SALIVA – NATURAL PROTECTION THE ORAL CAVITY

Anne Marie Lynge Pedersen, Associate Professor, PhD, DDS,
Department of Odontology, Faculty of Health Sciences, University of Copenhagen.

Saliva helps control pathogenic bacteria to maintain a healthy oral microflora

Under normal physiological conditions we produce almost a litre of saliva per day. Saliva has multiple essential functions. It facilitates mastication, swallowing and speech, acts in the initial digestive processes, and is one of the factors responsible for the ecological equilibrium in the mouth. Saliva controls the growth of bacteria in the oral cavity, thereby preventing unlimited microbial colonisation.[1]

The importance of saliva in the maintenance of oral health becomes evident when salivary flow is reduced, increasing the risk of oral diseases such as dental caries, erosion and oral candidal infections.[2]

THE SALIVARY GLANDS

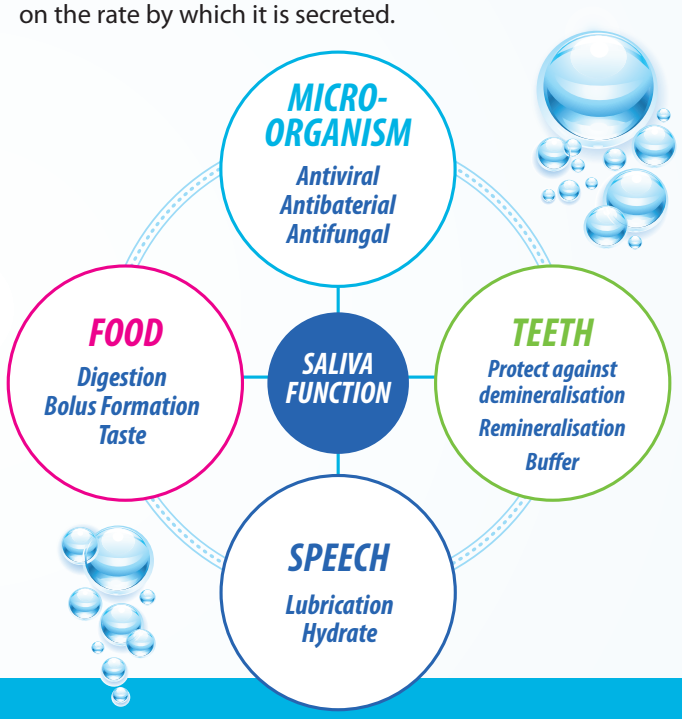
The minor salivary glands produce less than 10% of the total volume of saliva, but contribute about 70% to the total mucin content in whole saliva

The majority of saliva is produced by four paired major salivary glands, the parotid, submandibular and sublingual glands. However, it is the minor salivary glands, on the inner mucosal surface of the lips, cheeks, palate and glossopharyngeal areas that secrete about 70% of salivary proteins and play an important role in the lubrication of the oral mucosa.

THE FORMATION AND COMPOSITION OF SALIVA

Salivary secretion is under autonomic control and is regulated by reflexes, activated by stimulation of mechanoreceptors (chewing), chemoreceptors in the taste buds, sight, sound and thought of food.

Neural activation of the salivary glands triggers a cascade of events, including initiation of water and salt transport, and secretion of proteins, mucins and amylase-rich saliva into the duct system. Saliva is normally composed of more than 99% water and less than 1% of its solutes but the final composition of saliva in the mouth is dependent on the rate by which it is secreted.



THE MANY FUNCTIONS OF SALIVA

Saliva serves multiple functions, including protection of teeth and oral mucosa, antimicrobial activities and facilitation of digestion.

Aids initial digestive processes

In the oral cavity, α-amylase and lipase in saliva aid initial digestion of starch and triglycerides.

Protects teeth and oral mucosa

Saliva can protect the oral mucosa, gingiva and teeth against infection and disease

Saliva maintains oral hard tissue integrity via mechanical cleansing, buffering, antimicrobial actions and maintaining saturation with respect to hydroxyapatite. Saliva also dilutes and eliminates dietary sugars and acids, and microorganisms by oral clearance.

Salivary proteins and antimicrobial activities

Saliva covers oral hard and soft tissues with a protective film, rich in proteins and enzymes

Salivary proteins play an important role in the protection of the teeth against caries and dental erosion. Through modulation of bacterial attachment, supply of growth substrates for microorganisms, and antimicrobial activity, saliva regulates the colonisation of oral tissues.[1]

Several salivary proteins, such as proline-rich proteins, cystatins, MUC5B (MG1), lysozyme, lactoferrin and amylase, coat dental enamel with a salivary film. The level of antimicrobial protection is related to the composition and thickness of this pellicle. The primary mucin component of the dental pellicle, MUC5B, plays an important role in suppression of bacterial adhesion to the tooth surface.[3]

Saliva contains a large number of organic substances with antimicrobial activities

Antibaterial	***Lysozyme, lactoferrin peroxidases,*** mucins, amylases, cystatins, histatins, immunoglobulins (IgA), calprotectin, chromogranin A
Fungicidal	***Lactoferrin,*** histatins, immunoglobulins, chromogranin A
Antiviral	***Lactoferrin***, mucins, cystatins, immunoglobulins

- ***Lysozyme*** was the first antibacterial protein discovered.[1] Its action is attributed to its enzymatic breakdown of peptidoglycan, an essential component in the gram-positive bacterial cell wall. Lysozyme can also inhibit bacterial agglutination due to its strong positive charge.

- ***Lactoferrin*** binds to iron, reducing the concentration of iron available as a co-factor for the bacterial enzymes. This induces bacterial mobility and prevents the build-up of a biofilm.[1] In addition to its bacteriostatic effect, lactoferrin has bactericidal, fungicidal and antiviral properties.

- ***Lactoperoxidase*** catalyses the oxygenation of thiocyanate to hypothiocyanite, via hydvrogen peroxide.[1,4] Whilst lactoperoxidase and thiocyanate are normal components of saliva, hydrogen peroxide comes from metabolising bacteria in the oral cavity.[4] Hypothiocyanite's bacteriostatic effects are due to its blocking of central bacterial metabolic processes.[5]

SALIVA SCIENCE AT THE CUTTING EDGE

Contemporary research continues to reveal more about the protective properties of salivary components.[1,3]

Opportunities to enhance protection by supplementing salivary enzyme systems appear to offer potential for oral healthcare interventions. Saliva also has great potential as a diagnostic fluid, as the use of saliva biomarkers becomes a reality in a clinical setting.[6]

SUMMARY

- Saliva serves multiple functions, including protection of teeth and oral mucosa, antimicrobial activities and facilitation of digestion.
- Saliva is responsible for the ecological equilibrium of the mouth, controlling the growth of bacteria to maintain a healthy oral cavity and resistance against infection.
- Salivary proteins form a protective pellicle, governing the initial attachment of microorganisms to the tooth surface.
- Saliva harbours a large panel of antimicrobial proteins, including lysozyme, lactoferrin and lactoperoxidase, which inhibit uncontrolled outgrowth of bacteria.

Anne Marie Lynge Pedersen is Associate Professor, PhD, DDS at the Section for Oral Medicine, Clinical Oral Physiology, Oral Pathology and Anatomy, Department of Odontology, Faculty of Health and Medical Sciences, at the University of Copenhagen, Denmark. She graduated as dentist from the Royal Dental College in Copenhagen in 1992 and obtained her PhD degree in 1997. Dr Pedersen's research has focused on clinical, neurophysiological, biochemical, immunological, histological, and therapeutic aspects of salivary gland dysfunction, especially in relation to systemic diseases, medication and cancer therapy.

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For further reading, see Pedersen AML, Sørensen CE, Dynesen AW, Jensen SB. Salivary Gland Structure and Functions and Regulation of Saliva Secretion in Health and Disease. In: Salivary Glands: Anatomy, Functions in Digestion and Role in Disease. Louis Braxton and Simone Quinn (eds). Nova Science Publishers Inc. New York, 2012; Nova Science Publishers Inc., New York, pp 1–44.