HKU Faculty of Dentistry fights mouth bacteria with prune extract

Researchers at the HKU Faculty of Dentistry have discovered that a traditional Chinese medicine that comes from a dried plum is able to kill mouth bacteria that are linked to human dental and gum disease.

By performing laboratory tests on 20 plant products that are widely used in traditional Chinese medicine, the research team found that an extract from a type of dried plum (Asian plum, or Japanese apricot) was the most active of all the traditional medicines in killing mouth bacteria. The extract was the only one that killed all four kinds of mouth bacteria included in the study.

To find safer alternatives to some antimicrobial mouth rinses that may be harmful if swallowed, Dr Ricky WK Wong, Professor Urban Hägg, Professor Lakshman Samaranayake, **Dr Michelle KZ Yuen**, and Dr CJ Seneviratne, all from the HKU Faculty of Dentistry, along with **Dr Richard Kao** from the HKU Li Ka Shing Faculty of Medicine, decided to look for new drugs that can kill oral bacteria and are natural, safe, and edible.

The researchers visited local traditional Chinese medicine stores and bought 20 plant products that are used to treat infection-related conditions, such as cough and fever. They then boiled the products in water and made standardised solutions of the extracts (concentration, 2.5 g/mL). Each extract was tested for its ability to kill four types of bacteria that in nature live on human teeth in complex layered communities known as biofilms (commonly called dental plaque). One type of bacteria (*Streptococcus mutans*) is known to be closely associated with tooth decay (dental caries), one type (*Porphyromonas gingivalis*) is closely associated with gum disease (periodontal disease), and two types (*Streptococcus mitis* and *Streptococcus sanguis*) are important in the initial formation of plaque.

Thirteen plant extracts were active against one type of bacteria (*P gingivalis*) when grown in solution, but very few extracts were active against the other three types of bacteria. Only the prune extract — known in Chinese as *wu mei* and in Latin as *Fructus armeniaca mume*, and

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traditionally taken to treat coughs — killed all four bacterial species. It was even more effective at killing two species (*S mitis* and *S sanguis*) than a chemical found in some mouth rinses (chlorhexidine, at 0.2% concentration). The prune sample could also kill bacteria grown on a gel layer when the extract solution was very dilute — a concentration of 0.0003 g/mL was enough to kill *P gingivalis* and about 0.08-0.16 g/mL was enough to kill the other three species.

The authors conclude that the prune extract was "very effective against all four bacteria" in the laboratory experiments, and that future studies, such as in humans (clinical studies/trials), will be needed to test if the preparation is safe to use, can fight bacteria in plaque, and can actually prevent tooth decay and gum disease. They also hope to identify the active ingredients of the prune extract that are responsible for its antibacterial activity. Eventually, the research team suggests, "clinical studies should be carried out to optimize the clinical use of *Fructus armeniaca mume* in mouth rinses, toothpaste, chewing gum and other oral products."

The research, funded by The University of Hong Kong, was recently published in the *International Journal of Oral and Maxillofacial Surgery*.

"After we first did the experiments, we received an unrestricted grant of US$75,000 to do more detailed studies, in the form of an *Innovation in Oral Care Award* from the International Association for Dental Research and GlaxoSmithKline Consumer Healthcare," said investigator Dr Ricky Wong. "That was the first time that Hong Kong or China had won the award." The team has now started clinical studies of the prune, but until results have been confirmed, Dr Wong warned that people should avoid increasing their consumption of the prune or extract — especially because it is very acidic and may attack the enamel coating of tooth surfaces.

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Source: Wong RWK, Hägg U, Samaranayake L, Yuen MKZ, Seneviratne CJ, Kao R. Antimicrobial activity of Chinese medicine herbs against common bacterial in oral biofilm. A pilot study. *International Journal of Oral and Maxillofacial Surgery* 2010;39:599-605. Medline link: http://www.ncbi.nlm.nih.gov/pubmed/20418062

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For more information about oral biofilms, visit
http://facdent.hku.hk/engagement/community/pdf/Oral_Biofilms.pdf

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