

*Saveetha Dental College And Hospitals,
Saveetha University , Chennai – 600 077.*

Necrosis is a form of cell injury that results in the premature death of cells in living tissue by autolysis. Necrosis is caused by factors external to the cell or tissue, such as infection, toxins, or trauma that result in the unregulated digestion of cell components. In contrast, apoptosis is a naturally occurring programmed and targeted cause of cellular death. While apoptosis often provides beneficial effects to the organism, necrosis is almost always detrimental and can be fatal. Cells that die due to necrosis do not follow the apoptotic signal transduction pathway but rather various receptors are activated that result in the loss of cell membrane integrity and an uncontrolled release of products of cell death into the intracellular space. This initiates in the surrounding tissue an inflammatory response which prevents nearby phagocytes from locating and eliminating the dead cells by phagocytosis. For this reason, it is often necessary to remove necrotic tissue surgically, a procedure known as debridement. Untreated necrosis results in a build-up of decomposing dead tissue and cell debris at or near the site of the cell death. A classic example is gangrene. Coagulative necrosis is characterized by the formation of a gelatinous (gel-like) substance in dead tissues in which the architecture of the tissue is maintained, and can be observed by light microscopy. Coagulation occurs as a result of protein denaturation, causing the albumin in protein to form a firm and opaque state. This pattern of necrosis is typically seen in hypoxic (low-oxygen) environments, such as infarction. Coagulative necrosis occurs primarily in tissues such as the kidney, heart and adrenal glands. Severe ischemia most commonly causes necrosis of this form. Liquefactive necrosis (or colliquative necrosis), in contrast to coagulative necrosis, is characterized by the digestion of dead cells to form a viscous liquid mass. This is typical of bacterial, or sometimes fungal, infections because of their ability to stimulate an inflammatory response. The necrotic liquid mass is frequently creamy yellow due to the presence of dead leukocytes and is commonly known as pus. Hypoxic infarcts in the brain presents as this type of necrosis, because the brain contains little connective tissue but high amounts of digestive enzymes and lipids, and cells therefore can be readily digested by their own enzymes. Caseous necrosis can be considered a combination of coagulative and liquefactive necroses, typically caused by mycobacteria (e.g. tuberculosis), fungi and some foreign substances. The necrotic tissue appears as white and friable, like clumped cheese. Dead cells disintegrate but are not completely digested, leaving granular particles. Microscopic examination shows amorphous granular debris enclosed within a distinctive inflammatory border. Granuloma has this characteristic. Fat necrosis is specialized necrosis of fat tissue, resulting from the action of activated lipases on fatty tissues such as the pancreas. In the pancreas it leads to acute pancreatitis, a condition where the pancreatic enzymes leak out into the peritoneal cavity, and liquefy the membrane by splitting the triglyceride esters into fatty acids through fat saponification. Calcium, magnesium or sodium may bind to these lesions to produce a chalky-white substance. The calcium deposits are microscopically distinctive and may be large enough to be visible on radiographic examinations. To the naked eye, calcium deposits appear as gritty white flecks. Fibrinoid necrosis is a special form of necrosis usually caused by immune-mediated vascular damage.



Abstract – Path - 04

Osteoporosis

Gireesh Kumar

*Saveetha Dental College And Hospitals,
Saveetha University , Chennai – 600 077.*

Osteoporosis is a progressive bone disease that is characterized by a decrease in bone mass and density which can lead to an increased risk of fracture. In osteoporosis, the bone mineral density (BMD) is reduced, bone microarchitecture deteriorates, and the amount and variety of proteins in bone are altered. Osteoporosis is defined by the World Health Organization (WHO) as a bone mineral density of 2.5 standard deviations or more below the mean peak bone mass (average of young, healthy adults) as measured by dual-energy X-ray absorptiometry; the term "established osteoporosis" includes the presence of a fragility fracture. The disease may be classified as primary type 1, primary type 2, or secondary. The form of osteoporosis most common in women after menopause is referred to as primary type 1 or postmenopausal osteoporosis. Primary type 2 osteoporosis or senile osteoporosis occurs after age 75 and is seen in both females and males at a ratio of 2:1. Secondary osteoporosis may arise at any age and affect men and women equally. This form results from chronic predisposing medical problems or disease, or prolonged use of medications such as glucocorticoids, when the disease is called steroid- or glucocorticoid-induced osteoporosis. The risk of osteoporosis fractures can be reduced with lifestyle changes and in those with previous osteoporosis related fractures medications. Lifestyle change includes diet, exercise, and preventing falls. The utility of calcium and vitamin D is questionable in most. Bisphosphonates are useful in those with previous fractures from osteoporosis but are of minimal benefit in those who have osteoporosis but no previous fractures. Osteoporosis is a component of the frailty syndrome. Bisphosphonates are useful in decreasing the risk of future fractures in those who have already sustained a fracture due to osteoporosis. This benefit is present when taken for three to four years. They have not been compared directly to each other, though, so it is not known if one is better. Fracture risk reduction is between 25 and 70% depending on the bone involved. There are concerns of atypical femoral fractures and osteonecrosis of the jaw with long term use, but these risk are low. With evidence of little benefit when used for more than three to five years and in light of the potential adverse events, it may be appropriate to stop treatment after this time in some. For those with osteoporosis but who have not had any fractures evidence does not support a reduction of in fracture risk with risedronate or etidronate. Alendronate may decrease fractures of the spine but does not have any effect on other types of fractures. Half stop their medications within a year. Teriparatide (a recombinant parathyroid hormone) has been shown to be effective in treatment of women with postmenopausal osteoporosis.



Abstract – Path 05

Tuberculosis In HIV Patients

Cheng Ging

*Saveetha Dental College And Hospitals,
Saveetha University , Chennai – 600 077.*

Tuberculosis (TB) and HIV have been closely linked since the emergence of AIDS. Worldwide, TB is the most common opportunistic infection affecting HIV-seropositive individuals, and it remains the most common cause of death in patients with AIDS. HIV infection has contributed to a significant increase in the worldwide incidence of TB. By producing a progressive decline in cell-mediated immunity, HIV alters the pathogenesis of TB, greatly increasing the risk of disease from TB in HIV-coinfected individuals and leading to more frequent extrapulmonary involvement, atypical radiographic manifestations, and paucibacillary disease, which can impede timely diagnosis. Although HIV-related TB is both treatable and preventable, incidence continues to climb in developing nations wherein HIV infection and TB are endemic and resources are limited. Interactions between HIV and TB medications, overlapping medication toxicities, and immune reconstitution inflammatory syndrome (IRIS) complicate the cotreatment of HIV and TB. This chapter will review the epidemiology, pathogenesis, management, and prevention of TB in the setting of HIV infection. TB can develop through progression of recently acquired infection (primary disease), reactivation of latent infection, or exogenous reinfection. Infection with *M tuberculosis* can occur when an individual exposed to an infectious case of TB inhales particles (<5 μm in size) containing the tubercle bacilli. If the bacilli reach the pulmonary alveoli, they may be ingested by alveolar macrophages, the first line of defense against *M tuberculosis*. Surviving tubercle bacilli multiply within the macrophage and eventually undergo hematogenous spread to other areas of the body. In HIV infection, defective macrophages function in response to TB infection, which may in part increase susceptibility to TB disease. Despite this, there is no conclusive evidence that HIV-seropositive persons are more likely to acquire TB infection than HIV-seronegative individuals, given the same degree of exposure. Once infection does occur, however, the risk of rapid progression is much greater among persons with HIV infection, because HIV impairs the host's ability to contain new TB infection. Immunocompetent individuals infected with *M tuberculosis* have approximately a 10% lifetime risk of developing TB, with half of the risk occurring in the first 1-2 years after infection. In contrast, HIV-infected individuals with latent TB are approximately 20-30 times more likely to develop TB disease than those who are HIV uninfected, at a rate of 8-10% per year. HIV coinfection also increases the risk of progression of recently acquired infection to active disease. In several outbreak settings, 35-40% of HIV-infected patients exposed to TB in health care or residential settings developed active TB disease within 60-100 days of exposure. Infection with *M tuberculosis* in an immunocompetent person is thought to confer significant protective immunity against exogenous reinfection. However, reinfection has been reported in both HIV-seronegative and HIV-seropositive individuals, although its incidence is not known. DNA fingerprinting on paired isolates of *M tuberculosis* from 17 patients who repeatedly had positive cultures at a single hospital in New York City found 4 patients to have acquired a new, drug-resistant strain of *M tuberculosis* through exogenous reinfection, probably as a result of nosocomial transmission.



Abstract – Path - 06

Opportunistic Infections Of Oral Cavity In HIV Patients

Madhavi Ghosh

*Saveetha Dental College And Hospitals,
Saveetha University , Chennai – 600 077.*

An opportunistic infection is an infection caused by pathogens, particularly opportunistic pathogens—those that take advantage of certain situations—such as bacterial, viral, fungal or protozoan infections that usually do not cause disease in a healthy host, one with a healthy immune system. A compromised immune system, however, presents an "opportunity" for the pathogen to infect. Oral candidiasis (also known as oral candidosis, oral thrush, oropharyngeal candidiasis, moniliasis, candidal stomatitis, muguet) is candidiasis that occurs in the mouth. That is, oral candidiasis is a mycosis (yeast/fungal infection) of *Candida* species on the mucous membranes of the mouth. *Candida albicans* is the most commonly implicated organism in this condition. *C. albicans* is carried in the mouths of about 50% of the world's population as a normal component of the oral microbiota. This candidal carriage state is not considered a disease, but when *Candida* species become pathogenic and invade host tissues, oral candidiasis can occur. This change usually constitutes an opportunistic infection of normally harmless micro-organisms because of local (i.e., mucosal), or systemic factors altering host immunity. Oral hairy leukoplakia (OHL) is a disease of the mucosa first described in 1984. This pathology is associated with Epstein-Barr virus (EBV) and occurs mostly in people with HIV, both immunocompromised and immunocompetent. This white lesion cannot be scraped off, much like idiopathic leukoplakia. The lesion itself is benign and does not require any treatment, although its appearance may have diagnostic and prognostic implications for the underlying condition. The white appearance is created by hyperkeratosis (overproduction of keratin) and epithelial hyperplasia. The causative organism implicated is Epstein-Barr virus, the same virus that causes infectious mononucleosis (glandular fever). After the primary EBV infection has been overcome, the virus will persist for the rest of the host's life and "hides" from the immune system by latent infection of B lymphocytes. The virus also causes lytic infection in the oropharynx, but is kept in check by a normal, functioning immune system. Uncontrolled lytic infection is manifested as oral hairy leukoplakia in immunocompromised hosts. OHL usually arises where the immunocompromise is secondary to HIV/AIDS. Rarely are other causes of immunocompromise associated with OHL, but it has been reported in people who have received transplants and are taking immunosuppressive medication. OHL may also accompany chronic graft versus host disease. Even more rare are reports of OHL in persons with competent immune systems.



Abstract – Path - 07

Thrombocytopenia In Hepatitis C Viral infections

Mugunth Nandagopal

*Saveetha Dental College And Hospitals,
Saveetha University , Chennai – 600 077.*

The terms thrombocytopenia and thrombopenia refer to a relative decrease of platelets in blood. One common definition of thrombocytopenia is a platelet count below 50,000 per microlitre. The pathophysiology of thrombocytopenia in patients with chronic liver disease resulting from hepatitis C virus (HCV) infection is complex and involves several complementary mechanisms that likely act in concert. In patients with untreated hepatitis C, both prevalence and severity of thrombocytopenia increase in parallel with the extent of disease, usually becoming clinically relevant when patients develop extensive fibrosis and/or cirrhosis. Pathogenetic mechanisms include hypersplenism secondary to portal hypertension, bone marrow suppression resulting from either HCV itself or interferon treatment, aberrations of the immune system resulting in the formation of anti-platelet antibodies and/or immune-complexes that bind to platelets and facilitate their premature clearance, development of immunologically-mediated extra hepatic manifestations including mixed cryoglobulinemia with or without associated joint, renal, or cutaneous involvement, and thrombopoietin (TPO) deficiency secondary to liver dysfunction. The association between HCV infection and thrombocytopenia is unclear, but hepatic fibrosis might be central to it. The prevalence of thrombocytopenia increased remarkably along with liver disease severity with HCV infection. In addition, the liver is the main site for the production of thrombopoietin, the dominant cytokine for controlling the development of megakaryocyte and platelet production. Thrombopoietin levels and platelet counts are highly correlated with liver-function impairment and the severity of hepatic fibrosis in chronic HCV infection. Other studies have shown increasing thrombopoietin levels and platelet counts after IFN therapy in patients with HCV infection or who have undergone liver transplantation. This indicates that thrombocytopenia in persons with HCV infection might be strongly associated with disease activity and long-term progression.



Abstract – Path - 08

Common Malignant Tumours Of Salivary Gland

Yogeshwari Swaminathan

*Saveetha Dental College And Hospitals,
Saveetha University , Chennai – 600 077.*

Adenoid cystic carcinoma is a rare type of cancer that can exist in many different body sites. It most often occurs in the areas of the head and neck, in particular the salivary glands; but has also been reported in the breast, lacrimal gland of the eye, lung, brain, bartholin gland, trachea, and the paranasal sinuses. It is sometimes referred to as adenocyst, malignant cylindroma, adenocystic, adenoidcystic carcinoma. It is the third most common malignant salivary gland tumor overall (after mucoepidermoid carcinoma and polymorphous low grade adenocarcinoma). It represents 28% of malignant submandibular gland tumors, making it the single most common malignant salivary gland tumor in this region. Patients may survive for years with metastases because this tumor is generally well-differentiated and slow growing. Primary treatment for this cancer, regardless of body site, is surgical removal with clean margins. This surgery can prove challenging in the head and neck region due to this tumour's tendency spread along nerve tracts. Adjuvant or palliative radiotherapy is commonly given following surgery. For advanced major and minor salivary gland tumours that are inoperable, recurrent, or exhibit gross residual disease after surgery, fast neutron therapy is widely regarded as the most effective form of treatment. Chemotherapy is used for metastatic disease. Chemotherapy is considered on a case by case basis, as there is limited trial data on the positive effects of chemotherapy. Mucoepidermoid carcinoma is the most common type of salivary gland malignancy in adults. Mucoepidermoid carcinoma can also be found in other organs, as bronchi, lacrimal sac and thyroid. Mucicarmine staining is one stain used by pathologist for detection. Occurs in adults, with peak incidence from 20–40 years of age. A causal link with cytomegalovirus (CMV) has been strongly implicated . Presents as painless, slow-growing mass that is firm or hard. Most appear clinically as mixed tumors. This tumor is not encapsulated and is characterized by squamous cells, mucus-secreting cells, and intermediate cells.



Abstract - Path - 09

Koch's Infection Of Oral Cavity - Tongue

Sriram

*Saveetha Dental College And Hospitals,
Saveetha University , Chennai – 600 077.*

Tuberculosis is a major cause of morbidity and mortality worldwide. It is a chronic granulomatous disease that can affect any part of the body, including the oral cavity. Oral lesions of tuberculosis, though uncommon, are seen in both the primary and secondary stages of the disease. Tuberculosis of the oral cavity is a rare occurrence. Oral cavity lesions in tuberculosis occur most frequently on the tongue, but are also seen on the gingiva and palate. They may be painful and may resemble a malignant ulceration. Biopsy generally reveals non-specific inflammation, caseating granulomas and foreign body giant cells, but cultures are frequently negative for acid-fast bacilli. Oral ulcers may occur in primary or secondary tuberculosis, and it is important to test for pulmonary disease. Additionally, cultures for drug sensitivities are important. Tuberculosis of the oral cavity is an uncommon occurrence, might be because of an intact squamous epithelium of the oral mucosa which makes tuberculosis bacilli penetration difficult and provides protection against the infection. Although the mechanism of primary inoculation has not been definitely established yet, it appears that the organisms are carried most likely in the sputum and enter the mucosal tissue through a small tear in the oral mucosa as a result of chronic irritation or inflammation which may favor the localization of organism. Local predisposing factors include poor hygiene, local trauma, dental extraction, leukoplakia, jaw fracture, cyst and abscess. In the present case, bacteria might have spread through local trauma or poor oral hygiene. The differential diagnosis of the lesions of oral tuberculosis includes trauma, actinomycosis, syphilis, carcinoma, Wegener's granulomatous and aphthous ulceration. Treatment of extrapulmonary tuberculosis is the same as for pulmonary tuberculosis. A standard six- or nine-month course is acceptable and effective therapy.



Abstract – Path - 10

Osteoradionecrosis Of Jaw Bones

Shalini

*Saveetha Dental College And Hospitals,
Saveetha University , Chennai – 600 077.*

Osteoradionecrosis, or ORN, is the most serious possible complication facing the oral cancer patient. A condition of the non vital bone in a site of radiotherapy (RT), Osteoradionecrosis is bone that has died as a complication of radiotherapy. Because radiation works to destroy cancerous cells through the deprivation of oxygen and vital nutrients, it inevitably destroys normal cells as well, damaging small arteries and reducing circulation to the area of the mandible. Not an infection itself, it is the bone's reduced ability to heal and the resulting lesions, pain and fragility. Insufficient blood supply to the irradiated areas decreases the ability to heal, and any subsequent infections to the jaw can pose a huge risk to the patient. Though it is possible to develop spontaneously, ORN most frequently occurs when an insult to the bone is sustained in the irradiated area, such as related subsequent surgery or biopsy, tooth extractions or denture irritations. Clinical manifestations and symptoms range from mild to severe and include pain, swelling, reduced mobility of the jaw, drainage, exposed bone in the maxilla and/or mandible and bone destruction. Symptoms vary depending on the location and the extent of damage to the bone. Many people do not experience any symptoms for month, or even years after the Radiation treatment. There are many factors that can contribute to the development of ORN. Though any patient having received 40 gray (Gy) radiation administered to the mandible is at risk, it is more common in patients who have received more than 60 (Gy) radiation therapy. Since many oral cancer patients have as much as 70 Gy of radiation you can see why this is of importance to them. There is also an increased risk for those who receive a combination of both radiation and chemotherapy. The location and size of the primary tumor are other compounding factors. When the resulting lesion from a removed tumor is large and located on the floor of the mouth, the rate of incidence of ORN more than doubles. The immunologic and nutritional health of the patient at the time of treatment also seems to increase the risk as does smoking that the time of treatment. Prior to beginning radiation therapy, all patients should undergo a thorough dental evaluation, including full mouth radiographs, dental and periodontal diagnosis, and prognosis for each tooth. Outline a complete treatment plan, taking into account the patient's motivation and compliance based upon discussions with the patient and his or her family. Patient education regarding the need for meticulous oral hygiene and frequent follow-up must be stressed. The dentist should perform prophylaxis, periodontal scaling, caries control, and fabrication of fluoride trays. Teeth that cannot be salvaged with conservative endodontic therapy should be extracted. Ideally, extractions should be performed 3 weeks prior to beginning radiation therapy. Extraction of teeth during radiation therapy should be discouraged and delayed until the completion of treatment with resolution of the oral mucositis. To prevent radiation caries, patients should begin daily fluoride treatment with 1% neutral sodium fluoride gel in prefabricated trays for 5 minutes each day. This practice should continue for life. Medical therapy in treatment of ORN is primarily supportive, involving nutritional support along with superficial debridement and oral saline irrigation for local wounds. Antibiotics are indicated only for definite secondary infection.



Abstract – Path - 11

Oral Cancer

Vinitha Elizabeth

*Saveetha Dental College And Hospitals,
Saveetha University , Chennai – 600 077.*

Oral cancer or mouth cancer a subtype of head and neck cancer, is any cancerous tissue growth located in the oral cavity. It may arise as a primary lesion originating in any of the oral tissues, by metastasis from a distant site of origin, or by extension from a neighboring anatomic structure, such as the nasal cavity. Alternatively, the oral cancers may originate in any of the tissues of the mouth, and may be of varied histologic types:teratoma, adenocarcinoma derived from a major or minor salivary gland, lymphoma from tonsillar or other lymphoid tissue, or melanoma from the pigment-producing cells of the oral mucosa. There are several types of oral cancers, but around 90% are squamous cell carcinomas, originating in the tissues that line the mouth and lips. Oral or mouth cancer most commonly involves the tongue. It may also occur on the floor of the mouth, cheek lining, gingiva (gums), lips, or palate (roof of the mouth). Most oral cancers look very similar under the microscope and are called squamous cell carcinoma, but less commonly other types of oral cancer occur, such as Kaposi's sarcoma. Oncogenes are activated as a result of mutation of the DNA. Risk factors that predispose a person to oral cancer have been identified in epidemiological (epidemiology) studies. It is important to note that around 75 percent of oral cancers are linked to modifiable behaviors such as tobacco use and excessive alcohol consumption. Other factors include poor oral hygiene, irritation caused by ill-fitting dentures and other rough surfaces on the teeth, poor nutrition, and some chronic infections caused by bacteria or viruses. If oral cancer is diagnosed in its earliest stages, treatment is generally very effective. Oral cancer often presents as a non-healing ulcer (shows no sign of healing after 2 weeks). Men are affected twice as often as women, particularly men older than 40/60. A premalignant (or precancerous) lesion is defined as "a benign, morphologically altered tissue that has a greater than normal risk of malignant transformation." There are several different types of premalignant lesion that occur in the mouth. Some oral cancers begin as white patches (leukoplakia), red patches (erythroplakia) or mixed red and white patches (erythroleukoplakia or "speckled leukoplakia"). Other common premalignant lesions include oral lichen planus (particularly the erosive type), oral submucous fibrosis and actinic cheilitis. In the Indian subcontinent oral submucous fibrosis is very common. This condition is characterized by limited opening of mouth and burning sensation on eating of spicy food. This is a progressive lesion in which the opening of the mouth becomes progressively limited, and later on even normal eating becomes difficult.



PATHOLOGY - (Poster Presentations)

Abstract - Path - 01

Garlic Is Man's Best Friend

Mark David , Sri Shoban Raj

*Saveetha Dental College And Hospitals,
Saveetha University , Chennai – 600 077*

Allium sativum, commonly known as garlic, is a species in the onion genus, Allium. Its close relatives include the onion, shallot, leek, chive, and rakkyo. With a history of human use of over 7,000 years, garlic is native to central Asia, and has long been a staple in the Mediterranean region, as well as a frequent seasoning in Asia, Africa, and Europe. It was known to Ancient Egyptians, and has been used for both culinary and medical purposes. The name garlic comes from a gar (a spear) and lac (a plant) in reference to the shape of its leaves. It is one of the oldest medicinal remedies known to man. Garlic contains volatile oils of allin, allinase (the enzyme that converts allin to allicin when garlic is crushed), and allicin, sulphurous compounds (like diallyle disulphide), selenium, and vitamins A, B, C, and E. The volatile oils and sulphurous compounds are responsible for both its pungent odor and its medicinal properties. Organically-grown garlic tends to have a higher sulphur level, and therefore, a stronger medicinal effect. Garlic has antioxidant and anti-inflammatory effects that fight a variety of ailments. Garlic has been used as both food and medicine for thousands of years, dating back to when the Egyptian pyramids were built. In early 18th-century France, gravediggers drank crushed garlic in wine believing it would protect them from the plague. During both World Wars I and II, soldiers were given garlic to prevent gangrene. It was also used as an antiseptic, applied to wounds to prevent infection. Today garlic is used to help prevent heart disease, including atherosclerosis or hardening of the arteries (plaque buildup in the arteries that can block the flow of blood and may lead to heart attack or stroke), high cholesterol, high blood pressure, and to boost the immune system. Eating garlic regularly may also help protect against cancer.



Diagnostic Cells In Peripheral Blood Smear

Akhil , Batmaraj

*Saveetha Dental College And Hospitals,
Saveetha University , Chennai – 600 077*

When a peripheral blood sample is smeared on a slide and stained, it is known as a peripheral blood film. It allows for examination of the physical characteristics of the red cells, white cells and platelets under the microscope. Additionally, it helps detect parasites or abnormal cells in the blood. Thus the peripheral blood film is an important indicator of haematological and other disease. It is, however, relatively difficult to interpret, uses terminology which can be opaque to those who do not practise haematology and can be of limited specificity depending on the abnormality that is found. Abnormalities in red cell morphology are as follows. Acanthocytes are spiculated (spikey) red cells that are found in some cases of α - β -lipoproteinaemia, chronic liver disease and α -thalassaemia trait. There is also an hereditary acanthocytosis. Anisocytosis is variation in red cell size which may occur in thalassaemia, iron deficiency or megaloblastic anaemias. Basophilic stippling describes the presence of small granular bodies within the red cell cytoplasm and occurs when there is disordered and accelerated erythropoiesis so that red cells with immature cytoplasm are released into the circulation. It may be found in lead poisoning, thalassaemia or other causes of significant anaemia. Bite cells occur in G6PD deficiency and in oxidative haemolysis. Burr cells type of echinocyte: found in patients with uraemia. Cabot's rings are circular or figure-of-eight structures in red cells that stain red with Wright's stain and are thought to represent nuclear membrane remnants; they are found in similar conditions to Howell-Jolly bodies . Dimorphic picture/appearance describes heterogeneity in the size of red blood cells, usually with two distinct populations. It can be found in partially treated iron deficiency, mixed deficiency anaemias (eg, folate/B12 and iron together), following red cell transfusion or in cases of sideroblastic anaemia. Heinz bodies are denatured haemoglobin due to oxidative damage. They are never seen in normal individuals, as they are removed by the spleen. A small number may therefore be seen post-splenectomy and also with the use of antioxidant drugs or sulfonamides, in G6PD deficiency and with unstable haemoglobin. Howell-Jolly bodies are nuclear remnants found in red cells normally removed by the spleen and seen after splenectomy, in cases of megaloblastic and iron-deficiency anaemias and rarely in cases of leukaemia. Hypochromia is impaired staining of red cells seen commonly in iron-deficiency anaemia and also in thalassaemia and sideroblastic anaemias. Hyposplenic film is a description of the collection of abnormalities found in these patients. They include Howell-Jolly bodies, target cells, occasional nucleated red blood cells, lymphocytosis, macrocytosis and acanthocytes. There may also be evidence of infectious mononucleosis, any viral infection, toxoplasmosis and drug reactions.



PHARMACOLOGY (Oral Presentations)

Abstract –Pharma-01

THE HIDDEN POISON-HEAVY METALS

Tee Jing Loo

*Saveetha Dental College,
Saveetha University, Chennai-600077*

Effects of low-level chronic exposures to mercury have been linked to a number of adverse health effects including kidney damage, behavioral and mental changes, liver damage, immune system abnormalities, neurological problems and male infertility. Identifying mercury toxicity and successful removal of mercury from the body has shown corresponding improvement in health in those affected by mercury poisoning. While mercury is perhaps the most publicized of the heavy metal toxicities, there are other toxic metals present in our environment that may lead to adverse health effects. Lead has been shown to cause fatigue, constipation, insomnia, emotional disturbances, hyperactivity and learning disabilities in children. Arsenic, a common ingredient in lumber products, may cause fatigue, skin problems and tingling in the extremities. Aluminum, cadmium, germanium and other metals all have been shown to cause disease with both acute and chronic exposures. Hair analysis is generally regarded to be the best screening test for both heavy metal and long-term nutrient element status. It is inexpensive, noninvasive, and can pick up abnormalities not seen in other types of testing. This is because teeth, hair and nails in particular concentrate heavy metals, and thus are useful indicators of element status. The lab we use at SOMA Acupuncture measures the levels of 20 of the most commonly encountered toxic elements. If the hair analysis shows high levels of toxic elements, provocative urine testing is a more specific test to measure the body's burden and the ability of therapeutic agents to remove the metal from the body. A 24-hour urine sample is collected and analyzed for the presence of toxic metals, as well as a kidney function test to ensure adequate kidney function because elimination of these metals can stress the kidneys. At this point, a chelating agent is given orally for three days, and a second urine test is done. If the presence of heavy metals in the urine rises, it indicates that oral chelation is effective in helping detoxify the body of these substances.



Abstract – Pharma-02

PHARMACOTHERAPY OF TUBERCULOSIS

Trophimus Gnanabagyam

Saveetha Dental College,

Saveetha University, Chennai-600077

Multidrug resistance tuberculosis (MDR-TB) is defined as resistance to isoniazid and rifampicin, with or without resistance to other anti-TB drugs. The prevalence of MDR-TB is 1–3% in new cases and around 12% in retreatment cases. MDR-TB differs from drug-resistant tuberculosis (TB), which is a case of TB resistant to one or more anti-TB drugs. Initiation of drug therapy in patients with MDR-TB requires an assessment of history of treatment as well as meticulous laboratory parameters to characterize the susceptibility of the specific strain. Irregular, incomplete, and inadequate treatment is the commonest means of acquiring drug resistant organisms. Poor compliance is also an important factor of acquisition of drug resistance. Treatment regimens should contain at least four drugs with certain effectiveness. After confirmatory diagnosis of MDR-TB, patients can be treated with either standard MDR regimen or by individually tailored regimen which is based on the drug sensitivity test (DST). Any patient who does not respond to the treatment of Category first or third; any category second patient who remains smear positive at the end of fourth month treatment; contacts of MDR-TB cases will be identified as MDR-TB suspect. These will be tested by culture sensitivity and drug resistance tests. If a patient is confirmed as a non-MDR-TB case; continue Category second or Category first regimen but if MDR-TB is confirmed then Cat. fourth regimen should be started. Revised National Tuberculosis Control Programme (RNTCP) uses Category fourth regimen as the standard regimen for treatment of MDR-TB. Category fourth regimen includes: six drugs—four bactericidal: Ofloxacin (Ofx) or Levofloxacin (Lfx); Kanamycin; ethionamide; pyrazinamide and two bacteriostatic drugs: Ethambutol; cycloserine (Cs) during 6–9 months of the intensive phase (IP) and four drugs: ofloxacin (levofloxacin), ethionamide, ethambutol, and cycloserine during the 18 months of the continuation phase. The treatment duration is divided into two phases: initial intensive phase (IP for 6 months and the continuation phase (CP) for 18 months. After 6 months of treatment, the patient reviewed and the treatment changed to CP if the fourth month culture result is negative (fourth month culture results are available at the end of the sixth month). If the 4-month culture result remains positive, the treatment is extended by 1 month duration.



Abstract – Pharma-03

DRUGS FROM BUGS-A FACT OF PHARMACEUTICAL ENTAMOLOGY

Dushyanthan.N

*Saveetha Dental College,
Saveetha University, Chennai-600077*

Natural Products from microbes and plants have been used in human medicine for thousands of years. During the last 60 years they have been especially useful as antibiotics and anti-cancer compounds. Most low-molecular-mass compounds used clinically are in fact natural products, natural product derivatives or have been inspired by natural products. However, the current situation where we have antibiotics to treat many bacterial infections is likely to change rapidly in the next decade or two due to increasing resistance and the emergence of not only multi-, but pan-resistant human pathogens. At the same time, pharmaceutical companies have stepped back from antibiotic research due to high development costs and have concentrated mostly on drugs for chronic diseases. This dramatic situation in the clinic contrasts with the enormous possibilities of modern science. Next-generation sequencing allows cheap and rapid access to biosynthesis gene clusters in bacteria and fungi, which can be manipulated very efficiently in the original host using genetic tools, or expressed heterologously in more accessible model organisms, such as *Escherichia coli*, *Bacillus* or optimised *Streptomyces* hosts. Additionally, analytical methods, like mass spectrometry, allow the rapid detection and structural elucidation of novel natural products or their derivatives. The development of these tools has already led to the revitalisation of academic natural product research. *Photorhabdus* and *Xenorhabdus* belong to the *Enterobacteriaceae* and live in symbiosis with nematodes of the genera *Heterorhabditis* and *Steinernema*, respectively. Both bacterium and nematode form an entomopathogenic complex that can infect and kill several soil-dwelling insect larvae and therefore this complex can be used industrially for pest control in organic farming. The nematode can be regarded as the carrier for the bacteria, setting them free once inside the insect, and the bacteria essentially function as the warhead that kills the insects. More than 200 different bacterial strains were isolated from nematode-infected insects obtained from soil samples (some together with their associated nematodes) and the bacterial strains were analysed using mass spectrometry. Using bioinformatics, over 500 novel compounds have been identified in these bacteria and more than 150 compounds have been isolated and/or synthesised. These compounds range from simple amino acid derivatives like phenylalanine-derived cinnamic acid or simple amides to very large peptides with a molecular mass greater than 1,800Da.



Abstract – Pharma-04

PHARMACOTHERAPY OF ANGINA PECTORIS

Surendranath.P

*Saveetha Dental College,
Saveetha University, Chennai-600077*

Angina or chest pain occurs because the heart is not receiving enough oxygen. The pain is usually in the chest and may also be felt in the shoulder, arm, or jaw. Not all chest pain is angina and it may be difficult to determine the cause of chest pain. The treatment for angina depends on the severity of the symptoms and the results of tests that are done to find the underlying cause. Nitrates are the medicines most commonly used to treat angina. They relax and widen blood vessels. This allows more blood to flow to the heart, while reducing the heart's workload. Nitroglycerin (NI-tro-GLIS-er-in) is the most commonly used nitrate for angina. Nitroglycerin that dissolves under your tongue or between your cheek and gum is used to relieve angina episodes. Nitroglycerin pills and skin patches are used to prevent angina episodes. However, pills and skin patches act too slowly to relieve pain during an angina attack. Nitroglycerine drug is indicated for acute angina or myocardial infarction. It is characterized by a rapid onset of action. For emergency purposes it is available as sublingual tablets or a sublingual spray. One important point to be aware of is that the tablets have a short shelf-life of approximately 3 months once the bottle has been opened and the tablets exposed to air or light. The spray has the advantage of having a shelf-life which corresponds to that listed on the bottle. Therefore, if a patient uses his/her own nitroglycerin, there is a possibility of the drug being inactive. This supports the need for the dentist to always having a fresh supply available. With signs of angina pectoris, one tablet or spray (0.3 or 0.4 mg) should be administered sublingually. Relief of pain should occur within minutes. If necessary, this dose can be repeated twice more in 5-minute intervals. Systolic blood pressures below 90 mmHg contraindicate the use of this drug.



Abstract – Pharma-05

MANAGEMENT OF SCHIZOPRENIA

Steffi Vimal

*Saveetha Dental College,
Saveetha University, Chennai-600077*

Treatment of schizophrenia requires integration of medical, psychological, and psychosocial inputs. The bulk of care occurs in an outpatient setting and probably is best carried out by a multidisciplinary team, including some combination of the following: a psychopharmacologist, a counselor or therapist, a social worker, a nurse, a vocational counselor, and a case manager. Clinical pharmacists and internists can be valuable members of the team. It is important not to neglect the medical care of the person with schizophrenia. Obesity, diabetes, cardiovascular disease, and lung diseases are prevalent in schizophrenia, and the person with schizophrenia often does not receive adequate medical care for such conditions. Antipsychotic medications (also known as neuroleptic medications or major tranquilizers) diminish the positive symptoms of schizophrenia and prevent relapses. Approximately 80% of patients relapse within 1 year if antipsychotic medications are stopped, whereas only 20% relapse if treated. Children, pregnant or breastfeeding women, and elderly patients present special challenges. In all of these cases, medications must be used with particular caution. Although treatment is primarily provided on an outpatient basis, patients with schizophrenia may require hospitalization for exacerbation of symptoms caused by noncompliance with pharmacotherapy, substance abuse, adverse effects or toxicity of medications, medical illness, psychosocial stress, or the waxing and waning of the illness itself. Hospitalizations are usually brief and are typically oriented towards crisis management or symptom stabilization. Treatment of patients with schizophrenia, particularly during a psychotic episode, may raise the issue of informed consent. Consent is a legal term and should be used with respect to specific tasks. A person who is delusional in some but not all areas of life may still have the capacity to make medical and financial decisions.



Abstract – Pharma-06

MANAGEMENT OF ORAL FUNGAL INFECTIONS

Simin Abraham

Saveetha Dental College,
Saveetha University, Chennai-600077

Small amounts of the candida fungus are present in the mouth, digestive tract, and skin of most healthy people and are normally kept in check by other bacteria and microorganisms in the body. However, certain illnesses, stress, or medications can disturb the delicate balance, causing the fungus candida to grow out of control, causing thrush. Medications that upset the balance of microorganisms in the mouth and may cause thrush include corticosteroids, antibiotics, and birth control pills. Illnesses or medical situations that make candida infection more likely to develop include uncontrolled diabetes, HIV infection, cancer, dry mouth, or pregnancy (caused by the hormonal changes that occur with pregnancy). People who smoke or wear dentures that don't fit properly also are at increased risk for thrush. In addition, babies can pass the infection to their mothers during breast-feeding. Candida is present in the oral cavity of almost half of the population. Everyone who wears dentures will have candida, without necessarily suffering any ill effects. Candida doesn't become a problem until there's a change in the chemistry of the oral cavity that favours candida over the other micro-organisms that are present. These changes can occur as a side-effect of taking antibiotics or drug treatment, such as chemotherapy. These changes can also be caused by certain conditions – such as diabetes, drug abuse, malnutrition – and as a consequence of immune deficiencies relating to old age or infection – such as AIDS. Furthermore, people whose dentures don't fit well can sustain breaks in the mucous membranes in their mouth, which can act as a gateway for candida. People who suffer from this problem often have moist, pale pink spots on their lips, known as angular cheilitis, which is an indication of a candida infection. In Babies, oral thrush may clear spontaneously without treatment and may be prevented by sterilising all feeding equipment and mouth toys. It's been suggested that by giving the child sterilised water immediately following a milk feed, residual milk in the mouth is rinsed away, reducing the population of candida within the oral cavity. In other circumstances, the condition that caused the thrush must be brought under control. This might involve investing in new and better fitting dentures, or adjusting diabetes treatment. For AIDS patients, it's not always possible to correct the immune deficiency. A course of oral treatment, using antifungal drugs, has to be used. Once the condition that caused the oral thrush has been treated, the thrush itself can be cured. Treatment is with antifungal medicines, in the form of pastilles that are sucked or oral suspensions that are held in the mouth before swallowing.



Abstract – Pharma-07

POLYMERIC MICELLES FOR ORAL DRUG DELIVERY

Suraj Sharma

*Saveetha Dental College,
Saveetha University, Chennai-600077*

Oral administration is the most commonly preferred route for drug delivery because of its simplicity, convenience, and patient acceptance, especially in the case of repeated dosing for chronic therapy. In contrast to the intravenous administration, which probably results in toxic blood level after injection and sometimes an under concentration of the desired threshold towards the end of the dosing interval, oral chemotherapy can provide a prolonged and continuous exposure to a relatively lower and thus safer concentration. Now, more than 60% of marketed drugs are used as oral products. However, it is intricate to formulate a therapeutic agent for oral administration. The bioavailability of oral drugs is strongly influenced by two important parameters, solubility and permeability. Based on that, the Biopharmaceutic Classification System (BCS) defines four categories of drugs [5]. Many existing and new therapeutic entities are characterized as BCS class II (low solubility and high permeability) or BCS class IV (low solubility and low permeability). Poorly water-soluble drug candidates encountered in drug discovery cause increasing problems of poor and variable bioavailability. It is estimated that approximately 70% of new chemical entities are poorly soluble in aqueous medium and many even in organic medium. Besides, approximately 40% of currently marketed immediate-release oral drugs are considered practically insoluble (solubility less than 100 µg/mL) in water. Nanotechnology brings some advantages to the drug delivery, particular for oral drug. It allows the delivery of poorly water-soluble drugs; the targeting of drugs to specific parts of the gastrointestinal tract (GI) the transcytosis of drugs across the tight intestinal barrier; and the intracellular and transcellular delivery of large macromolecules. In recent years, nanotechnology has been widely focused on by numbers of researchers throughout the world for its superiority in increasing efficacy, specificity, tolerability, and therapeutic index of corresponding drugs. Several strategies have been proposed such as micronization, complexation, formation of solid solutions, microemulsification, and novel drug delivery systems, including nanoparticles, lipid-based vesicles, and micelles.



Abstract – Pharma-08

TREATMENT OF H1N1 FLU

Karunya.R

*Saveetha Dental College,
Saveetha University, Chennai-600077*

Swine flu (swine influenza) is a respiratory disease caused by viruses (influenza viruses) that infect the respiratory tract of pigs, resulting in nasal secretions, a barking cough, decreased appetite, and listless behavior. Swine flu produces most of the same symptoms in pigs as human flu produces in people. Swine flu can last about one to two weeks in pigs that survive. Swine influenza virus was first isolated from pigs in 1930 in the U.S. and has been recognized by pork producers and veterinarians to cause infections in pigs worldwide. In a number of instances, people have developed the swine flu infection when they are closely associated with pigs (for example, farmers, pork processors), and likewise, pig populations have occasionally been infected with the human flu infection. Treatment is largely supportive and consists of bedrest, increased fluid consumption, cough suppressants, and antipyretics and analgesics (eg, acetaminophen, nonsteroidal anti-inflammatory drugs) for fever and myalgias. Severe cases may require intravenous hydration and other supportive measures. Antiviral agents may also be considered for treatment or prophylaxis. Patients should be encouraged to stay home if they become ill, to avoid close contact with people who are sick, to wash their hands often, and to avoid touching their eyes, nose, and mouth. The CDC recommends the following actions when human infection with H1N1 influenza (swine flu) is confirmed in a community. Patients who develop flulike illness (ie, fever with either cough or sore throat) should be strongly encouraged to self-isolate in their home for 7 days after the onset of illness or at least 24 hours after symptoms have resolved, whichever is longer. To seek medical care, patients should contact their health care providers to report illness (by telephone or other remote means) before seeking care at a clinic, physician's office, or hospital. Patients who have difficulty breathing or shortness of breath or who are believed to be severely ill should seek immediate medical attention. If the patient must go into the community (eg, to seek medical care), he or she should wear a face mask to reduce the risk of spreading the virus in the community when coughing, sneezing, talking, or breathing. If a face mask is unavailable, ill persons who need to go into the community should use tissues to cover their mouth and nose while coughing. Laboratory testing has found the H1N1 influenza A (swine flu) virus susceptible to the prescription antiviral drugs oseltamivir and zanamivir. Other antiviral agents (eg, amantadine, rimantadine) are not recommended because of recent resistance to other influenza strains documented over the past several years. The usual vaccine for influenza administered at the beginning of the flu season is not effective for this viral strain.



Abstract – Pharma-09

DRUGS USED IN DENTAL EMERGENCIES

Aurelian Jovita Alexander

*Saveetha Dental College,
Saveetha University, Chennai-600077*

Dentists must be prepared to manage medical emergencies which may arise in practice. Medical emergencies were most likely to occur during and after local anesthesia, primarily during tooth extraction and endodontics. Over 60% of the emergencies were syncope, with hyperventilation the next most frequent at 7%. In the United States and Canada, studies have also shown that syncope is the most common medical emergency seen by dentists. Syncope represented approximately 50% of all emergencies reported in one particular study, with the next most common event, mild allergy, represented only 8% of all emergencies. In addition to syncope, other emergencies reported to have occurred include allergic reactions, angina pectoris/myocardial infarction, cardiac arrest, postural hypotension, seizures, bronchospasm and diabetic emergencies. The extent of treatment by the dentist requires preparation, prevention and then management, as necessary. Prevention is accomplished by conducting a thorough medical history with appropriate alterations to dental treatment as required. The most important aspect of nearly all medical emergencies in the dental office is to prevent, or correct, insufficient oxygenation of the brain and heart. Therefore, the management of all medical emergencies should include ensuring that oxygenated blood is being delivered to these critical organs. Drugs that should be promptly available to the dentist can be divided into two categories.⁴ The first category represents those which may be considered essential. The second category contains drugs which are also very helpful and should be considered as part of the emergency kit. Medical emergencies in dental practice are uncommon but could occur at any time. It is important, however, that dental practitioners are proficient in recognizing them and carrying out initial management of such emergencies.



Abstract – Pharma-10

NANOTECHNOLOGY IN DRUG DELIVERY SYSTEM

Sneha Subramaniam

*Saveetha Dental College,
Saveetha University, Chennai-600077*

Nanotechnology involves the engineering of functional systems at the molecular scale. Such systems are characterized by unique physical, optical and electronic features that are attractive for disciplines ranging from materials science to biomedicine. One of the most active research areas of nanotechnology is nanomedicine, which applies nanotechnology to highly specific medical interventions for the prevention, diagnosis and treatment of diseases. The surge in nanomedicine research during the past few decades is now translating into considerable commercialization efforts around the globe, with many products on the market and a growing number in the pipeline. Nanomaterials fall into a size range similar to proteins and other macromolecular structures found inside living cells. As such, nanomaterials are poised to take advantage of existing cellular machinery to facilitate the delivery of drugs. Nanoparticles (NPs) containing encapsulated, dispersed, absorbed or conjugated drugs have unique characteristics that can lead to enhanced performance in a variety of dosage forms. When formulated correctly, drug particles are resistant to settling and can have higher saturation solubility, rapid dissolution and enhanced adhesion to biological surfaces, thereby providing rapid onset of therapeutic action and improved bioavailability. In addition, the vast majority of molecules in a nanostructure reside at the particle surface, which maximizes the loading and delivery of cargos, such as therapeutic drugs, proteins and polynucleotides, to targeted cells and tissues. Highly efficient drug delivery, based on nanomaterials, could potentially reduce the drug dose needed to achieve therapeutic benefit, which, in turn, would lower the cost and/or reduce the side effects associated with particular drugs. Furthermore, NP size and surface characteristics can be easily manipulated to achieve both passive and active drug targeting.



Abstract – Pharma-11

NANOTECHNOLOGY IN DRUG DELIVERY

M.Priya

*Saveetha Dental College,
Saveetha University, Chennai-600077*

The use of nanotechnology in medicine and more specifically drug delivery is set to spread rapidly. Currently many substances are under investigation for drug delivery and more specifically for cancer therapy. Interestingly pharmaceutical sciences are using nanoparticles to reduce toxicity and side effects of drugs and up to recently did not realize that carrier systems themselves may impose risks to the patient. The toxicology of particulate matter differs from toxicology of substances as the composing chemical(s) may or may not be soluble in biological matrices, thus influencing greatly the potential exposure of various internal organs. This may vary from a rather high local exposure in the lungs and a low or neglectable exposure for other organ systems after inhalation. However, absorbed species may also influence the potential toxicity of the inhaled particles. For nanoparticles the situation is different as their size opens the potential for crossing the various biological barriers within the body. From a positive viewpoint, especially the potential to cross the blood brain barrier may open new ways for drug delivery into the brain. One of the major challenges in drug delivery is to get the drug at the place it is needed in the body thereby avoiding potential side effects to non diseased organs. This is especially challenging in cancer treatment where the tumor may be localized as distinct metastases in various organs. The non restricted (cyto)toxicity of chemotherapeutics thus limits the full use of their therapeutic potential. Local drug delivery or drug targeting results in increased local drug concentrations and provides strategies for more specific therapy. A multitude of substances are currently under investigation for the preparation of nanoparticles for drug delivery, varying from biological substances like albumin, gelatine and phospholipids for liposomes, and more substances of a chemical nature like various polymers and solid metal containing nanoparticles. It is obvious that the potential interaction with tissues and cells, and the potential toxicity, greatly depends on the actual composition of the nanoparticle formulation. This paper provides an overview on some of the currently used systems for drug delivery. Besides the potential beneficial use also attention is drawn to the questions how we should proceed with the safety evaluation of the nanoparticle formulations for drug delivery.



Abstract – Pharma-12

NANOMEDICINE

Senthoor.R

*Saveetha Dental College,
Saveetha University, Chennai-600077*

Non-neuronal cells of the central nervous system (CNS), termed “neuroglia,” play critical roles in neural regeneration; therefore, replacement of glial populations via implantable nanofabricated devices (providing a growth-permissive niche) is a promising strategy to enhance repair. Most constructs developed to date have lacked three-dimensionality, multiple glial populations and control over spatial orientations, limiting their ability to mimic in vivo neurocytoarchitecture. In recent years, the use of nanomedicine formulations for therapeutic and diagnostic applications has increased exponentially. Many different systems and strategies have been developed for drug targeting to pathological sites, as well as for visualizing and quantifying important (patho-) physiological processes. In addition, ever more efforts have been undertaken to combine diagnostic and therapeutic properties within a single nanomedicine formulation. These so-called nanotheranostics are able to provide valuable information on drug delivery, drug release and drug efficacy, and they are considered to be highly useful for personalizing nanomedicine-based (chemo-) therapeutic interventions. Molecular nanotechnology has been defined as the three-dimensional positional control of molecular structure to create materials and devices to molecular precision. The human body is comprised of molecules, hence the availability of molecular nanotechnology will permit dramatic progress in human medical services. More than just an extension of "molecular medicine," nanomedicine will employ molecular machine systems to address medical problems, and will use molecular knowledge to maintain and improve human health at the molecular scale. Nanomedicine will have extraordinary and far-reaching implications for the medical profession, for the definition of disease, for the diagnosis and treatment of medical conditions including aging, and ultimately for the improvement and extension of natural human biological structure and function."Nanomedicine is the preservation and improvement of human health using molecular tools and molecular knowledge of the human body."



PHARMACOLOGY – (Poster Presentations)

Abstract – Pharma-01

MANAGEMENT OF ORAL CANCER

B.N Radhika & Tanuja

*Saveetha Dental College,
Saveetha University, Chennai-600077*

Oral cancer is the sixth most common cancer worldwide, with a high prevalence in South Asia. Tobacco and alcohol consumption remain the most dominant etiologic factors, however HPV has been recently implicated in oral cancer. Surgery is the most well established mode of initial definitive treatment for a majority of oral cancers. The factors that affect choice of treatment are related to the tumor and the patient. Primary site, location, size, proximity to bone, and depth of infiltration are factors which influence a particular surgical approach. Tumors that approach or involve the mandible require specific understanding of the mechanism of bone involvement. This facilitates the employment of mandible sparing approaches such as marginal mandibulectomy and mandibulotomy. Reconstruction of major surgical defects in the oral cavity requires use of a free flap. The radial forearm free flap provides excellent soft tissue and lining for soft tissue defects in the oral cavity. The fibula free flap remains the choice for mandibular reconstruction. In many instances 'radical' methods of surgical access can be combined with a more 'conservative' resection of the mandible or cervical lymph nodes. One-stage reconstructive procedures, often incorporating osteotomy techniques, miniature bone plating and free tissue transfer, have minimised the morbidity and functional deficit so often seen after earlier operations. Oral mucosal melanomas may occur, particularly affecting the palate, alveolar gingivae and lips. Virtually any malignancy can metastasise to the oral cavity but carcinomas of the breast, lung, kidney and adrenal gland are the most common. Early detection and treatment are critical, as they increase survival chances considerably, allow for simpler treatment and result in a better quality of life for survivors.



Abstract – Pharma-02

MORPHEUS AWAKEN

Gargi.S & Madhumitha.R

*Saveetha Dental College,
Saveetha University, Chennai-600077*

Morphine is one of the naturally occurring phenanthrene alkaloids of opium derived from the opium poppy; it is classified pharmacologically as a narcotic analgesic. Morphine sulfate may be designated chemically as 7,8-didehydro-4,5-epoxy-17-methylmorphinan-3,6-diol sulfate pentahydrate (2:1) (salt) pentahydrate. Morphine sulfate occurs as white, feathery, silky crystals, cubical masses of crystals, or white crystalline powder; it is soluble in water and slightly soluble in alcohol. Morphine has a pKa of 7.9 with an octanol/water partition coefficient of 1.42 at pH 7.4. At this pH, the tertiary amino group is mostly ionized, making the molecule water soluble. Morphine is significantly more water soluble than any other opiod in clinical use. The auto-injector dispenses 10 mg morphine sulfate in 0.7 mL Water for Injection, USP with 10.5 mg benzyl alcohol and 0.7 mg edetate disodium. Sulfuric acid may be added to adjust pH. The pH range is 2.5 - 6.0. In addition to analgesia, alterations in mood, euphoria and dysphoria, and drowsiness commonly occur. Morphine depresses various respiratory centers, depresses the cough reflex, and constricts the pupils. Analgesic blood levels of morphine may cause nausea and vomiting directly by stimulating the chemoreceptor trigger zone, but nausea and vomiting are significantly more common in ambulatory than in recumbent patients as is postural syncope. Morphine increases the tone and decreases the propulsive contractions of the smooth muscle of the gastrointestinal tract. The resultant prolongation in gastrointestinal transit time is responsible for the constipating effect of morphine. Because morphine may increase biliary-tract pressure, some patients with biliary colic may experience worsening rather than relief of pain. While morphine generally increases the tone of urinary-tract smooth muscle, the net effect tends to be variable, in some cases producing urinary urgency, in others, difficulty in urination.



Abstract – Pharma-03

CHANGES IN ORAL CAVITY DURING PREGNANCY

Avinash K & Mohammed Afradh

*Saveetha Dental College,
Saveetha University, Chennai-600077*

Some striking observations have now been made about the role of sex hormones in the development of pathologic changes in the gingiva. It has been known for a long time that sex hormones contribute to the vascular changes in gingiva during pregnancy. Evidence now suggests that sex hormones also are capable of altering the normal subgingival flora and the immune response in the oral cavity, resulting in intense (pregnancy granuloma) and frequent gingivitis in pregnant women. Other problems that seem to appear in the oral cavity during pregnancy are discussed later and are for the most part unrelated to hormonal changes. These unrelated pathologic findings include periodontitis and dental caries. The special treatment and prevention needs of dental patients during pregnancy are also discussed. Four oral diseases have been described as affecting pregnant women to a greater degree than their nonpregnant counterparts: gingivitis, pregnancy granuloma, periodontitis, and dental caries. The frequently observed gingival changes that occur during pregnancy were reported as early as 1877. For many years, however, there have been questions about the reported prevalence of periodontal disease in pregnancy, the role that local and hormonal factors may have in the pathogenesis, and the implication of certain microorganisms in the etiology of this disease. Based on clinical observation, the reported frequency of so-called pregnancy gingivitis ranges from 35% To 100%. This variation may be a reflection of both the populations studied and the clinical parameters used. The causes of gingivitis in pregnancy can be separated into two general headings: host factors and microbial changes. Relative to host factors, the onset of increased gingival inflammation observed in the second month of gestation coincides with an increase in the circulating levels of estrogen and progesterone. The continuous rise in these two hormone levels up to the eighth month is reflected in the greatest amount of gingival inflammation noted during pregnancy. In addition, a marked reduction in gingivitis after the eighth month correlates with an abrupt decrease of the circulating levels of these hormones. Estrogen and progesterone receptors have been demonstrated in human gingiva,⁵ indicating that it is a target tissue for hormones.



PHYSIOLOGY-(Oral Presentations)

Abstract – Physio - 01

ARTIFICIAL BLOOD

Acquivinas,

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

Artificial blood is life -saving substance that carries oxygen to body when there is a shortage of red blood cells. While true blood serves many different functions, artificial blood is designed for the sole purpose of transporting oxygen and carbon dioxide throughout the body. Depending on the type of artificial blood, it can be produced in different ways using synthetic production, chemical isolation, or recombinant biochemical technology. The toxicity problems that plague blood substitutes are believed to originate from the free tetrameric haemoglobin in the products, and an alternative approach being considered is to encase the tetramers in an artificial container - in essence mimicking the red blood cells. Blood carries all these connotations for good reason -- it's absolutely essential to the survival of vertebrate life forms, including people. It carries oxygen from your lungs to all the cells in your body. It also picks up the carbon dioxide you don't need and returns it to your lungs so you can exhale it. Blood delivers nutrients from your digestive system and hormones from your endocrine system to the parts of your body that need them. It passes through the kidneys and liver, which remove or break down wastes and toxins. Immune cells in your blood help prevent and fight off illnesses and infections. Blood can also form clots, preventing fatal blood loss from minor cuts and scrapes. A blood substitute (also called artificial blood or blood surrogates) is a substance used to mimic and fulfill some functions of biological blood. It aims to provide an alternative to blood transfusion, which is transferring blood or blood-based products from one person into another. Thus far, there are no well-accepted oxygen-carrying blood substitutes, which are the typical objective of a blood (RBC) transfusion; however, there are widely available non-blood volume expanders for cases where only volume restoration is required. These are helping doctors and surgeons avoid the risks of disease transmission and immune suppression, address the chronic blood donor shortage, and address the concerns of Jehovah's Witnesses and others who have religious objections to receiving transfused blood. The first approved oxygen-carrying blood substitute was a perfluorocarbon-based product called Fluosol-Haemoglobin is the main component of red blood cells, comprising about 33% of the cell mass. Haemoglobin-based products are called haemoglobin-based oxygen carriers (HBOCs)



Abstract – Physio - 02

STEM CELL THERAPY

Nathaniel

*Saveetha dental college and hospital,
Saveetha University, Chennai – 600077*

Stem cell therapy is an intervention strategy that introduces new adult stem cells into damaged tissue in order to treat disease or injury. Many medical researchers believe that stem cell treatments have the potential to change the face of human disease and alleviate suffering. The ability of stem cells to self-renew and give rise to subsequent generations with variable degrees of differentiation capacities, offers significant potential for generation of tissues that can potentially replace diseased and damaged areas in the body, with minimal risk of rejection and side effects. A number of current stem cell treatments already exist, although they are not commonly used because they tend to be experimental and not very cost-effective technologies. Stem cell treatment protocols employ well-targeted combinations of allogeneic human umbilical cord stem cells, autologous bone marrow stem cells, and autologous adipose stem cells, and to treat the diseases. Successful treatment for leukemia depends on getting rid of all the abnormal leukocytes in the patient, allowing healthy ones to grow in their place. One way to do this is through chemotherapy, which uses potent drugs to target and kill the abnormal cells. When chemotherapy alone can't eliminate them all, physicians sometimes turn to bone marrow transplants. In a bone marrow transplant, the patient's bone marrow stem cells are replaced with those from a healthy, matching donor. To do this, all of the patient's existing bone marrow and abnormal leukocytes are first killed using a combination of chemotherapy and radiation. Next, a sample of donor bone marrow containing healthy stem cells is introduced into the patient's bloodstream. If the transplant is successful, the stem cells will migrate into the patient's bone marrow and begin producing new, healthy leukocytes to replace the abnormal cells. Stem cell technology gives hope of effective treatment for a variety of malignant and non-malignant diseases through the rapid developing field that combines the efforts of cell biologists, geneticists and clinicians. Stem cells are defined as totipotent progenitor cells capable of self-renewal and multi-lineage differentiation. Stem cells survive well and show steady division in culture which then causes them the ideal targets for vitro manipulation. Research into solid tissue stem cells has not made the same progress as haematopoietic stem cells because of the difficulty of reproducing the necessary and precise 3D arrangements and tight cell-cell and cell-extracellular matrix interactions that exist in solid organs. Yet, the ability of tissue stem cells to assimilate into the tissue cyto architecture under the control of the host microenvironment and developmental cues makes them ideal for cell replacement therapy



Abstract – Physio - 03

CONDUCTION SYSTEM OF HEART

Shanmugapriya,

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

The normal electrical conduction in the heart allows the impulse that is generated by the sino atrial node (SA node) of the heart to be propagated to (and stimulate) the myocardium (Cardiac muscle). The myocardium contracts after stimulation. It is the ordered stimulation of the myocardium that allows efficient contraction of the heart, thereby allowing blood to be pumped throughout the body. Going back to the analogy of the central heating system, the pump, pipes and radiators are of no use unless connected to a power supply. The pump needs electricity to work. The human heart has a similar need for a power source and also uses electricity. The cardiac conduction system is a group of specialized cardiac muscle cells in the walls of the heart that send signals to the heart muscle causing it to contract. This pathway is made up of 5 elements: The sino-atrial (SA) node, the atrio-ventricular (AV) node, the bundle of His, the left and right bundle branches, the Purkinje fibres. The conducting system provides the heart its automatic rhythmic beat. For the heart to pump efficiently and the systemic and pulmonary circulations to operate in synchrony, the events in the cardiac cycle must be coordinated.

Pacemaker Impulse Generation
The sinoatrial (SA) node (also referred to as the pacemaker of the heart) contracts generating nerve impulses that travel throughout the heart wall. This causes both atria to contract. The SA node is located in the upper wall of the right atrium. It is composed of nodal tissue that has characteristics of both muscle and nervous tissue.

AV node Impulse Conduction:
The atrioventricular (AV) node lies on the right side of the partition that divides the atria, near the bottom of the right atrium. When the impulses from the SA node reach the AV node they are delayed for about a tenth of a second. This delay allows the atria to contract and empty their contents first.

AV Bundle Impulse Conduction:
The impulses are then sent down the atrioventricular bundle. This bundle of fibers branches off into two bundles and the impulses are carried down the center of the heart to the left and right ventricles.

Purkinje Fibers Impulse Conduction
At the base of the heart the atrioventricular bundles start to divide further into Purkinje fibers. When the impulses reach these fibers they trigger the muscle fibers in the ventricles to contract. An impulse (action potential) that originates from the SA node at a rate of 60 - 100 beats/minute (bpm) is known as normal sinus rhythm. If SA nodal impulses occur at a rate less than 60 bpm, the heart rhythm is known as sinus bradycardia. If SA nodal impulses occur at a rate exceeding 100 bpm, the consequent rapid heart rate is sinus tachycardia. These conditions are not necessarily bad symptoms, however. Trained athletes, for example, usually show heart rates slower than 60 bpm when not exercising.



Abstract –Physio-04

PACEMAKER

Dheepika,

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

A pacemaker (or artificial pacemaker, so as not to be confused with the heart's natural pacemaker) is a medical device that uses electrical impulses, delivered by electrodes contracting the heart muscles, to regulate the beating of the heart. The primary purpose of a pacemaker is to maintain an adequate heart rate, either because the heart's natural pacemaker is not fast enough, or there is a block in the heart's electrical conduction system. Modern pacemakers are externally programmable and allow the cardiologist to select the optimum pacing modes for individual patients. Some combine a pacemaker and defibrillator in a single implantable device. Others have multiple electrodes stimulating differing positions within the heart to improve synchronisation of the lower chambers (ventricles) of the heart. Methods of pacing Percussive pacing, also known as transthoracic mechanical pacing, is the use of the closed fist, usually on the left lower edge of the sternum over the right ventricle in the vena cava, striking from a distance of 20 – 30 cm to induce a ventricular beat. This is an old procedure used only as a life-saving means until an electrical pacemaker is brought to the patient. The rescuer selects the pacing rate, and gradually increases the pacing current (measured in mA) until electrical capture (characterized by a wide QRS complex with a tall, broad T wave on the ECG) is achieved, with a corresponding pulse. Pacing artifact on the ECG and severe muscle twitching may make this determination difficult. External pacing should not be relied upon for an extended period of time. It is an emergency procedure that acts as a bridge until transvenous pacing or other therapies can be applied. The epicardial pacemaker leads were placed after the patient collapsed during aortic valve surgery. In the first half of the tracing, pacemaker stimuli at 60 beats per minute result in a wide QRS complex with a right bundle branch block pattern. Because decreased pacemaker stimuli do not result in a ventricular escape rhythm, the patient can be said to be pacemaker-dependent and needs a definitive pacemaker. Temporary epicardial pacing is used during open heart surgery should the surgical procedure create atrioventricular block. The electrodes are placed in contact with the outer wall of the ventricle (epicardium) to maintain satisfactory cardiac output until a temporary transvenous electrode has been inserted. Transvenous pacing, when used for temporary pacing, is an alternative to transcutaneous pacing. A pacemaker wire is placed into a vein, under sterile conditions, and then passed into either the right atrium or right ventricle. The pacing wire is then connected to an external pacemaker outside the body. Transvenous pacing is often used as a bridge to permanent pacemaker placement.



Abstract – Physio - 05

BREATHING IN HIGH ALTITUDE

R.Dhivya

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

Everyone breathes faster and deeper (hyperventilates) at high altitude – it is necessary to do this in order to survive. The function of the lungs is to expose blood to fresh air, and breathing faster essentially increases the flow of fresh air past the blood. This means that whenever an oxygen molecule is taken away by the blood, it is quickly replaced by a fresh one. This means that there is always more oxygen available to be taken up into the blood. Carbon dioxide (CO₂) is constantly produced by the body and the lungs remove it by allowing it to diffuse into the fresh air in the lungs. Increasing the flow of fresh air through the lungs, by hyperventilating, increases the rate at which CO₂ is lost. This happens for the same reason that wet laundry dries faster in a strong wind: the wind blows away the water vapour, so there is space for more water to evaporate. Hyperventilating changes the level of carbon dioxide in the blood using the altitude oxygen calculator. Simply increase the number of breaths taken per minute, and watch what happens to the CO₂. Because CO₂ is an acid gas, losing more of it from the blood leaves the blood relatively alkaline. At altitudes up to about 6000m, the kidneys correct the alkalinity of the blood over a few days by removing alkali (in the form of bicarbonate ions, HCO₃⁻) from the blood. Our oxygen calculator will allow you to remove bicarbonate ions; watch the effect on the alkalinity of the blood. The heart still pumps the same amount of blood through the lungs, but because all of the blood vessels are tightly constricted, the pressure needed to force blood through them is much greater. In fact the pressures get so high that some of the tiniest blood vessels break open, and this is thought to be part of the cause of HAPE (high altitude pulmonary edema). The effects of high altitude on humans are considerable. The percentage saturation of hemoglobin with oxygen determines the content of oxygen in our blood. After the human body reaches around 2,100 m (7,000 feet) above sea level, the saturation of oxyhemoglobin begins to plummet. However, the human body has both short-term and long-term adaptations to altitude that allow it to partially compensate for the lack of oxygen. decreased intake of oxygen at high altitudes is to slow down your breathing rate, but increase the depth of your breaths. Instead of breathing quick, shallow and only in your lungs, breathe slow, deep and inhale until your stomach expands.



Abstract – Physio - 06

MULTIPLE SCLEROSIS

Meenakshi.J,

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

Multiple sclerosis (or MS) is a chronic, often disabling disease that attacks the central nervous system (CNS), which is made up of the brain, spinal cord, and optic nerves. Symptoms may be mild, such as numbness in the limbs, or severe, such as paralysis or loss of vision. The progress, severity, and specific symptoms of MS are unpredictable and vary from one person to another. They can include visual disturbances, muscle weakness, trouble with coordination and balance sensations such as numbness, prickling, or "pins and needles" . There is no known cure for multiple sclerosis at this time. But, there are treatments that may slow the disease. The goal of treatment is to control symptoms and help you maintain a normal quality of life. Medicines are often taken long-term. These include: Medicines to slow the disease steroids may be used to decrease the severity of attacks medicines to control symptoms such as muscle spasms, urinary problems, fatigue or mood problems The following may also be helpful for people with MS: Physical therapy, speech therapy, occupational therapy, and support groups Assistive devices, such as wheelchairs, bed lifts, shower chairs, walkers, and wall bars A planned exercise program early in the course of the disorder A healthy lifestyle, with good nutrition and enough rest and relaxation Avoiding fatigue, stress, temperature extremes, and illness Changes in what you eat or drink if there are swallowing problems, Making changes around the home to prevent falls ,Social workers or other counseling services to help you cope with the disorder and get assistance ,Vitamin D or other supplements (talk to your doctor first) . Exactly what causes the immune system to act in this way is unclear, but most experts think a combination of genetic and environmental factors are involved. Smoking has been shown to be an independent risk factor for MS. Stress may be a risk factor although the evidence to support . Association with occupational exposures and toxins mainly solvents has been evaluated, but no clear conclusions have been reached. Vaccinations were studied as causal factors; however, most studies show no association. Several other possible risk factors, such as diet and hormone intake, have been looked at; however, evidence on their relation with the disease is "sparse and unpersuasive". Gout occurs less than would be expected and lower levels of uric acid have been found in people with MS. This has led to the theory that uric acid is protective; although it's exact importance remains unknown.



Abstract – Physio - 07

Effects Of Cell Phones On Ear Drum

Madhulika,

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

Mobile phone radiation and health concerns have been raised, especially following the enormous increase in the use of wireless mobile telephony throughout the world. This is because cell phones use Electromagnetic radiation in the Microwave range. These concerns have induced a large body of research in animals and in humans. The rate at which radiation is absorbed by the human body is measured by the Specific Absorption Rate (SAR) and its maximum levels for modern handset is set between 1.6 to 2 W/Kg averaged for 1 gram tissue. If the SAR level is above the limit, it may cause both Thermal and Non thermal effects on the body especially on the ear and head since these are at the “Near Field” of the radiation. Thermal effect of microwave is the dielectric heating in which any dielectric material such as living tissue is heated by rotations of polar molecules such as water. Ear Defects Finally, one major danger of excess use of a cell phone is the risk of damaging the ear drum. A large percent of ear problem reported are caused by the harmful way people use their mobile device. To avoid the risk of damaging your ear drum, whenever you want to make or receive calls let your phone’s speaker stay at a reasonable distance from your ear or reduce your phone speaker’s volume whenever you want to put it near your ear. Sound reaching the outer ear is funneled through the canal to ear drum. The sound causes the eardrum to vibrate, which in turn causes the malleus (mallet), incus (anvil), and stapes (stirrup) to also vibrate. The vibration of these three bones has an amplifying effect on the sound. The amplified sound is then transmitted to the fluid-filled cochlea. As the fluid in the cochlea vibrates, traveling waves are formed. Small sensory “hair” cells located on a membrane of the cochlea move with the motion of the traveling waves. This causes them to be pushed against an adjacent membrane. When these sensory “hairs” are agitated in this way, they are able to accept an inrush of chemicals which cause an electric signal to be generated. The auditory nerve transmits the electric signal to the brain. According to Mayo Clinic, the frequent use of mobile phone can be destructive to your skin, by causing acne and burns on your face. It was recorded that, the frequent call we make and receive, the more we are exposed to the damages of a cell phone and the more we’re likely to have bad skin, this happens because, when you keep your phone close to your face while receiving calls, you create a friction between your face and the surface of the phone and that part of the face you use in receiving calls begins to burn out.



Abstract – Physio - 08

CROHN'S DISEASE

Pratiba Anita Doss

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

Crohn's disease is an inflammatory bowel disease (IBD). It causes inflammation of the lining of your digestive tract, which can lead to abdominal pain, severe diarrhea and even malnutrition. Crohn's disease is caused by interactions between environmental, immunological and bacterial factors in genetically susceptible individuals. This results in a chronic inflammatory disorder, in which the body's immune system attacks the gastrointestinal tract possibly directed at microbial antigens. While Crohn's is an immune related disease, it does not appear to be an autoimmune disease (in that the immune system is not being triggered by the body itself). The exact underlying immune problem is not clear; however it may be an immune deficiency state. Crohn's disease is associated with a type of rheumatologic disease known as seronegative spondyloarthropathy. This group of diseases is characterized by inflammation of one or more joints (arthritis) or muscle insertions (enthesitis). The arthritis can affect larger joints, such as the knee or shoulder, or may exclusively involve the small joints of the hands and feet. The arthritis may also involve the spine; leading to ankylosing spondylitis if the entire spine is involved or simply sacroiliitis if only the lower spine is involved. The symptoms of arthritis include painful, warm, swollen, stiff joints and loss of joint mobility or function. Crohn's disease may also involve the skin, blood, and endocrine system. One type of skin manifestation, erythema nodosum, presents as red nodules usually appearing on the shins. Erythema nodosum is due to inflammation of the underlying subcutaneous tissue, and is characterized by septal panniculitis. Another skin lesion, pyoderma gangrenosum, is typically a painful ulcerating nodule. Crohn's disease also increases the risk of blood clots; painful swelling of the lower legs can be a sign of deep venous thrombosis, while difficulty breathing may be a result of pulmonary embolism. Autoimmune hemolytic anemia, a condition in which the immune system attacks the red blood cells, is also more common in Crohn's disease and may cause fatigue, pallor, and other symptoms common in anemia. Clubbing, a deformity of the ends of the fingers, may also be a result of Crohn's disease. Finally, Crohn's disease may cause osteoporosis, or thinning of the bones. Individuals with osteoporosis are at increased risk of bone fractures.



Abstract – Physio – 09

PANCREATITIS

Durgha,

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

Pancreatitis is inflammation in the pancreas. The pancreas is a long, flat gland that sits tucked behind the stomach in the upper abdomen. The pancreas produces enzymes that assist digestion and hormones that help regulate the way your body processes sugar (glucose). Pancreatitis can occur as acute pancreatitis — meaning it appears suddenly and lasts for days. Or pancreatitis can occur as chronic pancreatitis, which describes pancreatitis that occurs over many years. Mild cases of pancreatitis may go away without treatment, but severe cases can cause life-threatening complications. In the majority of cases, acute pancreatitis is caused by gallstones or heavy alcohol use. Other causes include medications, infections, trauma, metabolic disorders, and surgery. In up to 30% of people with acute pancreatitis, the cause is unknown. The severity of acute pancreatitis may range from mild abdominal discomfort to a severe, life-threatening illness. However, the majority of people with acute pancreatitis recover completely after receiving the appropriate treatment. In very severe cases, acute pancreatitis can result in bleeding into the gland, serious tissue damage, infection, and cyst formation. Severe pancreatitis can also create conditions which can harm other vital organs such as the heart, lungs, and kidneys. Chronic pancreatitis occurs most commonly after an episode of acute pancreatitis and is the result of ongoing inflammation of the pancreas. In about 45% of people, chronic pancreatitis is caused by prolonged alcohol use. Other causes include gallstones, hereditary disorders of the pancreas, cystic fibrosis, high triglycerides, and certain medicines. Damage to the pancreas from excessive alcohol use may not cause symptoms for many years, but then the person may suddenly develop severe pancreatitis symptoms, including severe pain and loss of pancreatic function, resulting in digestion and blood sugar abnormalities. Symptoms of acute pancreatitis may include Upper abdominal pain that radiates into the back; patients may describe this as a "boring sensation" that may be aggravated by eating, especially foods high in fat, swollen and tender abdomen, nausea and vomiting, fever and increased heart rate. The symptoms of chronic pancreatitis are similar to those of acute pancreatitis. Patients frequently experience constant pain in the upper abdomen that radiates to the back. In some patients, the pain may be disabling. Other symptoms may include weight loss caused by poor absorption (malabsorption) of food. This malabsorption occurs because the gland is not secreting enough enzymes to break down the food normally. Also, diabetes may develop if the insulin-producing cells of the pancreas become damaged.



Abstract – Physio - 10

DIALYSIS

Joji Alex

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

Dialysis is the artificial process of eliminating waste (diffusion) and unwanted water (ultrafiltration) from the blood. Our kidneys do this naturally. Some people, however, may have failed or damaged kidneys which cannot carry out the function properly - they may need dialysis. Haemodialysis The blood circulates outside the body of the patient - it goes through a machine that has special filters. The blood comes out of the patient through a catheter (a flexible tube) that is inserted into the vein. The filters do what the kidney's do; they filter out the waste products from the blood. The filtered blood then returns to the patient via another catheter. Dialysis helps the body by performing the functions of failed kidneys. The kidney has many roles. An essential job of the kidney is to regulate the body's fluid balance. It does this by adjusting the amount of urine that is excreted on a daily basis. On hot days, the body sweats more. Thus, less water needs to be excreted through the kidneys. On cold days, the body sweats less. Thus, urine output needs to be greater in order to maintain the proper balance within the body. It is the kidney's job to regulate fluid balance by adjusting urine output. A semipermeable membrane (one with microscopic holes that allow only certain types of particles to pass through) keeps the blood apart from the dialysate. This membrane lets the wastes and fluid in your blood flow through into the dialysate. Hemofiltration is a similar treatment to hemodialysis, but it makes use of a different principle. The blood is pumped through a dialyzer or "hemofilter" as in dialysis, but no dialysate is used. A pressure gradient is applied; as a result, water moves across the very permeable membrane rapidly, "dragging" along with it many dissolved substances, including ones with large molecular weights, which are not cleared as well by hemodialysis. Salts and water lost from the blood during this process are replaced with a "substitution fluid" that is infused into the extracorporeal circuit during the treatment. Hemodiafiltration is the combining of hemodialysis and hemofiltration in one process. Hemodiafiltration is a combination of hemodialysis and hemofiltration. In intestinal dialysis, the diet is supplemented with soluble fibres such as acacia fibre, which is digested by bacteria in the colon. This bacterial growth increases the amount of nitrogen that is eliminated in fecal waste. An alternative approach utilizes the ingestion of 1 to 1.5 liters of non-absorbable solutions of polyethylene glycol or mannitol every fourth hour.



Abstract – Physio - 11

ANTIOXIDANTS

Aishwarya Rajan

*Saveetha dental college and hospital,
Saveetha University, Chennai – 600077*

Antioxidants are man-made or natural substances that may prevent or delay some types of cell damage. Antioxidants are found in many foods, including fruits and vegetables. They are also available as dietary supplements. Examples of antioxidants include Beta-carotene, Lutein, Lycopene, Selenium, Vitamin A, Vitamin C, Vitamin E. High-dose supplements of antioxidants may be linked to health risks in some cases. For example, high doses of beta-carotene may increase the risk of lung cancer in smokers. High doses of vitamin E may increase risks of prostate cancer and one type of stroke. Antioxidant supplements may also interact with some medicines. Carotenoids in foods, beta-carotene, lycopene and lutein are well-known leaders in the fight to reduce the damage from free radicals. Foods high in carotenoids may be effective allies against prostate cancer (beta-carotene); cancers of the mouth, pharynx, esophagus, stomach, colon and rectum (lycopene); and may help decrease your risk of macular degeneration (lutein). Vitamin C offers a wide-variety of health benefits, including protecting from infection and damage to body cells, helping produce collagen (the connective tissue that holds bones and muscles together); protecting your body from bruising by keeping capillary walls and blood vessels firm; and helping in the absorption of iron and folate. To take advantage of these benefits, eat foods rich in vitamin C like citrus fruits (oranges, grapefruits and tangerines), strawberries, sweet peppers, tomatoes, broccoli and potatoes. Glutathione is a cysteine-containing peptide found in most forms of aerobic life. It is not required in the diet and is instead synthesized in cells from its constituent amino acids. Glutathione has antioxidant properties since the thiol group in its cysteine moiety is a reducing agent and can be reversibly oxidized and reduced. In cells, glutathione is maintained in the reduced form by the enzyme glutathione reductase and in turn reduces other metabolites and enzyme systems, such as ascorbate in the glutathione-ascorbate cycle, glutathione peroxidases and glutaredoxins, as well as reacting directly with oxidants. Due to its high concentration and its central role in maintaining the cell's redox state, glutathione is one of the most important cellular antioxidants. In some organisms glutathione is replaced by other thiols, such as by mycothiol in the Actinomycetes, bacillithiol in some Gram-positive bacteria, or by trypanothione in the Kinetoplastids.



Abstract – Physio – 12

DEFICIENCY DISEASES PERTAINING TO ORAL CAVITY

Sathya Ramanathan

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

The most common oral diseases are dental caries and the periodontal diseases. Individuals are vulnerable to dental caries throughout life, with 85 percent of adults aged 18 and older affected. Periodontal diseases are most often seen in maturity, with the majority of adults experiencing some signs and symptoms by the mid-30s. Certain r The bacteria colonizing the mouth are known as the oral flora. They form a complex community that adheres to tooth surfaces in a gelatinous mat, or biofilm, commonly called dental plaque. A cariogenic biofilm at a single tooth site may contain one-half-billion bacteria, of which species of mutans streptococci are critical components. These bacteria are able to ferment sugars and other carbohydrates to form lactic and other acids. Repeated cycles of acid generation can result in the microscopic dissolution of minerals in tooth enamel and the formation of an opaque white or brown spot under the enamel surface (Mandel 1979). are forms of periodontal disease affect young people. A mouth ulcer (also termed an oral ulcer, or a mucosal ulcer) is an ulcer that occurs on the mucous membrane of the oral cavity. More plainly, a mouth ulcer is a sore or open lesion in the mouth.^[1] Mouth ulcers are very common, occurring in association with many diseases and by many different mechanisms, but usually there is no serious underlying cause. The two most common causes of oral ulceration are local trauma (e.g. rubbing from a sharp edge on a filling) and aphthous stomatitis ("canker sores"), a condition characterized by recurrent formation of oral ulcers for largely unknown reasons. Mouth ulcers often cause pain and discomfort, and may alter the person's choice of food while healing occurs (e.g. avoiding acidic or spicy foods and beverages). They may occur singly or multiple ulcers may occur at the same time (a "crop" of ulcers). Once formed, the ulcer may be maintained by inflammation and/or secondary infection. Gingivitis is an inflammation of the gums characterized by a change in color from normal pink to red, with swelling, bleeding, and often sensitivity and tenderness. These changes result from an accumulation of biofilm along the gingival margins and the immune system's inflammatory response to the release of destructive bacterial products Many drugs can cause mouth ulcers as a side effect. Common examples are alendronate^[8] (a bisphosphonate, commonly prescribed for osteoporosis), cytotoxic drugs (e.g. methotrexate, i.e. chemotherapy), non steroidal anti-inflammatory drugs, nicorandil^[9] (may be prescribed for angina) and propylthiouracil (e.g. used for hyperthyroidism)



PHYSIOLOGY-(Poster Presentations)

Abstract – Physio - 01

PLACENTAL FUNCTIONS

D.Divya & Y.Poojitha,

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

The placenta is an organ that connects the developing fetus to the uterine wall to allow nutrient uptake, waste elimination, and gas exchange via the mother's blood supply. Placentas are a defining characteristic of eutherian or "placental" mammals, but are also found in some non-mammals with varying levels of development. The placenta functions as a fetomaternal organ with two components: the fetal placenta (Chorion frondosum), which develops from the same blastocyst that forms the fetus, and the maternal placenta (Decidua basalis), which develops from the maternal uterine tissue. Oxygen and nutrients pass from your blood supply into the placenta. From there, the umbilical cord carries the oxygen and nutrients to your unborn baby. Waste products from the baby, such as carbon dioxide, pass back along the umbilical cord to the placenta and then into your bloodstream, for your body to dispose of them. The placenta produces hormones that help your baby to grow and develop. The placenta also gives some protection against infection for your baby while it's in the womb. It protects your baby against most bacteria. However, it does not protect your baby against viruses. For example, if you're not immune to the rubella virus (German measles), it can cross the placenta and cause miscarriage, stillbirth or birth defects such as deafness, brain damage, heart defects and cataracts. Alcohol, nicotine and other drugs can also cross the placenta and can cause damage to your unborn baby. Towards the end of your pregnancy, the placenta passes antibodies from you to your baby, giving them immunity for about three months after birth. Pre-eclampsia/blood pressure: this common problem, which affects up to 10 per cent of women in their first pregnancy, originates in the placenta, and occurs when the placenta has not developed normally. If a woman experiences significant blood pressure during pregnancy, labour or after birth, then she will need medication to treat and lower her blood pressure. In addition, the woman has to be assessed to see if her kidney, liver, blood clotting and central nervous system have been affected. The definitive treatment for a woman with pre-eclampsia during pregnancy is delivery of the baby. This is generally best if a woman has a vaginal birth, but there may be instances where a caesarean section is required. Placental abruption: this is a condition where the placenta has not developed normally and eventually separates from the wall of the uterus during the pregnancy. In severe cases, the baby has to be delivered usually between one and two hours. This will often be by caesarean section, however there are a good number of women who labour very quickly and the baby is born vaginally.



Abstract – Physio -02

CIRCADIAN RHYTHM

B.Keerthana & Syed Nayeema,

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

A circadian rhythm is a roughly 24 hour cycle in the physiological processes of living beings, including plants, animals, fungi and cyanobacteria. In a strict sense, circadian rhythms are endogenously generated, although they can be modulated by external cues such as sunlight and temperature. Circadian rhythms are important in determining the sleeping and feeding patterns of all animals, including human beings. There are clear patterns of brain wave activity, hormone production, cell regeneration and other biological activities linked to this daily cycle. Circadian rhythm disorders can be caused by many factors, including: shift work, pregnancy, time zone changes, medications, changes in routine. Circadian rhythm disorders are treated based on the kind of disorder diagnosed. The goal of treatment is to fit a person's sleep pattern into a schedule that allows him or her to meet the demands of a desired lifestyle. Therapy usually combines proper sleep hygiene techniques and external stimulus therapy, such as bright light therapy or chronotherapy. While the process underlying circadian rhythm is still being investigated, it is known to be controlled mainly by the release of hormones. In humans, the internal clock is located within the brain's hypothalamus and pineal gland, which releases melatonin in response to the information it receives from photoreceptors in the retina. Delayed Sleep Phase Disorder is a circadian rhythm disorder most common in adolescents and young adults whose "night owl" tendencies delay sleep onset -- often until 2 a.m. or later. If allowed to sleep in late (often as late as 3 p.m.), sleep deprivation does not occur. However, earlier wake up times can lead to daytime sleepiness and impaired work and school performance. Advanced Sleep Phase Disorder is usually seen in the elderly. This disorder is identified by regular early evening bedtimes (6 p.m. - 9 p.m.) and early morning awakenings (2 a.m. - 5 a.m.). People with advanced sleep phase syndrome are "morning larks" and typically complain of early morning awakening or insomnia as well as sleepiness in the late afternoon or early evening. Jet Lag results from a conflict between the pattern of sleep and wakefulness between the internal biological clock and that of a new time zone. Shift Work Disorder affects people who frequently rotate shifts or work at night. Work schedules conflicts with the body's natural circadian rhythm and some individuals have difficulty adjusting to the change. Shift work disorder is identified by a constant or recurrent pattern of sleep interruption that results in insomnia or excessive sleepiness.



Abstract – Physio - 03

HAEMORRHAGE AND SHOCK CYCLE

Linda & Monica.B,

*Saveetha dental college and hospital,
Saveetha University, Chennai – 600077*

Hemorrhagic shock is a condition of reduced tissue perfusion, resulting in the inadequate delivery of oxygen and nutrients that are necessary for cellular function. Whenever cellular oxygen demand outweighs supply, both the cell and the organism are in a state of shock. On a multicellular level, the definition of shock becomes more difficult because not all tissues and organs will experience the same amount of oxygen imbalance for a given clinical disturbance. Clinicians struggle daily to adequately define and monitor oxygen utilization on the cellular level and to correlate this physiology to useful clinical parameters and diagnostic tests. Hemorrhage, a leading cause of morbidity and mortality, is encountered frequently in hospital emergency rooms, operating rooms, and intensive care units. Marked loss of intravascular volume subsequently may lead to hemodynamic instability, decreased tissue perfusion, impaired delivery of O₂ and nutrients, cellular hypoxia, organ damage, and eventually death. Gastrointestinal bleeding and trauma are the most common causes of hemorrhagic shock. Controlled hemorrhage caused a more than 50% decrease in the mean aortic pressure. Lactated Ringer solution was used to resuscitate the swine. The volume and type of solution that we used as well as the way it was infused simulated the initial approach for fluid resuscitation in trauma and hemorrhagic shock in the prehospital setting and emergency department. The effect of a resuscitation treatment should not be judged only during active volume restoration but also after treatment. In our experimental protocol, we targeted a fluid resuscitation to 90% of the baseline blood pressure. The large volume of Lactated Ringer solution infused resulted in effective hemodynamic performance due to expansion of the intravascular volume. After infusion, hemodynamic variables decreased, probably because crystalloids entered the interstitial space due to lack of intrinsic colloid osmotic pressure. Shock associated with the sudden and rapid loss of significant amounts of blood. Severe traumatic injuries often cause such blood losses. This results in inadequate perfusion to meet the metabolic demands of cellular function. Death occurs within a relatively short time unless transfusion quickly restores normal blood volume. Hemorrhagic shock occurs in about 1-2% of trauma cases. Often accompanies secondary shock. The symptoms are cardiac arrest, cool skin, unconsciousness, weakness etc .



Abstract – Physio -04

SICKLE CELL ANAEMIA

Lainu & Divya.T,

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

Sickle-cell anaemia (SCA) or drepanocytosis, is a hereditary blood disorder, characterized by red blood cells that assume an abnormal, rigid, sickle shape. Sickling decreases the cells flexibility and results in a risk of various complications. The sickling occurs because of a mutation in the haemoglobin gene. Normal red blood cells are disc-shaped and look like doughnuts without holes in the center. They move easily through your blood vessels. Red blood cells contain an iron-rich protein called hemoglobin. This protein carries oxygen from the lungs to the rest of the body. Sickle cells contain abnormal hemoglobin called sickle hemoglobin or hemoglobin S. Sickle hemoglobin causes the cells to develop a sickle, or crescent, shape. Sickle cells are stiff and sticky. They tend to block blood flow in the blood vessels of the limbs and organs. Blocked blood flow can cause pain and organ damage. It can also raise the risk for infection. The sickled red blood cells are fragile and prone to rupture. When the number of red blood cells decreases from rupture (hemolysis), anemia is the result. This condition is referred to as sickle cell anemia. The irregular sickled cells can also block blood vessels causing tissue and organ damage and pain. Sickle cell anemia is one of the most common inherited blood anemias. The disease primarily affects Africans and African Americans. It is estimated that in the United States, some 50,000 African Americans are afflicted with the most severe form of sickle cell anemia. Overall, current estimates are that one in 1,875 U.S. African American is affected with sickle cell anemia. Children are born with sickle cell disease; it is not contagious. It occurs when a child inherits two sickle hemoglobin genes, one from each parent. About 2,000 babies are born with sickle cell disease each year in the United States. People who inherit only one sickle hemoglobin gene are carriers (sickle cell trait) and do not have anemia or painful sickle cell crises. About 2 million Americans have sickle cell trait. People with sickle cell anemia can also experience complications from impaired blood circulation and infection-fighting problems. These include a higher risk of certain infections and stroke as well as a condition called acute chest syndrome, which is caused by inflammation, infection, or occlusions (blockages) of blood vessels in the lungs by sickled cells.



Abstract – Physio - 05

MYASTHENIA GRAVIS

Vaishnavi & Vidya.K. S,

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

Myasthenia gravis is a chronic autoimmune neuromuscular disease characterized by varying degrees of weakness of the skeletal (voluntary) muscles of the body. Muscle weakness is caused by circulating antibodies that block acetylcholine receptors at the postsynaptic neuromuscular junction, inhibiting the excitatory effects of the neurotransmitter acetylcholine on nicotinic receptors at neuromuscular junctions. The most common form of MG is a chronic autoimmune neuromuscular disorder that is characterized by fluctuating weakness of the voluntary muscle groups. The prevalence of MG in the United States is estimated to be about 20/100,000 population. However, MG is probably under diagnosed and the prevalence may be higher. Myasthenia Gravis occurs in all races, both genders, and at any age. MG is not thought to be directly inherited nor is it contagious. It does occasionally occur in more than one member of the same family. There is no cure for myasthenia gravis, but treatment can help relieve signs and symptoms, such as weakness of arm or leg muscles, double vision, drooping eyelids, and difficulties with speech, chewing, swallowing and breathing. Though myasthenia gravis can affect people of any age, it's more common in women younger than 40 and in men older than 60. The symptoms of myasthenia gravis may include eye muscle weakness, eyelid drooping (ptosis), blurry or double vision (diplopia), unstable gait, a change in facial expression, difficulty in swallowing, shortness of breath, impaired speech, and weakness in the arms, hands, fingers, legs, and neck. A special blood test can detect the presence of immune molecules or acetylcholine receptor antibodies. Most patients with myasthenia gravis have abnormally elevated levels of these antibodies. Recently, a second antibody—called the anti-MuSK antibody—has been found in about 30 to 40 percent of individuals with myasthenia gravis who do not have acetylcholine receptor antibodies. This antibody can also be tested for in the blood. However, neither of these antibodies is present in some individuals with myasthenia gravis, most often in those with ocular myasthenia gravis. There is no known cure for myasthenia gravis. Treatment may allow you to have periods without any symptoms (remission). Lifestyle changes often help you continue your daily activities. Medicines that may be prescribed include: Neostigmine or pyridostigmine to improve the communication between the nerves and the muscles and Prednisone and other medications (such as azathioprine, cyclosporine, or mycophenolate mofetil) if to suppress the immune system response, if you have severe symptoms and other medicines have not worked well.



Abstract – Physio - 06

AUTOIMMUNE DISEASE

Shobitha.M & Vidya.V.S,

*Saveetha dental college and hospital,
Saveetha University, Chennai - 600077*

An autoimmune disorder is a condition that occurs when the immune system mistakenly attacks and destroys healthy body tissue. There are more than 80 different types of autoimmune disorders. Your body's immune system protects you from disease and infection. But if you have an autoimmune disease, your immune system attacks healthy cells in your body by mistake. Autoimmune diseases can affect many parts of the body. No one is sure what causes autoimmune diseases. They do tend to run in families. Women - particularly African-American, Hispanic-American, and Native-American women - have a higher risk for some autoimmune diseases. It is possible to classify autoimmune diseases by corresponding type of hypersensitivity: type II, type III, or type IV. (No type of autoimmune disease mimics type I hypersensitivity. There is continuing debate about when a disease should be considered autoimmune, leading to different criteria such as Witebsky's postulates. The cause of autoimmune disease is unknown. If you have a family member with an autoimmune disease, you may be more susceptible to developing one. There are many theories about what triggers autoimmune diseases, including bacteria or virus, drugs, chemical irritants and environmental irritants. Some people are at a greater risk of getting autoimmune disorders. These include women of child bearing age. In general most of the autoimmune disorders affect women more commonly than men. The conditions often begin during the reproductive period of a woman's life. Those who have a family history of the condition are also more likely get the disease. For example, lupus and multiple sclerosis runs in families. Some races and ethnicities also have a greater risk. For example type 1 diabetes is more common in white people and lupus is more severe for African-American and those of Hispanic origin. Genetics may play a role in causation of autoimmune disorders but several environmental factors may also be important in causing autoimmune disorders. These include exposure to solvents, chemicals, viral and bacterial infections, sunlight etc. Systemic Lupus Erythematosus (SLE) – this is a chronic auto-inflammatory disease. It is seen more commonly among females. The diagnostic tests are usually positive for antibodies against nuclear proteins including nucleic DNA and RNA. Some of triggers for flare ups include UV radiation, viral infections and stress. Although there are many different types of autoimmune diseases and they can affect many different organs, at their core they are all similar in that they are an immune response caused by systemic inflammation that leads your body to attack itself.