

It's All About the Spit!



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Remember eighth grade, when you were taught the correlation between pH and saliva? You learned that testing saliva provides information on whether the mouth is an acidic, basic, or neutral environment. But did you ever suspect then that saliva would become a formidable instrument for medical diagnosis, health, and research?

It's true, friends and colleagues: Spit is the latest, greatest trend in health care! This important physiologic fluid, which contains a highly complex assortment of substances, is rapidly gaining notice as a diagnostic tool. Don't believe it? Read on!

The oral cavity, according to Dr. Jack Dillenberg, the inaugural dean of the Arizona School of Dentistry and Oral Health (ASDOH), "is the gateway and window into health in our body. The signs of nutritional deficiencies, general infections, and systemic diseases that affect the entire body may first become apparent in the oral cavity via lesions or other oral problems. Saliva plays a significant role in maintaining oral health and has a strong correlation to tooth decay."¹

Yes, we've known for a while that an adequate amount of saliva serves as a pH buffer; when plaque pH drops below 5.5, dental caries can occur. But according to researchers at The Johns Hopkins University's Center for Interdisciplinary Salivary Bioscience Research (yes, a research center dedicated to spit!), saliva holds a wealth of data that is easily collected and economically analyzed and may be a key to many mysteries of human biology and

genetics, as well as a helpful tool to combat disease. "There's lots of potential in exploring what's in saliva," according to Dr. Doug Granger, the center's director and a psychoneuroendocrinologist (what a mouthful—pun intended!) at Arizona State University.²

Saliva in the mouth forms a thin film that protects against dental caries, erosion, attrition, abrasion, periodontal diseases, candidiasis, and abrasive mucosal lesions. Studies suggest saliva may be useful in detecting heart disease, acid reflux, and diabetes; it is already being used for rapid HIV testing.³⁻⁵ Researchers have also reported encouraging results in the use of saliva for the diagnosis of autoimmune disorders, breast cancer, oral cancers, gum disease, and cardiovascular, endocrine, and infectious diseases.^{6,7}

So is saliva screening the new "blood test"? Blood testing, performed as an aid to diagnosis, has its drawbacks: Samples are often uncomfortable to obtain, a lab visit may be necessary, and processing takes time. Finding a reasonable alternative would be beneficial, but there are several steps to such a process.

The capacity to monitor health status, disease onset and progression, and treatment outcomes through noninvasive means is a goal in health care promotion and delivery. For this to occur, three things must happen: first, specific biomarkers associated with a health or disease state must be established; second, a noninvasive manner to detect and monitor those biomarkers must be developed; and third, a mechanism to

differentiate between the results is needed. Dr. Granger's team has been studying the possibilities for several years now. Some of the key biomarkers measurable via saliva are listed in the Table.⁸

Meanwhile, Dr. Tony Hashemian and colleagues at the ASDOH have developed a diagnostic tool based on pH. The purpose of their *pH of Oral Health* (pH2OH) initiative is to deliver new technology for pH saliva testing.⁹ This innovation uses a mobile phone application to capture time-sensitive data and to communicate with a server (in compliance with HIPAA regulations, of course).

A saliva-testing examination tool is used by the dental team to educate patients, inform preventive treatment planning, and assist with proper selection of dental materials to initiate changes in the patient's oral hygiene. Dental teams measure saliva pH with test strips—the litmus paper we used even as kids in school. It is simply a strip of colored paper that, when soaked in sample saliva, turns a different color depending on the pH level. The color scale ranges from red (indicating a strong acidic state [pH < 3]) to dark blue

or purple (indicating a strong alkaline state [pH > 11]).

The free iPhone or Android app developed by Dr. Hashemian's team is designed to capture the pH value for a patient. The app can manually set the value, or you can take a picture of a test strip and auto-calculate the pH using color-coding analysis. Once set, the app will allow you to save the data and track improvements to oral pH over time.⁹

With improvements in immunology, microbiology, and biochemistry, salivary testing—in both research and clinical settings—may prove to be an applied and reliable means of recognizing oral signs of systemic illness and exposure to risk factors.¹⁰ Salivary diagnostics will be the next great breakthrough in improving the general health of the public. Stay tuned.

What are your thoughts about how “spit” could be applied clinically? Contact me at PAEditor@frontlinemedcom.com

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TABLE Important Saliva Biomarkers

α-Amylase
Antibodies
Cortisol
Environmental chemicals
Estrogen
Inflammatory markers
Testosterone

Source: Cornelius. *Phoenix Magazine*. 2014.⁸

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