

KEY NOTE SPEAKERS' ABSTRACTS





Micro Organisms Behind ECC

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Abstract: Early Childhood Caries (ECC) continues to be an enormous problem in both developing and industrialised countries, interfering in the growth, development and well-being of children. As paediatric dentists, we are faced with the difficult job of caring for the child who already has ECC. The child is usually embedded in a culture where habits, food and environment support development of the disease. This paper will explore modern thinking around delivery of dental care for children with ECC. There are five key principles on which this approach is built: Recognition (of factors contributing to the disease/caries risk); Re-orientation (of lifestyle factors and/or oral health behaviours); Remineralisation (of all lesions); Repair (of lost tooth substance, where no other management solution is appropriate); and Review (of the child, their oral health and their situation). The most diverse collection of oral microorganisms are found in the biofilms on teeth. A small sample of dental plaque contains on average 12-27 species. Bacteria seem to initiate biofilm development in response to specific environmental cues, such as nutrient availability. An adherent, bacterial biofilm that forms on all hard and soft tissue, is the principal aetiologic agent in caries and periodontal diseases. Once bacteria have attached to the pellicle and growth occurs, additional adherent interactions must take place to permit the organisms to accumulate. Thus to understand dental caries as a disease and to further diagnose the reasons for varied susceptibility among individuals, it is important to have a proper knowledge of the acquisition of these microorganisms and the factors that affect it. Our profession faces an enormous task and we need our dentists to be responsible for helping patients and their families achieve and maintain oral health. Holistic care of our patients with ECC, helping them to achieve oral health, needs to be regarded as just as important as, and rewarded financially similarly to, operative dentistry. We need to become a health focussed profession.





A Low Cost, Real Time, Portable Nanopore Sequencer for Rapid Meta Genomic Analysis of Complex Microbial Environments

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Abstract: The oral cavity of humans is inhabited by hundreds of bacterial species and some of them have a key role in the development of oral diseases, mainly dental caries and periodontitis. More than 750 taxa of bacteria have been detected in the oral cavity. Unlike most infectious diseases where a single causal agent can be associated with the infection, oral diseases appear to be the outcome of multiple microorganisms. Major challenge in studying oral microbiome has been the complexity of the ecosystem (several hundreds of species of microbes with multiple levels of interaction) making the potential pathogenic species difficult to target, inability to associate a single etiologic entity as the causal agent and difficulties in culturing large proportion of oral bacteria. Therefore traditional microbiological approaches give an incomplete picture of the natural communities inhabiting the oral cavity. Development of metagenomic methods and next-generation sequencing technology has provided a significant improvement in our understanding of oral microbiota. *Metagenomics techniques* enabled direct genetic analysis of genomes contained within an environment including human gut, oral and skin¹. Metagenomics has obviated the need for culture and allowed the study of whole bacterial communities by analyzing the total DNA pool from complex microbial samples. Two main approaches 16S ribosomal RNA (rRNA) gene amplicons and shotgun metagenomics using short read second generation sequencing technologies such as Illumina (HiSeq & MiSeq) and Roche 454. The second generation sequencing platforms are accurate and generate a large amount of data, but are limited by capital costs, the necessity to pool samples to reduce per-sample costs, shorter sequence read length, and a turnaround time of days to weeks that may be inadequate for many applications. Short reads are often difficult to accurately assign to a taxonomic unit and less informative to differentiate closely related taxa. Recently, Oxford Nanopore has released a small, real time, portable and inexpensive sequencing platform called the MinION2 that can generate ultra-long reads of up to 300 kb. It has been applied in variety of metagenomics studies including gut microbiome, analysis of complex environment and infection. Long reads generated using nanopore sequencing can permit easy identification of taxa with greater specificity and sensitivity than short reads. The presentation will discuss chemistry behind the Nanopore sensing and its applications in studying metagenome with case studies.





Acquisition of Microflora and Its Implication on ECC

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Abstract: The oral cavity of infant is usually 'germ free' at the time of birth, and shortly after, the epithelial surfaces become exposed to millions of microorganisms, only a small portion of which becomes part of its normal flora. Earlier it was thought that 700 different species colonized the oral cavity which now may reach upto 19,000 phlotypes. This is due to the development of new technologies in the microbiological analysis. Early colonization of total microbes in the oral cavity will not influence the colonization of *S. mutans*, which colonize later, and still make up a majority of the total initial colonizers in the dental biofilm, attributable to their ability to co-aggregate and to the presence of adhesins on their outer surface, which recognize receptors in the acquired pellicle. The role of *MS* and *Lacobacillus* species in the development of dental caries is well established. The other microbes which have been implicated are the *S. sobrinus*, *Veillonella*, *Actinomyces* and most recently *Scardoviawiggisiae*. The potential sources for the early establishment of *S. mutans* in the oral cavity of infant were tasting of food by the mother, low socioeconomic status of the family, prolonged bottle feeding, improper oral hygiene maintenance and sucrose consumption and the mode of delivery could not be correlated. This paper discusses the evolution of complex microbial communities and the factors that influence this greatly in order to better understand the progression of early childhood caries and to aid in the development of preventive and treatment strategies that will guide the formation of health-promoting bacterial communities.





Sugars Consumption and Early Childhood Caries: From Evidence to Practice

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Abstract: The WHO recently recommended that ideally the intake of free sugars should not exceed 5% of energy intake by children. This presentation will summarise the evidence pertaining to amount of sugars intake and dental caries that underpinned this recommendation, focusing on evidence most relevant to young children. Sources of free sugars intake in the diets of young children will be considered including consideration of the sugars content of different infant milks and sugars contained in complementary (weaning) foods. Practical guidance on what constitutes 5% of energy intake in young children will be provided and strategies for reducing intake of free sugars, including upstream and downstream approaches will be summarised. Finally consideration will be given to what dental teams can advise parents of infants and young children with respect to limiting sugars consumption.





Role of Eating Behaviour in ECC

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Abstract: Is the role of diet limited to type, frequency, quantity and order in which it is consumed? Will the manner of selection and manner of consumption of diet relate as risk factor to Early Childhood Caries? Are problematic eating behaviour seen in Indian Children? Role of eating behaviour as a causative factor for ECC is still an uninvestigated area. Problematic Eating behavior problems frequently reported by parents ranging from slow, fussy, selective, pouching and emotional eating is on the rise. Role of such behaviors in ECC need to be investigated to a greater extent. The presentation intends explore the role of eating behavior in ECC.





Oral Health Related Quality of Life in Early Childhood: Perspectives and Tool for India

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Abstract: Early Childhood Caries not only affects the oral cavity and physical health of the child but it has significant impact on the child and the family. We are quite different from developed countries in terms of socio cultural milieu and oral health related perceptions thereby the impact on quality of life due to oral diseases (specially ECC) is different and needs customized tool for our country. The policy makers are not interested in standard epidemiologic tools like percentage prevalence and incidence. They want to know how much a particular disease is affecting lives of people and how much is financial burden on the country due to the same. Therefore, health professionals have developed a method of measuring health related impact on quality of life and economy. Oral health professionals across the world have also put in efforts to develop standard tools for the same. AIIMS team also tried to develop one such tool for our country with Early Childhood caries in mind. During the process of development and validation of our own instrument on Oral Health related Early Childhood Quality of Life, we have come across several issues in family and social domains, which were out of contemplation of us as researchers. A tool was developed using the standard methodology and its reliability and validity was tested in Indian population and it was named as Oral Health related Early Childhood Quality of Life (OH- ECQOL) scale. The presentation aims to discuss the steps in development of qualitative research tools and share the unique experiences gained during the development of the tool.





Enamel and Early Childhood Caries

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Abstract: Enamel is the outermost hard tissue of the tooth crown and is known to be the hardest substance in the body yet vulnerable for dissolution. Despite its hardness, enamel is permeable. The enamel of primary teeth is less mineralized, more porous, and organic, with high water content. Since it is softer and more elastic, it dissolves considerably faster than permanent enamel. The correlation between enamel defects and Early Childhood Caries (ECC) has been widely researched. It has been an important tissue for the polarization of caries experience in underserved populations. Studying permeability in dental tissues can provide insight into the progression of caries, thereby aiding in the establishment of barriers to prevent caries. Recent research into enamel composition and permeability have proven them as important risk factors for susceptibility to ECC. This presentation will address the current concepts in enamel development, the role of enamel defects, enamel permeability, composition etc in relationship with ECC. This presentation will emphasize the importance of host factors such as pits and fissure surfaces and contact areas in caries risk assessment and briefly address the future directions for research in this area





Saliva: The Unsung Hero in Early Childhood Caries

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Abstract: Early Childhood Caries (ECC) is one of the most prevalent biofilm –dependent infectious diseases in the child. Left untreated, ECC can result in rapid and extensive carious lesions and destruction of primary teeth causing painful pulpal and complicated systemic infections. The disease most frequently targets children from poor socioeconomic families and hence, it places enormous health and economic burdens most often on those who are least able to bear them. Saliva plays a crucial role in the health of the mouth and any changes in the quantity or quality of saliva may affect the oral health status. It is generally accepted that saliva plays an important role in the pathogenesis of dental caries. In recent years, various salivary characteristics and components (immunoglobulins and non-immunoglobulins) have been identified as biomarkers in the detection of ECC. These biomarkers are associated with the caries susceptibility of the children and thereby help in devising various caries risk assessment tools. Thus, the role of saliva as a ‘double-ended sword’ needs to be understood and applied accordingly.





Contemporary Management Strategies for Teeth in Different Stages of ECC

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Abstract: The management of Early Childhood Caries should always be based on a Risk assessment approach and should include formulating an individualized care plan – consisting of intervention for both non-cavitated and cavitated lesions. The risk assessment should focus on determining all the offensive and defensive factors including components of Key’s triad, saliva along with socio-economic and behavioural factors. A risk category thus established guides the treatment plan - which should aim at remineralization of the early lesions, arresting of the Non-cavitated lesions, surgical management of cavitated lesions in a minimal invasive manner and last, but not the least, framing a customized preventive strategy to change the oral ecology thus ensuring the avoidance of new lesions formation. This presentation will focus on step by step approach that should be advocated for management of children suffering from ECC. It will elaborate the evidenced based care to be provided for the teeth (‘host factor’) in different stages of the disease. The evidence, guidelines and current practices will be discussed for the non-invasive and micro-invasive management (Resin Infiltration) of Non-cavitated lesions and contemporary minimal invasive approaches for cavitated lesions. Lastly, a novel technique for fabricating customized full-coronal restoration using temporization material will also be depicted.

