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Dear members,

Change is inevitable, we have to accept it. Computers and technology has touched each and every one of us in our daily routine. The various uses of these technologies ranging from digital recording, data processing, statistical analysis etc, one should be proficient in the use of computers and technology, be it in teaching, documentation, clinical research.

E-learning, online examination, digital evaluation, telemedicine have swept in to our education system and also in our day to day clinical practice. Realizing tremendous potential of technology we the journal committee has decided to go digital, before it is too late. So I will be happy to inform you that Journal of our branch will be online from this year.

I appreciate the co-operation extended by president, secretary and entire team of office bearers in bringing E-Journals.

With Warm Regards,
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Dear members, Dear respected IDA member,

It gives me immense pleasure to present to you the first issue of the current edition of BDJ for the year 2016.

It’s been a very enriching and memorable journey as President, IDA Bangalore branch, which has given me an opportunity to evolve as a person and to serve our fraternity in my capacity.

I would like to thank all the office bearers of the IDA Bangalore branch and all the people who have supported me through this journey.

I would like to express my heartfelt thanks to Dr. Satheesha Reddy B H, our editor for his enduring efforts in ensuring the publication of this journal.

Dr.Ashwatharaju .P  
President, IDA Bangalore Branch

It is with great pride, enthusiasm, and anticipation that I invite you to read the inaugural issue of the IDA BANGALORE DENTAL JOURNAL, a new kind of research journal.

An enormous amount of work has gone into the development of this journal and I believe you will see that effort reflected in this journal and in the impact it will have on the field. It has been an interesting journey, the journey has not been one with a completely charted course. It could not have been, given our time constraints.

As we look at Journal, it is important to keep in mind that it represents the collective thinking of a group of innovative individuals with whom I am privileged to work. First, we want Journal to be the premiere scientific journal in Dental Sciences. We want it to look different, to be different, to be one journal that, with its related website, will be as dynamic as the work going on in our disciplines, a rarity in academic publishing. Second, we want it to be a vehicle for a new type of conversation about dental practice and its place in the academic review, tenure, promotion, and reward process. That’s a tall order, but with your help we will make it happen.

Over the past six years, having acquired considerable new experience in Indian Dental Association with such experienced and well informed colleagues from all the Dental Colleges, and papers of various qualities covering all fields of dental medicine, I believe this is the proper time to initiate some new activities. Setting a web site is such an activity; I believe quite an important activity, which will add to the Journals wider recognition and, consequently, better and more efficient communication and exchange of scientific ideas. Now, on the web site, the BDJ will be easily found, and I hope that this will enable the BDJ to become a well-known international scientific journal, covering all aspects of Dental Medicine.

Dr Mahesh Chandra  
Hon. Secretary, IDA Bangalore Branch
Abstract
An important factor in restorations is the shade determination, it is imperative that guides are available to assist in the correct shade matching. Shade matching is a much more complicated task than it may look like. The final judgment about tooth shade should be made by a dentist, who could eventually consult a dental technician. Dentists should be educated about the basics of color science. Variability of the factors which influence the shade matching procedure should be minimised. There is a need for new, better, logically and scientifically arranged shade guides which would cover the complete color range of natural teeth.

Key words: Color, Shade Guides, Shade Matching

Introduction
Tooth shape, size, position and color are classical determinants of esthetics in prosthodontics, and color is probably most important. A number of experts point out the outstanding need for a systematic and scientifically based approach to color science in dental (especially prosthodontic) education, and its application in clinical practice.

Prosthodontics is more concerned with color than other dental branches, so it is logical to expect that a dentist who has been trained in prosthodontics should be better in shade matching. It can also be expected that working experience exerts positive impact on the shade matching quality1.

Shade taking devices are designed to aid clinicians and technicians in the specification and control of tooth color. The shade taking devices are based on the principles of colorimeters, digital cameras as filter colorimeters, spectrophotometers, and spectroradiometers. Visual shade selection is the most common method of color determination in dentistry, but color duplication via this process is plagued by unreliable and inconsistent result.

Although the dental profession has been aware of the shortcomings in shade guide and the corresponding materials for a decade, it is probably the current media-driven emphasis on appearance and an esthetic standard that is primarily responsible for recent advances in dental shade matching. Clinically there is difference in the ready made shade guides available and the porcelain fired for metal ceramic crowns after selecting the shade from the guide. Most brands of porcelain are labeled to match shades of the Vita shade guide, but produce slightly different colors from this guide upon firing.2

"Color is light, modified by an object as perceived by an eye". Color matching can be performed using visual and/or instrumental methods. Visual color matching methods are subjective, while instrumental methods are objective, but still not widespread in dental practice. Precise and objective answers to most of the questions mentioned could be obtained only by using instrumental color matching techniques, because they allow numerical expression of results. A correct interpretation of colorimetric results requires knowledge of the basic elements of the color science1.

Shade Selection Procedure
Prior to shade matching, the dentist must have an understanding that the human tooth and dental porcelain transmit light waves differently. It is their physical composition that determines the differences in light-wave transmission, absorption, reflection, refraction, scattering and surface gloss. The manner in which light strikes an object determines the total appearance of the material. Transparent materials allow for the passage of light with little change. Translucent materials scatter, transmit and absorb light. Opaque materials reflect and absorb; however they do not transmit. Surface characteristics, such as gloss, curvature and texture, will affect the degree of light diffusion when striking the particular object3.

A vital tooth is both naturally translucent and transparent. Enamel rods are transparent and therefore refract and reflect light. Light that strikes the incisal edges of an anterior tooth passes through with maximum transmission because of a high degree of translucency.
Porcelain, however, is a heterogeneous material. It contains transparent properties and metallic oxides that act as opacifiers. These porcelains modify light by absorption, transmission and reflection. Absorption is largely responsible for color. It occurs when light passes through the layers of the porcelain. Scattering occurs when light encounters interfaces between the materials (i.e., pigments and glass). The smaller the pigment size, the less light that is absorbed, resulting in less detectable color. The larger the pigment size, the more reflection that occurs as light scatters at the particle surfaces. Scattering light is necessary in dental porcelains to simulate the prismatic effect of enamel. Yet, one must keep in mind that too much dispersed reflection through internal scattering will create an unnatural looking prosthesis.

Light Sources: One of the questions asked when selecting a shade is, what light source should be used? Shade determination should be performed under color corrected fluorescent lighting, which contains a balance of the entire visible spectrum. The operatory should be lit using a luminous ceiling with translucent diffusing panels that are simple to maintain. Clean watt saver lamps having a color temperature of 4200K or higher is advocated. Shade selection should not be made using daylight, because daylight is subject to constant changes.

One must also be concerned with the phenomenon of metamerism, which occurs when the color of two objects looks identical when observed under one light source but different under other light conditions. Metamerism occurs only when two objects have different wavelength distribution and therefore reflect different spectra.

The color of the operatory can also affect shade selection. Colors should be kept at a low saturation level. Walls and cabinets should be glossy enough to maintain brightness without causing a glare. It is recommended that the color of the walls and ceiling be white or off-white.

The dentist should be concerned with “blue fatigue.” This occurs when the eye is unable to differentiate between the various shades of blue. However, blue fatigue increases sensitivity to yellow therefore, to improve shade selection in the yellow range, the operator should stare at a blue card or patient napkin between shade comparisons.

It has been suggested that dentists use natural north daylight for shade matching. Many dental offices have been designed to face the north to enhance the selection process. However, daylight is not at a constant throughout the day and therefore must not be used as the only light source for shade matching.

Shade Selection Guidelines
The dentist must have a working knowledge of the basic principles of color. This allows for accurate shade selection. Munsell described the three dimensions of color as hue, value and chroma.

Hue is the property of color that is determined by wavelength, which distinguishes one color from another. Value is a quantity of brightness. It is a qualitative term related to lightness or blackness of color and not the quantity of the color gray. Chroma is the saturation of color.

Matching the proper shade is not carried out just by holding up a guide tab to the tooth in question. There are a number of methods that can be employed to intensify the shade selection. They are as follows:

1. If patient is wearing bright clothing, drape him or her with a neutral colored cover.
2. Have patient remove lipstick or other make-up.
3. Clean the teeth and remove all stains and debris.
4. Have patient's mouth at dentist's eye level.
5. Determine shade at the beginning of the appointment to avoid ocular fatigue.
6. Shade comparisons should be performed at five-second intervals so as not to fatigue the cone cells of the retina.
7. Obtain value levels by squinting.
8. Compare shade under varying conditions (i.e., wet vs. dry lips; retracted lip vs. pulled down lip).
9. Use the canine as a reference for shade because of the highest chroma of the dominant hue of the teeth.
10. If unable to precisely match shade, select a shade of lower chroma and higher value.
11. Grind off the necks of the shade tabs because they tend to be darker than the rest of the shade tab.

Procedure for shade selection
The first step is to select the hue. There is not much difference among the hues. Different chromas of the same hue are close to each other in the manufacturers
arrangement of the shade guide there can be confusion. For this reason Pizzamiglio used “the four hues technique”. In the Vita shade guide there are only four hues, A, B, C, and D. The maximum chromas of each hue A4, B4, C4, and D4 are removed from the shade guide and put in a Vita VMK-individualskala kit. This allows one to visualize the difference in hue more effectively because chroma is more intense.

The lamp is set at a distance of 20 cm from the dental arch and, with the shade guide arranged with the four hues, two passes from the beginning to the end of the guide are quickly made close to the teeth. It is important to determine the hue by observing the shade guide against the cervical part of the tooth.

Looking toward the cervical part increases the perceived chroma whereas looking toward the incisal part decreases the perceived chroma, making it more difficult to distinguish the hues. When the canine is present, it is the best tooth on which to choose hue because it has the highest chroma. This step should be performed within 5 sec, otherwise, the ability to recognize the desired hue decreases. The eyes are then rested by gazing at a blue background. Suppose that the hue chosen is A, once this is done, the other three hues (B, C, and D) are set aside. Next, all of the different chromas of the selected hue are put in the Vita VMK-individualskala kit. An example that would be A1, A2, A3, A3.5, and A4. At this point, we have different chromas of the selected hue in the shade guide to match with the tooth.

Again working quickly (less than 5 sec), the dentist selects the chroma by comparing the shade guide against the tooth. This is much easier because now we have only different chromas of the same hue, the eyes are rested by gazing at a blue background for 1 min. Suppose that the selected chroma is A2. Through the shade indicator chart, we know the number of the dentin (in the case of A1, it is 541). The chroma is again checked with a ring arranged by the dentin colour. The number of the dentin chroma that has been chosen is recorded. The blue background is again used to rest the eyes. Next, the enamel is chosen with enamel colours. In this case, the observation should be done at the incisal part of the teeth where the enamel is thicker.

The second shade guide arranged according to the value, is used to select the value. An important part of this procedure is to squint the eyes. Squinting causes the black and white sensitive rods in the eye to become more active than the colour sensitive cones. The rods are responsible for helping to determine the value. It is important to avoid consideration of the hue and chroma when selecting the value. The value that has been selected is used to choose the opaque porcelain. If the value is wrong, the effect will be particularly unpleasant in the cervical region where the thickness of PFM is less.

Conclusion
It is no surprise that color matching for crowns and dentures can be a frustrating and discouraging experience for the dentist, technician, and patient. An understanding of the science of colour and colour perception is important for the success of an esthetic restoration. For successful application of colour in dentistry, an understanding of how light is interpreted as colour is important. Errors in shade matching continue to be a problem and a source of dissatisfaction for the patient. In spite of the limitations in materials and techniques, a harmonious restoration can almost always be achieved if a methodical and organized manner is followed during shade selection.

References
Abstract:
Gene therapy refers to the treatment of genetic diseases using normal copies of the defective genes. It has the potential to cure any genetic disease with long-lasting therapeutic benefits. It remained an enigma for a long period of time, which was followed by a series of setbacks in the late 1990s. Gene therapy has re-emerged as a therapeutic option with reports of success from recent clinical studies. The United States and Europe has been pioneers in this field for over two decades. Gene therapy is a particular method by which defective gene is replaced or repaired by therapeutic gene. Vectors are vehicles which deliver the therapeutic gene into the host. Gene therapy can be used to treat wide range of diseases ranging from single gene disorder to multigene disorder. In dentistry the application of gene therapy includes bone repair, for treating auto immune disease, pain, DNA vaccination (for caries and periodontal disease) and cancer. Minor salivary glands and keratinocytes present in the oral mucosa are the excellent target sites for gene therapy since it can be readily accomplished with minimal invasive manner. This makes dentists as suitable candidate for gene therapy.

Introduction
Gene therapy is an emerging field of biomedicine that has commanded considerable scientific and popular attention. Rapid progress in molecular biological technology has made researchers to manipulate gene easier. A gene is a linear sequence of DNA that codes for a particular protein. Originally known as genes replacement therapy during the 1980s, 'gene therapy' and is applied to all manner of protocol that involve an element of gene transfer. Now outgrown its original definition Gene therapy is a technique in which defective genes that are responsible for disease development are corrected. The applications of gene therapy are based on the principle that a normal gene is inserted to compensate for a non functional gene and abnormal gene that can be repaired through selective reverse mutation. Scientists began gene therapy with bacteria in 1980 and first gene therapy in human (1990) was performed for treating severe combined immunodeficiency which worked for only few months. Several gene therapy clinical studies carried out in different parts of the world after 2008 have clearly demonstrated that gene therapy using viral vectors still holds promise to cure several genetic diseases. In October 2008, for the first time in the history of retinal genetic diseases, gene therapy had been shown to restore vision in three young adult patients with Leber’s congenital amaurosis, a common cause of blindness affecting infants and children. Each of the patients received a unilocular subretinal injection of recombinant adeno-associated virus serotype 2 (rAAV2) vectors containing a normal copy of the RPE65 gene. Initial follow-up after 3 months showed increased visual sensitivity compared to the control eye, demonstrating correction of the genetic defect. Gene therapy in recent days has grown by leaps and bounds and its application in dentistry includes bone repair, treatment of salivary gland diseases, auto immune diseases, pain, DNA vaccination, dermatological disorder and cancer. This article will review few of the dental application of gene therapy.

Types of gene therapy and Gene transfer vectors
Gene therapy may be classified into two types; In somatic cell gene therapy (SCGT), the therapeutic genes are transferred into any of any cell other than a gamete, germ cell, gametocyte or undifferentiated stem cell. Any such modifications affect the individual patient only, and are not inherited by offspring. Somatic gene therapy represents mainstream basic and clinical research, in which therapeutic DNA (either integrated in the genome or as an external episome or plasmid) is used to treat disease. Over 600 clinical trials utilizing SCGT are underway in the US.
Most focus on severe genetic disorders, including immunodeficiencies, haemophilia, thalassaemia and cystic fibrosis. Such single gene disorders are good candidates for somatic cell therapy. In germline gene therapy (GGT), germ cells (sperm or eggs) are modified by the introduction of functional genes into their genomes. Modifying a germ cell causes all the organism’s cells to contain the modified gene. The change is therefore heritable and passed on to later generations. Australia, Canada, Germany, Israel, Switzerland and the Netherlands prohibit GGT for application in human beings, for technical and ethical reasons, including insufficient knowledge about possible risks to future generations.

As described in 1995, there are two general ways to transfer genes: viral and non-viral. Viral are natural infectious agents for transferring genetic information. they are quite efficient, and at present they generally provide more preclinical and clinical utility than non-viral vectors. The principal viral vectors in clinical use today are based on modified adenoviruses, retroviruses and adeno-associated viruses. An ideal gene transfer should be targeted to specific cells; express the transgene product at a therapeutic level and under tight regulation for the required amount of time; show essentially no toxicity; and be administered with minimal invasiveness. There is no yet perfect gene transfer vector. However, some currently available vectors are quite useful for certain defined conditions such as adeno-associated vectors for gene therapy of head and neck cancers.

Areas of impact on dentistry

Bone repair
Bone loss caused by trauma, neoplasia, reconstructive surgery, congenital defect or periodontal disease is major worldwide problem. Gene therapy represents an ideal approach towards augmenting bone regeneration. gene therapy can enhance osteoinduction via expression of growth factors, induce osteoblast differentiation and facilitate the production of osteoid matrix. Bone morphogenetic proteins (BMPs) are essential for the first requirement, osteoinduction, which is the activation of various cytokines or growth factors to attract osteoblasts and/or their progenitor cells to the repair site and induce them to produce bone. Bone defects in the oral and maxillofacial region can be repaired by transferring genes encoding BMPs (Bone morphogenetic Protein). It will be possible to directly deliver the BMP2 gene in vivo to tissues via an adenoviral vector to heal bone defects. Michigan research group has found non osteogenic fibroblasts (gingiva, dental pulp), which can express BMP7 gene after being infected with an adenoviral vector.

Gene therapeutics for salivary glands
Salivary glands are excellent target sites for gene transfer. They are capable of producing large amounts of proteins and are site where gene transfer can be readily accomplished in a minimally invasive manner by means of intraductal cannulation. Our original goal in developing gene transfer with salivary glands was to provide novel and effective therapies for patient who suffer from irreversible salivary gland dysfunction from either irradiation or sjogren’s syndrome. An adenovirus mediated water channel (aquaporin1 AQP1) gene transfer into irradiated submandibular gland showed increased saliva flow in rat model.
Gene transfer can also be utilized to augment salivary secretion by transferring genes that encode secretory proteins into salivary glands. A recombinant serotype 2 adenoassociated virus encoding the human VIP transgene was administered into submandibular gland of female mice to examine its ability to alter the progressive sjogren syndrome like dysfunction. The results showed that local delivery of recombinant serotype 2 adenoassociated virus can have a disease modifying and immunosuppressive effects in submandibular gland of mice.

**Gene therapy for cancer**

The general strategy in cancer treatment is to express a gene product that will result in cancer cell death. It can be achieved by:

1. Addition of a tumor suppressor Gene (gene addition therapy).
3. Down regulation of the expression of genes that stimulate tumor growth.
4. Enhancement of immune surveillance (immunotherapy)
5. Activation of prodrugs that have a chemotherapeutic effect (“suicide” gene therapy).
6. Introduction of genes to inhibit tumor angiogenesis.

The incidence of p53 in head and neck cancer is believed to be higher in recurrent disease. Replacing a mutated p53 with a wild type normal p53 gene is a potential approach to head and neck cancer treatment. Another tumor suppressor gene that could be replaced in head and neck cancer therapy is p16, since 80 to 90% of squamous cell carcinoma of head and neck cases show p16 inactivation. Heise and colleagues of ONYX pharmaceuticals in California, observed that an adenovirus with a mutant E1B-55KDa protein- termed ONYX-015 was able to replicate in cells with mutated p53 protein but spared cells with a normal p53 protein. This resulted in lysis of the mutant cell. Khuri and colleagues published clinical trial findings in which the ONYX-015 adenovirus was used with or without conventional chemotherapeutic drugs. They tested combinations of ONYX-015, cisplatinum and 5-fluorouracil in patients with squamous cell carcinoma of head and neck that had recurred after treatment by surgery, radiotherapy, or both. Patient were injected at the largest or more symptomatic tumor mass with 1010 plaque- forming units of ONYX-015 per day for five consecutive days. Khuri and colleagues described 8 complete and 11 partial responses among 30 patients included in the study.

**Pain**

Managing or eliminating pain is a major part of dental practice. The use of gene transfer technology offers a potentially novel approach to manipulate specific, localized biochemical pathways involved in pain generation. Gene transfer may be particularly useful for managing chronic and intractable pain. Several studies in animal models and University of Pittsburgh School of Medicine have shown that viral-mediated transfer of genes encoding opiate peptides to peripheral and central neurons can lead to antinociceptive effects. There also is a recent report from Okayama university dental school in Japan showing the feasibility of direct gene delivery to the articular surface of temporomandibular joint. While considering more research is needed before gene transfer can be tested clinically as a strategy for chronic pain management, the result of these recent studies suggest real promise.

**DNA vaccination**

For many years, dental scientists have tried to use classical vaccination technology to eradicate dental caries or periodontal disease, thus far achieving mixed susceptibility. In the last decade, gene transfer research has led to a novel way to achieve vaccination: directly delivering DNA in plasmid vs the traditional administration of a purified protein or an attenuated microbe. The ability to induce an immune response to a protein antigen by administration of plasmid encoding the antigen has been successfully demonstrated in animal models.

Human periodontitis is thought to be initiated by a principal organism called p.gingivalis. Two separate rgp-encoding genes (rgpA and rgpB) are located on the chromosome of p.gingivalis. A study demonstrated that immunization of mice with rgpA DNA vaccine protects against challenge with invasive p.gingivalis strain W50B in the mouse lesion model.
Although applications of DNA vaccination are in the earliest stages of use with oropharyngeal tissues, it seems reasonable to suggest that these approaches will play a role in future strategies for preventing periodontal diseases and dental caries.1

**Genes transfer to keratinocytes**

Keratinocyte are the cells which are present in oral mucosa. Several features make epidermal and mucosal keratinocytes, attractive for treating local tissue disorders and as systemic gene therapeutics. Expression of therapeutic genes can be achieved with use of topically applied agents. Gene therapy can be used to treat keratinocytes disorder like ichthyosis and epidermolysis bullosa. In future it can be used to treat most of dermatologic disorders.2 The ability of transduced human keratinocytes to synthesize and secrete biologically active recombinant proteins has been demonstrated. Human growth hormone, apolipoprotein E and the coagulation cascade factor IX are successfully delivered by genetically modified keratinocytes. For successful keratinocytes gene therapy, stable and long term gene expression may be achieved through the use of endogenous, keratinocytes-specific promoters and by targeting stem cells. The longevity of genetically altered keratinocytes in epidermal and oral epithelial grafts may be increased by identifying factors which will improve graft survival. Cell-marking studies through which grafted cells can be followed after being genetically marked with a reporter gene may shed light on the fate of grafted cells and on the persistence of expression in these cells in vivo. Ongoing work holds promise that it may soon be possible to characterize the phenotype of epithelial stem cells and to target gene delivery to them in vivo and in vitro. Such technical advances will open the door to clinical trials using keratinocytes to treat disease.3

**Gene therapy to grow new teeth**

Dental researchers hope to grow teeth in the laboratory that can be implanted into the mouths of patients who have lost their natural teeth. These would not be living teeth with nerves and blood vessels, but they would be made of the same substances as human teeth. In order to accomplish this, researchers must find the genes responsible for building the 25 major proteins making up tooth structures. In addition, there may be dozens of other genes involved in instructing the body when, how and where to form a particular tooth. There may be as many as 10% of the total number of genes somehow involved in the formation of teeth. The Baylor College of medicine was found PAX 9, a master gene critical for tooth development. The hope is we will able to bioengineer human teeth for replacement in future.3

**Is gene therapy safe?**

Gene therapy is under study to determine whether it could be used to treat disease. Current research is evaluating the safety of gene therapy; Future studies will test whether it is an effective treatment option. Several studies have already shown that this approach can have very serious health risks, such as toxicity, inflammation, and cancer. Because the techniques are relatively new, some of the risks may be unpredictable; However, medical researchers, institutions, and regulatory agencies are working to ensure that gene therapy research is as safe as possible. Comprehensive federal laws, regulations, and guidelines help protect people who participate in research studies (called clinical trials). The U.S. Food and Drug Administration (FDA) regulate all gene therapy products in the United States and oversee research in this area. Researchers who wish to test an approach in a clinical trial must first obtain permission from the FDA. The FDA has the authority to reject or suspend clinical trials that are suspected of being unsafe for participants. The National Institutes of Health (NIH) also plays an important role in ensuring the safety of gene therapy research. NIH provides guidelines for investigators and institutions (such as universities and hospitals) to follow when conducting clinical trials with gene therapy. These guidelines state that clinical trials at institutions receiving NIH funding for this type of research must be registered with the NIH Office of Biotechnology Activities. The protocol, or plan, for each clinical trial is then reviewed by the NIH. Recombinant DNA Advisory Committee (RAC) to determine whether it raises medical, ethical, or safety issues that warrant further discussion at one of the RAC’s public meetings. An Institutional Review Board (IRB) and an Institutional Biosafety Committee (IBC) must approve each gene therapy clinical trial before it can be carried out. An IRB is a committee of scientific and medical advisors and consumers that reviews all research within an institution. An IBC is a group that
reviews and approves an institution's potentially hazardous research studies. Multiple levels of evaluation and oversight ensure that safety concerns are a top priority in the planning and carrying out of gene therapy.7

**Dental surgeon as gene therapist**

The role of dental surgeon in gene therapy is tenable. Dental surgeon has got easy approach to areas like salivary glands and keratinocytes (oral epithelium). Salivary glands are excellent target sites for gene transfer, readily accomplished in minimal invasive manner. There are about 500-1000 minor salivary gland in oral cavity. Salivary gland produce large amount of proteins and it is a site where gene transfer can be readily accomplished in minimal invasive manner. Salivary glands could be used for gene therapeutic applications with single protein deficiencies. Irreversible salivary gland dysfunction due to autoimmune diseases and irradiation can also be corrected using Gene Therapy. Keratinocyte are the cells which are present in oral mucosa. Several features make epidermal and mucosal keratinocytes, attractive for treating local tissue disorders and as systemic gene therapeutics. Expression of therapeutic genes can be achieved with use of topically applied agents. Gene therapy can be used to treat disorders of keratinocytes like ichthyosis and epidermolysis bullosa. In future it can be used to treat most of dermatologic disorders. Dental surgeon can be the best fitting professional to administer gene therapy in the oral cavity which bears minor salivary glands and keratinocytes. Patient with intractable pain in any part of the body can walk in to dental clinic to get his/her pain relieved through gene therapy. In future dentist will have inseparable role in the field of gene therapy.2

**Conclusion**

Given the genetic basis for most diseases, instead of contemplating the future of gene therapy, it might be equally interesting to wonder about the future of gene therapy in the context of drug therapy. Although we still consider current gene transfer methods to fairly primitive and associated with significant problems, gene therapy’s acceptance as part of the routine clinical armamentarium, at least for some applications (like head and neck cancer), seems very close.3

**References**


Abstract: Ectodermal dysplasia is a group of disorders defined by the abnormal development of two or more structures derived from the ectodermal layer. Patients with ectodermal dysplasia are characterized by hypoplasia or aplasia of structures such as skin, hair, nails, teeth, sweat glands, parts of the eye and other organs. It is divided into two major groups: Hypohidrotic and Hidrotic. The gene that causes hidrotic ectodermal dysplasia (Clouston's syndrome) has been identified to be the GJB6, which encodes for connexin-30. Inheritance is autosomal dominant, the homozygous state may be lethal. Clinical features include nail dystrophy, associated with hair defects and and palmoplantar dyskeratosis.

In this report a case of 12 year old boy is presented who had few set of primary dentition but surprisingly complete absence of posterior permanent dentition which observed radiographically. In this case oligodontia was present with no alopecia, which is a rare finding.

Introduction

Hereditary ectodermal dysplasia is characterized by defective formation of one or more structures derived from ectoderm. It was first described by Thurnam in 1848 and was coined by Weech in 1929. 1 The ectoderm, one of three germ layers present in the developing embryo, gives rise to the central nervous system, peripheral nervous system, sweat glands, hair, nails, and enamel of the teeth. More than 200 different pathologic clinical conditions have been recognized and defined as ectodermal dysplasia. These disorders are considered relatively rare, 1 in 10,000 –1 in 100,000 births.3 Patients with ectodermal dysplasia are characterized by hypoplasia or aplasia of structures such as skin, hair, nails, teeth, nerve cells, sweat glands, parts of the eye and ear and other organs.4

According to the state of sweat glands involvement, two major groups are distinguished: (1) Hypohidrotic or anhydrotic (Christ-Siemens-Touriane syndrome) in which sweat glands are either absent or significantly reduced in number; (2) Hydrotic (Clouston's syndrome) in which sweat glands are normal. Dentition and hair are involved similarly in both types but hereditary patterns of nails and sweat glands involvement are different.5 Hypohidrotic ectodermal dysplasia as the most common type seems to show an X-linked inheritance pattern with the gene mapping to Xq12-q13; therefore, males are more susceptible than females. Hydrotic type is inherited in an autosomal dominant pattern. The disease is characterized by deformity of at least two or more of these tissues, which primarily involves skin, hair, nails, eccrine glands, and teeth, which makes it difficult for the patient not only to masticate food, but it also causes a psychological impact due to partial edentulism.5

The teeth are markedly reduced in number (oligodontia or hypodontia) and often manifest abnormal development in shape which may appear tapered, conical or pointed in incisors. Molars might be observed in reduced size. The lack of tooth bud formation causes hypoplastic alveolar bone, leading to a reduced vertical dimension of occlusion. Therefore, an old-age appearance is common in affected individuals.5

Here, we are presenting a rare case of Hidrotic Ectodermal Dysplasia in an 11 year old male patient.

Case Report

A male patient 11 year old reported to the department of oral medicine and radiology with the chief complaint of missing back teeth on both sides of the upper & lower jaw since childhood. His mother gave the history of eruption of only front teeth and back teeth on both sides never erupted. His

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4&5. Dr. Shilpa B & Dr. Kavitha Rajendra, Readers, Department of Oral Medicine & Radiology, Maaruti College of Dental Science & Research Centre, Bangalore.
medical history was non contributory and family history revealed that he was born to consanguineous marriage with normal delivery and mother did not suffer from any disease during pregnancy & sibling was not affected with the same problem. Detailed history also revealed that there was no history of decreased or absence of sweating. Developmental milestones were normal.

On extraoral examination he had small nostrils, reduced lower facial height, and hyperpigmented, dystrophic toe nails. There was no abnormality detected in relation to hair and skin.

Intraoral examination revealed low labial frenal attachment in relation to upper lip. Cone shaped deciduous anterior teeth were present. Teeth present were 51, 52, 53, 54, 61, 63, 64, 71, 73, 81, 43, 84. Notching of incisal edge was present in 62.

Based on the history and findings and a provisional diagnosis of hidrotic ectodermal dysplasia was given.

Radiographic examination (OPG) revealed erupted set of primary teeth with altered morphology in 52, 61, 81 and erupting all permanent canines only. There were absence of tooth germs of the remaining permanent teeth.

Hyperpigmented and Dystrophic Nails

OPG showing absence or malformation of certain teeth

Lateral cephalogram of the patient
Lateral cephalogram revealed underdeveloped alveolar process resulting in reduced vertical dimension, high arch palate and convex profile.

Pediatric and dermatologic consultation was taken regarding general health status of the patient. Complete set of investigations were done which included a radiographic examination of chest, routine examination of blood, TSH, T3, T4. The finding of these investigations were normal. Final diagnosis of hidrotic ectodermal dysplasia was given. Full mouth rehabilitation was planned along with maxillary frenectomy. Regular trimming of nails with application of cream is advised.

Discussion
The ectodermal dysplasia represents a group of inherited conditions in which two or more ectodermally derived anatomic structures fail to develop. Depending upon the presence or absence of sweat glands, it is divided into the hidrotic (Clouston syndrome) and anhidrotic types. Dentition and hair are involved similarly in both types but hereditary patterns of nails and sweat glands involvement are different. Latter variety is characterized by anhidrosis, hypodontia, and hypotrichosis. (CST-syndrome i.e. Christ-Siemens-Touraine syndrome and anhidrotic/hypohidrotic, ectodermal dysplasia being synonymous.)

The gene that causes hidrotic ectodermal dysplasia (Clouston's syndrome) has been identified to be the GJB6, which encodes for connexin-30. GJB-6 has been mapped to the pericentromeric region of chromosome 13q. Mutations of the gene PVRL1, encoding a cell-to-cell adhesion molecule/herpes virus receptor, have been reported in those with cleft lip/palate ectodermal dysplasia.

Hidrotic Ectodermal Dysplasia is an autosomal dominant condition with various features which include defect in hair, skin, nails, dental anomalies, craniofacial development. Clinical features include dystrophy of the nails, alopecia (partial or total), hyperpigmentation of the skin (especially over the joints), palmoplantar hyperkeratosis, and clubbing of the fingers. In our case hyperpigmented and dystrophic toe nails seen. Sweat glands, sebaceous glands, and teeth are normal. The clinical manifestations are highly variable even within the same family.

In the oral cavity the most striking feature of ectodermal dysplasia is oligodontia. The teeth that are present have abnormal crown form. There is wide midline diastema. Teeth may be widely spaced and conical or peg shaped. There are some reports of congenitally absent some deciduous and permanent teeth. There is considerable variability in expression, and hypodontia is not an invariable feature. In the present case there are expressions of these features which includes midline diastema, oligodontia in the permanent dentition and conical shape of deciduous incisors.

Oral rehabilitation of patients with ectodermal dysplasia is necessary to improve sagittal and vertical skeletal relationships during craniofacial growth and development as well as esthetics, speech, and masticatory efficiency. The most common treatment plan is removable prosthesis. Implant-supported denture is also suggested as the ideal reconstruction modality for adolescents over 12 years. Removable partial or complete dentures require regular adjustments and should be replaced when a decreased vertical dimension of occlusion and an abnormal mandibular posture are detected due to growth. Positive effects of the treatment include more self-confidence, facial esthetics, speech and masticatory function improvement.
Conclusion

As quoted by William Gooddy (1961) syndromes are the signpost, compass and map which direct us through the crowded twisting streets, the oceans and the jungles of medical experience. When confronted with multiple dental agenesis, the clinician should look for an association of Ectodermal dysplasia signs, because oligodontia or hypodontia is one of the important finding of ectodermal dysplasia. Young patients with Ectodermal dysplasia need to be evaluated by a dental professional to determine the oral ramifications of the condition.

Early recognition of this condition is important to enable better management of hypodontia or anodontia for both physiological and psychosocial reasons. Oral rehabilitation is an important part of the treatment protocol from esthetics, functional & psychosocial perspectives. It involves a number of challenges as the treatment procedures are complicated by growth & development of child, variation in tooth development & eruption, type of prosthesis planning and timing of treatment. Successful treatment depends on good cooperation & communication between dental team, the patient, and his parents.

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8. Hidrotic Ectodermal Dysplasia 2, Vazken M Der Kaloustian, MD Departments of Pediatrics and Human Genetics McGill University
Perinatal Transmission of HIV - An Update

AUTHORS: Dr. Deepak A., Dr. Pushpalatha Mahesh

Abstract:
Acquired Immunodeficiency Syndrome (AIDS) is a pandemic disease caused by the retrovirus Human Immunodeficiency Virus (HIV) which is characterized by profound immunosuppression resulting in increased susceptibility to opportunistic infections, secondary neoplasms and neurologic manifestations. The route of HIV transmission in children is predominantly Vertical Transmission which occurs through transplacental route, during parturum or postnatally during breastfeeding routes. Pediatric HIV infection can present in neonates, children or adolescents. HIV-infected children are the most vulnerable of all patients. In infants who acquire HIV at the time of delivery, the disease progresses rapidly in the first few months of life, often leading to death.

The number of cases of AIDS among children is decreasing due to increased awareness and effective medical intervention in preventing perinatal transmission. Prompt diagnosis and adherence to effective treatment protocol have helped in changing HIV infections from a fatal disease to a chronic, manageable infection.

Keywords: Acquired Immunodeficiency Syndrome (AIDS), Human Immunodeficiency Virus (HIV), Vertical Transmission

Introduction
The HIV pandemic affects 36.9 million people worldwide, of whom 1.5 million are pregnant women. HIV infection is strongly associated with increased risks of preterm birth, low birth-weight, small for gestational age and still-birth and weakly associated with term and preterm low birth-weight. The primary mode of HIV acquisition in children is through Mother-To-Child Transmission (MTCT) during pregnancy, childbirth or breastfeeding. It was estimated by the India's Joint Technical Mission in 2006, that 189 000 pregnancies occur in HIV-positive women and 56 700 HIV-positive babies were born annually in the absence of intervention. The most affected states were found to be Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu, Nagaland and Manipur. This lapse in intervention arises due to delayed infant diagnosis, lack of appropriate pediatric formulations and lack of skilled health personnel. In infants and children, poorly developed immunity allows greater dissemination throughout various organs. There is also an increased frequency of malnutrition and infections that may be more persistent, severe and less responsive to treatment.

HIV
The Center for Disease Control, USA first recognized Acquired Immunodeficiency Syndrome in June 1981 which since then has rapidly escalated to pandemic proportions and has been reported from all the continents. The causative agent was discovered simultaneously and named independently in the year 1983 by Dr. Luc Montangier as Lymphadenopathy Associated Virus (LAV) and Dr. Robert C. Gallo as Human T Lymphotropic Virus Type III (HTLV III).

Human Immunodeficiency Virus (HIV) are RNA viruses belonging to the family Retroviridae and subfamily Lentivirinae. They are further classified into two major subtypes HIV-1 and HIV-2 depending upon their biologic and molecular characteristics, geologic distribution and extent of transmission. HIV-1 has 3 subgroups HIV1 major group (HIV1 –M), outlier (HIV1 –O) and HIV1 –N group while HIV-2 has 5 subtypes (A-E). HIV1 –Major group can be further subdivided into types A to K excluding I.(fig 1) The strains of HIV isolated from USA and Europe are radically different from strains isolated from Africa and Asia. India predominantly has (HIV1 –M) while subtypes A and B are less frequent. HIV subtypes A, C and D are implicated in vertical transmission of HIV.
HIV is a 120 nm icosahedral enveloped RNA virus with the lipid layer of the outer envelope containing spikes of gp 120/ gp 41 (in HIV-1) and gp 140/ gp36 (in HIV-2). Within this is the protein core which encloses two copies of RNA and the enzymes reverse transcriptase, integrase and protease.

HIV replicates by binding of its surface gp 120/140 to CD4 receptors on the surface of host cells such as lymphocytes and macrophages, which is aided by interactions with other co-receptors termed as Cell Infectivity Factors (CCR-5, CXCR-4, CCR-2, CCR-3). This is followed by binding of gp 41/36 with the host cell membrane which causes uncoating of the viral capsid, releasing a ribonucleoprotein complex capable of reverse transcription. Reverse transcription occurs in the presence of viral reverse transcriptase to form complementary DNA which is then transported and integrated into the host nucleus by viral integrase to form the provirus which then synthesizes the necessary viral proteins for replication.

Transmission

Transmission of HIV in infants and children below 18 months is a significant global problem as it can be transmitted from an infected mother to her child. The route of HIV transmission in children is predominantly vertical transmission and blood transfusion.

Routes of vertical transmission include:
(i) Antenatally (transplacentally).
(ii) Intrapartum (as the infant passes through the birth canal during delivery) or
(iii) Postpartum (breast-feeding).

The relative contribution of the three modes of transmission is still not well defined. In India the chief mode of HIV transmission to children is through the vertical route. Almost half of the infected infants are clinically symptomatic in the first year of life. The immature immune system predisposes a vertically infected child to a rapid and fulminant disease process.

Numerous factors influence HIV perinatal transmission and these are often responsible for the observed variability in transmission rates. The strongest predictor of transmission is the maternal viral load. Maternal immune depletion appears to correlate with vertical transmission with increased risk of vertical transmission when there is a lowered CD4+ T cell counts or maternal AIDS. Factors that increase the risk of a child contracting HIV from its mother can be attributed to the following maternal factors or infant factors:

MATERNAL FACTORS
• Advanced HIV infection or AIDS
• High viral load or a low CD4 count
• Vaginal delivery in presence of high viral load
• STD, Hepatitis C, CMV
• Use illicit drugs during pregnancy
• Breast-feeding

OBSTETRICAL FACTORS
• Prolonged rupture of membrane (>4hrs)
• Intrapartum haemorrhage
• Obstetrical procedures (episiotomy or forceps delivery)
• Mode of delivery
• Invasive fetal monitoring
INFANT FACTORS

- Prematurity
- Compromised Cellular immunity
- Multiple pregnancy
- Oral factors – cuts/ abrasions/ oral thrush
- Gastro Intestinal factors - Low gastric acidity/thin mucosa and microvilli /deficiency of IgA secreting cells.

Intrapartum events are crucial factors governing mother to child transmission (MTCT). Elective caesarean section prior to onset prevents perinatal transmission. But studies have shown that increased transmission rates occur in emergency caesarean section performed for prolonged or difficult labor.

Breastfeeding is an important route of HIV transmission from mother to child as breast milk contains the HIV virus.7, 8.

Clinical Features

The clinical manifestation of HIV infection varies widely among infants, children and adolescents. Clinical manifestations in children differ from those in adults due to immature developing immune system and subsequent effect of on-going viral replication and inflammation on somatic and neuro developmental growth that allows greater dissemination throughout various organs. The pattern of disease progression may be:

(a) Rapid: Consisting of infants who manifest within the first few months of life and who have a rapid downhill course.

(b) Intermediate: Manifesting between 2 to 5 years, with persistent generalized lymphadenopathy, hepatosplenomegaly and recurrent bacterial infections including tuberculosis.

(c) Late: Revealing minor manifestations later in childhood or those who may be asymptomatic and detected incidentally.

The age at which infection occurs influences the presentation of the disease. Intrauterine infection coincides with the period of rapid expansion of CD4+ cells in the fetus resulting in infection of majority of the body’s immune-competent cells. The progressive migration of these cells to the marrow, spleen, and thymus result in efficient systemic delivery of HIV virus which is unchecked by the immature immune system of the fetus. Thus infection would be established prior to the development of the immune system making HIV a multisystem disorder with a wide variety of clinical signs and symptom.4, 7, 9

HIV infected neonates are mostly asymptomatic, although maternal comorbidities may give rise to various conditions such as prematurity, small birth weight, fetal alcohol syndrome, opioid withdrawal, anemia and other perinatal infections, including congenital syphilis, CMV, HBV, and HCV.8. Early presentation of disease is associated with in utero transmission of HIV, advanced maternal disease and high maternal viral burden.

General Features:

HIV infection in infants often present with chronic diarrhoea, failure to thrive and respiratory symptoms while children most commonly present with; generalized lymphadenopathy, pruritic eruptions, pulmonary tuberculosis (diagnosed by chest radiographs), measles, otitis media, mumps and scabies affecting skin on the generalized body surface. (Fig 3) HIV virus primarily infects the lymphocytes, with lymph node involvement being a persistent finding throughout the clinical course of HIV infection.

Higher prevalence of measles was due to the fact that even with mandatory imposition of the vaccination protocol advised in India, the awareness of the protocol and adherence to the vaccination schedule was poor. Pulmonary tuberculosis is one of the most common systemic opportunistic infections in HIV infected individuals, particularly in India. (Fig 4) 7, 9

Fig 3: Picture Of Infant Showing Failure To Thrive
Oral Manifestations:

In the paediatric age group certain oral HIV lesions are characteristic in children which may vary in severity. Oral mucosal lesions are one of the earliest clinical indicators of HIV infection and progression in children and are strongly associated with immune suppression. Hence the dentist has a major role in early detection of the opportunistic infections and diagnosis of HIV infection in resource constrained countries.7, 9

The most common presentation in infants and children are fungal and viral infections, periodontal diseases, oral pigmentation and cervical lymphadenopathy. In infants and children Oral candidiasis (OC) was the most prevalent of the oral lesions which presented in the following order of predominance; pseudomembranous candidiasis (PC), hyperplastic candidiasis (HC), angular cheilitis (AC), erythematous candidiasis (EC) and Oral hairy leukoplakia (OHL) or as combination of these.(Fig 5)

Although OC may be encountered in non-HIV infected infants, its presence in HIV infected children must be addressed as it is a marker for disease progression and often the initial sign of HIV infection.3, 7, 8, 9

Ulcerative lesions including recurrent aphthous ulcers and herpes simplex viral infections are painful conditions the can interfere with nutrition and oral hygiene measures. Both these diseases are common in healthy children. These ulcers tend to recur more frequently and are more aggressive as the immune system declines.

Oral pigmentation was also a common manifestation with pigmentation seen on the dorsal surface of tongue, hard palate and on the buccal mucosa. Anaemia and associated nutritional deficiency causes epithelial atrophy and predisposes to mucositis both of which lead to abnormal oral melanin pigmentation.

In addition to anaemia, other causes of pigmentation are the release of a melanocyte-stimulating hormone caused by dysregulation of cytokines in HIV disease, Addison’s disease and drug induced (antiretroviral therapy).

Both HIV-associated salivary gland disease and cervical lymphadenopathy, result in diffuse swellings of the face and neck. Concurrent xerostomia and pharyngeal tonsillar enlargement with subsequent mouth-breathing may increase the risk for plaque accumulation, dental caries and oral pseudomembranous candidiasis. Children with lymphoproliferative disease have a better prognosis initially but with increased survival are at risk for lymphoma.3, 7, 8, 9

Most viral infections are commonly associated with childhood infections but their presence in immunocompromised infant/children may result in more severe disease that is challenging to manage or may frequently recur. The occurrence of viral infections with multiple episodes of recurrence within the first year of life of an HIV infected infant are considered to be reflective of moderately
symptomatic disease. In general, painful and persistent oral ulcerations may be associated with Herpes simplex, Varicella-zoster and Cytomegalovirus infections. Facial lesions, including the common wart, Molluscum contagiosum are also observed.

Non-infective parotid gland enlargement in HIV infection is a common sign and arises due to infiltration of CD8+ cells that are cytotoxic to virally infected cells. (Fig 7) 7, 8, 9

**Fig 7: Parotid Gland Enlargement In Infant**

**DIAGNOSIS OF HIV INFECTION**

In resource-constrained settings where virological testing is not available, a presumptive diagnosis of severe HIV disease in infants < 18 months can be made using clinical criteria set by WHO.

The presumptive diagnosis of severe HIV disease should be made if:

- The infant is confirmed HIV antibody positive and
- Diagnosis of any AIDS-indicator condition(s) can be made.

or

- The infant is symptomatic with two or more of the following:
  1) Oral thrush
  2) Severe pneumonia
  3) Severe sepsis

Other factors that support the diagnosis of severe HIV disease in an HIV seropositive infant include:

- Recent HIV-related maternal death; or advanced HIV disease in the mother.
- CD4+ count < 20%

Confirmation of the diagnosis of HIV infection should be sought as soon as possible.6
Laboratory diagnosis of HIV infections in adults is made on the basis of two positive results of Enzyme Immunoassays which employ different antigens (ELISA, EIA, Rapid or Simple). The positive result of an enzyme assay test is confirmed by a Western Blot for antibodies to the virus. This also differentiates between HIV-1 and HIV-2 infection.

The same rapid testing methods cannot be utilized in infants as mothers pass their antibodies to their babies while still in the womb, hence the standard assays cannot accurately diagnose infants until the age of 18 months, after which the mother’s antibodies totally clear from the infant’s blood and the infected child develops its own antibody to HIV. But this delay in diagnosis results in the deaths of many HIV-infected infants.

In infants and children the test used to diagnose babies born to HIV-infected mothers is Polymerase Chain Reaction (PCR), which directly detects HIV-1 pro-viral DNA integrated to human genome rather than the HIV antibody in the blood. Using PCR, infants can be tested using PCR as early as six weeks from birth. (Fig 8) 3, 8, 11, 12

**Fig 8: Diagnostic protocol for infants lesser than 18 months old using PCR**

The test for diagnosing infant and children below 18 months is DNA polymerase chain reaction (DNAPCR) either by dried blood spot (DBS) or whole blood sample (WBS). Traditionally, WBS requires sophisticated and expensive equipment not commonly available and the samples have to be sent to the laboratory within 24 hours under proper cold storage. The test requires a liquid blood sample, which needs to be transported to a testing facility under refrigeration.

To overcome this a new technology has been devised that allows PCR to be performed on small spots of dried blood. The Dried Blood Spots (DBS) can easily be prepared in a resource-limited setting and can be stored and shipped to testing facilities which do not require refrigeration. PCR testing using DBS is as effective as PCR using liquid blood samples, with 100 % sensitivity and 99.6% specificity.3, 11, 12

**Criteria For Determining Site For With Drawing blood in infants**

<table>
<thead>
<tr>
<th>Age, weight</th>
<th>Site from where blood is drawn</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4 months, less than 6 kg</td>
<td>Heel</td>
</tr>
<tr>
<td>5-10 months, less than 10 kg</td>
<td>Toe</td>
</tr>
<tr>
<td>Larger than 10 kg</td>
<td>Finger</td>
</tr>
</tbody>
</table>

The site is first disinfected and blood is drawn using a sterile lancet. The first drop of blood should be wiped away with gauze or cotton wool. Then allow a large drop of blood to collect on the foot before touching it to the circle on the filter paper completely filling the circle. Samples should be stored horizontally out of direct sunlight for at least three hours. Once dry, samples are stored in sealable plastic bags with desiccant packets and a humidity card. Then they are transported to the laboratory. (Fig 9) 3, 11, 12

**Fig 9: Drawing blood from heel of infant for preparing dried blood spot**

In breast-fed infants, there is a need for repeat DNA-PCR testing at least 6 weeks after cessation of breastfeeding to confirm a HIV negative diagnosis. After 18 months of age a screening test (spot/ ELISA) must be done to confirm the serological status. Infants and children with confirmed HIV infection need a baseline CD4 testing (absolute count and CD4 %) and repeat every 6 months or earlier if clinically indicated. All children on ART should have regular clinical, immunological and virological monitoring for early recognition of treatment failure.
The immune classification for monitoring is based on the absolute CD4+ lymphocyte count or the percentage of CD4+ cells. Infants have naturally high CD4 counts compared to adults hence age appropriate normal values must be considered when interpreting. Children under 5 years have less variability in CD4 percentages and therefore can be monitored for following progression (Table 1). The risk of progression is greatest in the first year of life and CD4 counts and viral loads are poorly predictive of progression of disease. At any given CD4 count, infants less than 12 months are more likely to progress to AIDS. 3, 9, 11, 12

**Table 1:** Immune classification for monitoring is based on the absolute CD4+ lymphocyte count. 9

<table>
<thead>
<tr>
<th>Immunologic definitions</th>
<th>N: No signs or symptoms</th>
<th>A: Mild signs and symptoms</th>
<th>B: Moderate signs and symptoms</th>
<th>C: Severe signs and symptoms</th>
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<tbody>
<tr>
<td>Age-specific CD4+ T-lymphocyte count percentage of total lymphocytes</td>
<td>&lt;12 month</td>
<td>1-5 year</td>
<td>6-12 year</td>
<td></td>
</tr>
<tr>
<td>1. No evidence of suppression</td>
<td>≥1500</td>
<td>≥25</td>
<td>≥1000</td>
<td>≥25</td>
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<tr>
<td>3. Severe suppression</td>
<td>&lt;750</td>
<td>&lt;15</td>
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<td>&lt;15</td>
</tr>
</tbody>
</table>

**Conclusion**

The social stigma, complex treatment regimens, psychosocial, mental and neuro-cognitive issue must be recognized to provide appropriate holistic management. The dentist has a major role in early detection of opportunistic infections and diagnosis of HIV infection in resource constrained countries providing early access to life-saving medicine. c, b

**References**

The success of prosthetic rehabilitation of a partially or a completely edentulous patient no longer confines only to replacement of missing teeth. The emphasis on restoration of facial esthetics is an integral part of any prosthetic rehabilitation. The unsupported and paralyzed facial musculatures of especially the cheeks and lips have a detrimental psychological effect on the patient professional and social life. Prosthetic rehabilitation of such patient not only confines to replacement of missing teeth but also restoring the lost cheek support. Cheek plumpers or cheek lifting appliances have been effectively used for the purpose of improving aesthetics and psychological profile in such patients. This article focuses on simple, effective and a noninvasive technique of restoring the slumped facial musculature by incorporating cheek plumper in the dentures.

**Key words:** Cheek plumper, Cheek lifting appliance, Impression making, fabrication, Jugular glomus tumour, hemifacial paralysis, Bell’s palsy, facial esthetics rehabilitation.

The success of prosthetic rehabilitation of a partially or a completely edentulous patient no longer confines only to replacement of missing teeth. The emphasis on restoration of facial esthetics is an integral part of any prosthetic rehabilitation. The unsupported and paralyzed facial musculatures of especially the cheeks and lips have a detrimental psychological effect on the patient professional and social life. Prosthetic rehabilitation of such patient not only confines to replacement of missing teeth but also restoring the lost cheek support. Cheek plumpers or cheek lifting appliances have been effectively used for the purpose of improving aesthetics and psychological profile in such patients. This article focuses on simple, effective and a noninvasive technique of restoring the slumped facial musculature by incorporating cheek plumper in the dentures.

**Case Report**

A 58 year old male patient accompanied by his son reported to Department of Prosthodontics with chief complaint of missing teeth in the upper left back region and lower front and right back from past 3 years due which he able chew food properly and is referred by his physician for the replacement of the same. The extra oral findings included gross facial asymmetry with sunken cheek, drooping upper and lips on the left side face. (Fig.1) Medical history of the patient revealed that he was diagnosed with Jugular glomus tumour of the left ear and had complaints of hemi facial spasms and which was converted into hemi facial paralysis post surgery 9 years ago. Due to which the patient was indifferent type with low self esteem and most of the communication was done by his son. Patient was not subjected to any adjuvant chemotherapy or radiotherapy has it was a benign tumour. Patient is also known type II diabetic, hypertensive and under medication for the same. Patient and his son were educated about the cheek plumper and patient was taken into confidence, treatment plan involved of rehabilitation of the patient with acrylic cheek plumper attached to removable partial denture.

Primary upper and impressions (Fig 2, 3) were made using irreversible hydrocolloid (DPI Algitex, Dental Products of India, Mumbai) followed obtaining of the primary cast. A autopolymerising resin (DPI Cold Cure Resin, Dental Products of India, Mumbai) custom tray was made for fabrication of cheek plumper. A functional impression was made using condensation silicone (Fig 4, 5) (Speedex putty, Coltène/Whaledent Inc. USA) and was relined with light body (Fig 6, 7) (Speedex putty, Coltène/Whaledent Inc. USA) after a acceptable symmetrical and esthetical facial contouring was achieved. After the approval of the...
esthetics and denture trial, heat cure acrylic cheek plumper attached to removable partial denture (DPI Heat Cure resin, Dental Products of India, Mumbai) by using conventional compression moulding technique. (Fig8,9) After necessary adjustments, the dentures relined with chair side denture relining material. (Soft liner, GC Dental Product Corp, Japan) the check plumper (Fig 10,11) was delivered to patients after post insertion and maintenance instructions were given.

**Discussion**

The rehabilitation of hemi facial paralytic patient associated with long term psychosocial effects is always a challenge. \(^7\) A holistic approach and proper patient education are also the key ingredients of success along with prosthetic dexterity. Denture flanges if properly extended and contoured can help to achieve facial esthetics by supporting lips and cheeks. \(^8\) The use of condensation putty for obtaining functionally moulded impression saves chair side time and enhances patient comfort during the procedure unlike the conventional technique of using modelling wax.

**Conclusion**

The changes in appearance, function and psychological wellbeing have an enormous impact on the patients’ personal lives. This was very evident with present patient has he regained his self esteem and confidence during the recall visits. Prosthetic rehabilitation is not only confined to replacement of missing teeth but also restoring and rehabilitation holistically has a whole. Cheek plumpers or cheek lifting appliances can be effectively used for the purpose of improving aesthetics and psychological profile of patients with hemi facial paralysis. (Fig.12)
References:

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- Neutralizes & Eliminates VSC's That Cause Bad Breath

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Antimicrobial
Mouthwash

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No Taste Alteration
Controls Gum Disease & Eliminates Bad Breath Superior To Chlorhexidine Safe For Long Term Use

Mint flavour

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- ***Three Breakfasts, Three Lunches, Entry to Trade Exhibition.

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REGISTRATION FEES

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<td>DELEGATE (PG, s /Doctor)**</td>
<td>1800</td>
<td>1200</td>
<td>2500</td>
</tr>
<tr>
<td>Non IDA Member**</td>
<td>2800</td>
<td>1200</td>
<td>3500</td>
</tr>
<tr>
<td>STUDENT DELEGATE (UG ONLY)**</td>
<td>1000</td>
<td>1200</td>
<td>1500</td>
</tr>
<tr>
<td>Non IDA Member**</td>
<td>1500</td>
<td>1700</td>
<td>2000</td>
</tr>
<tr>
<td>ACCOMPANYING PERSON (NON-IDA Member)**</td>
<td>3000</td>
<td>3500</td>
<td>4000</td>
</tr>
</tbody>
</table>

GALA BANQUET DINNER- Rs 1500/- PER PERSON

Pre-Conference Venue:
SDM Dental College & Hospital

Reach us by:
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Conference Secretariat:
Dept. of Oral Medicine & Radiology,
SDM College of Dental Sciences & Hospital,
Satipur, Dharwad
0836-2468142 Etn 116, 9845334294

Conference Venue:
Hotel Denissons