

Streptococcus Mutans and its Detection - The Battle Continues

Opinion

Dental caries prevails as one of the most widely spread infectious disease worldwide. It is a ubiquitous disease of multifactorial origin in which microorganisms play the prime role for causation of the disease Susan Fisher-Owens conceptual model describes oral health being influenced by various level of factors that acts together. These multilevel factors are categorized into 5 sets which are genetics and biology; social environment; physical environment; health-influencing behaviors; and medical care; in individual, family and community levels, interacting across time and space. Considering the biological determinants microflora is an important aspect for causing the imbalance in the oral cavity leading to caries [1].

When focusing on the flora *Streptococcus Mutans* are the chief etiological microorganisms which are held culprit for dental caries, therefore, a quantitative measure of *S. mutans* is said to be a dependable measure to forecast the true caries activity. *S. mutans* is considered to be an important biomarker of caries risk assessment. There are various methods to detect the *S. mutans* counts that include both conventional as well as latest advancements. The various conventional culture medias used are mitis salivarius with bacitracin (MSB), mitis salivarius kanamycin-bacitracin (MSKB), glucose-sucrose tellurite-bacitracin (GSTB), trypticase soy-sucrose bacitracin (TYS20B) and tryptone-yeast-cysteine sucrose-bacitracin (TYCSB) agars [2]. All these medias are specific for *S. mutans* but requires a well-equipped laboratory and a minimum incubation period of 48hours and are therefore cumbersome and time consuming.

To overcome these time concerns, more research is being done on inventions of rapid detection methods that are easy, quick and reliable Tal H and Rosenberg M in the year 1990, first proposed oratest as a simple non invasive chairside detection method for assessing the microbial count of the oral cavity. Oratest is a non-specific test that detects salivary microbes based on their rate of oxygen depletion. Aerobic organisms utilize oxygen with the help of the enzyme aerobic dehydrogenase that transfers the electrons from oxygen. The activity of this enzyme reduces methylene blue to leucomethylene blue in the milk substrate. The rate of change in colour shows the metabolic activity of aerobic organisms present in saliva [3]. The major disadvantage of oratest is that it does not specifically detect *s. mutans* alone, rather it tells about the activity of aerobic microorganisms in the saliva. Moreover, this test requires a lot of armamentarium and is not rapid in action. To combat with these difficulties rapid chair- side detection kits are available now-a-days that gives instant results and can be used as powerful motivational tools for the patients regarding their oral health.

The various kits that are available in the market are Orion Diagnostica's Dentocult® SM Strip mutans, CRT bacteria (Ivoclar Vivadent AG, Liechtenstein), Clinpro™ Cario L-Pop™ (3M ESPE Dental Products, St. Paul, MN, USA) and Saliva-Check Mutans (GC

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America, Alsip, IL, USA). Orion Diagnostica's Dentocult SM Strip mutans provides easy detection of mutans *streptococci* from a saliva sample and plaque. The method is based on the use of a selective culture broth and the adherence and growth of mutans *streptococci* on the test strip. CRT bacteria (Ivoclar Vivadent AG, Liechtenstein), enables the simultaneous determination of the mutans *streptococci* and *lactobacilli* counts in saliva by means of selective agars. The stimulated saliva is spit in the tube containing the media to which NaHCO₃ tablet is added at the bottom which produces CO₂ making conditions favourable for *S. Mutans* and *Lactobacilli* growth. The blue mitis-salivarius-agar with bacitracin is used to detect mutans *streptococci*, while the light culture medium, Rogosa agar, is used to evaluate *lactobacilli* [4]. Both these chair-side methods are highly specific and sensitive for *S. mutans* but takes 48 hours to test positive. Clinpro™ Cario L-Pop™ (3M ESPE Dental Products, St. Paul, MN, USA) is a biochemical commercial rapid chair-side method that measures the production of lactic acid by metabolically active cariogenic bacteria. The reaction is based on the enzymatic degradation of lactic acid by lactate dehydrogenase and coupled to a cascade of redox indicators that generate a color signal, which is analyzed using a semi-quantitative scale [1]. This kit gives rapid results but is not specific for *S. mutans* as it does not determine CFU of microbes rather it determines their acidic activity [5]. Saliva-Check Mutans (GC America, Alsip, IL, USA) detects *S. mutans* in saliva using a highly specific immunochromatography process. The *S. mutans* present in saliva react with colloidal gold labeled anti *S. mutans* monoclonal antibody which is contained in the test device. Thus, gold colloidal particles attach to the surface of *S. mutans*. This reacts with another *S. mutans* antibody to form the red line on the test window and to show positive results. This kit test is highly specific and sensitive for *S. mutans* and gives results within 15 minutes, therefore it is considered as a powerful tool for rapid *S. mutans* detection.

Though there are multiple caries activity test kits available that can detect *Streptococcus mutans* count but all of them have certain advantages and disadvantages. Therefore, still there is need of inventing a novel caries risk assessment tool that can effectively forecast the caries activity and provide us with instant and correct results.

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