Amino acid found in some foods could improve oral health

7 May 2015

A naturally occurring amino acid found in some foods could help millions of people avoid cavities and gum disease, researchers have revealed.

Arginine, a common amino acid, could help significantly improve oral health as it breaks down dental plaque, according to a collaborative study by experts at Newcastle University and University of Michigan, USA.

Further clinical trials and studies are planned, but the authors say these early results, published today in the journal *PLOS ONE*, are promising and indicate that L-arginine could take the place of current plaque-controlling substances.

Dr Nick Jakubovics, lecturer in the School of Dental Sciences at Newcastle University, found that in the laboratory L-arginine – present in red meat, poultry, fish, and dairy products, and already being used in dental products for tooth sensitivity - stopped the formation of dental plaque.

He said: "Our study shows that a very common amino acid, L-arginine, can disrupt 'model' dental plaque under laboratory conditions.

"L-arginine is currently being included in certain toothpaste formulations as it is thought to protect against dentine hypersensitivity. Our work shows that the same concentrations of L-arginine potentially can control dental plaque, and so may be beneficial in protecting against gum disease.

"There is no doubt protection against gum disease would be the major potential benefit. L-arginine is cheap and easy to add to toothpaste or mouthwash. At present, around 10-15% of adults in the Western world have advanced gum disease which can lead to loose teeth and even tooth loss. Therefore, there is a clear need for better methods to control dental plaque."

Dental biofilms cause the formation of dental cavities, gingivitis and periodontal disease. Surveys indicate that 31% of adults in the UK have active dental cavities; and 45% have moderate or severe periodontal disease.

It is estimated that £3.7 billion is spent on NHS dentistry for adults and children in the UK each year, and around £2.6 billion on private dentistry. Dental plaque-related diseases such as dental cavities and periodontitis contribute to the vast majority of treatment costs.

Most methods for dental plaque control involve use of antimicrobial agents, such as chlorhexidine, which are chemicals aimed at killing plaque bacteria, but they can affect sense of taste and stain teeth. Antimicrobial treatments have been the subject of debate about overuse in recent years.

Dr Jakubovics said: "Our study shows that the effects are only seen at very high concentrations of arginine, such as those that are currently being introduced into certain oral healthcare products. There is no evidence yet that lower concentrations found in foods such as red meats would have benefits for removal of dental plaque."

Researchers say the mechanism for how L-arginine causes the disintegration of the biofilms needs further study. These initial findings show that arginine can change how cells stick together, and can trigger bacteria within biofilms to alter how they behave so that they no longer stick to surfaces.

In conducting their research, the team used a model system they introduced in 2013 that mimics the oral cavity. The researchers are able to grow together the numerous bacterial species found in dental plaque in the laboratory, using natural human saliva.

Dr Alexander Rickard, assistant professor of epidemiology at the University of Michigan's School of Public Health, said: "Other laboratory model systems use one or a small panel of species. Dental plaque biofilms can contain tens to hundreds of species - our model better mimics what occurs in the mouth, giving us great research insight."

More information: "L-Arginine Destabilizes Oral Multi-Species Biofilm Communities Developed in Human Saliva." *PLoS ONE* 10(5): e0121835. DOI: 10.1371/journal.pone.0121835

Provided by Newcastle University