FACT SHEET

Salivary Diagnostics

NATIONAL INSTITUTES OF HEALTH

Saliva is the watery fluid that moistens our mouths, helping us eat, speak, and maintain good oral health. Saliva consists of a clear, protein-rich fluid secreted by the salivary glands and trace amounts of various biochemicals present in blood serum that filter into the mouth. As certain health conditions arise, such as HIV infection and cancer, proteins and substances linked to these diseases can pass from the serum into the saliva. Increased concentrations of these compounds over time make saliva a potentially promising diagnostic fluid with several advantages over blood. Saliva is easy to collect, requires no painful needle sticks, and can be tested in many non-traditional settings because of the portability and lower cost of salivary test kits.

NIH supports research in technologies that use saliva to look for indicators of health conditions or diseases. Development of small, portable, and rapid processing technologies for saliva samples holds promise for faster identification of health issues and earlier access to treatment.

The faster turnaround allows more rapid communication and decision making, earlier initiation of therapy, better adherence to treatment, and greater patient satisfaction. It also has economic advantages. These include lower costs to perform tests, fewer doctor visits, fewer hospital admissions to run tests, and improved quality of life.

Technologies that will enable saliva to be used as a window into the body are being explored for their ability to detect disease and monitor our health. Efforts are underway to develop miniaturized lab-on-a-chip technology, where diagnostic tests and tools are made to be rapid, automated, and portable. Combined with saliva sample collection or cell collection (by gentle brushing of the skin surface), this technology could eliminate the need for blood sampling or mouth tissue biopsy, in many cases.

Building on this research, saliva will become a more commonly used diagnostic fluid. Ongoing studies indicate that saliva may be useful for detecting various cancers, heart disease, diabetes, periodontal diseases, and other conditions.

Yesterday

- Getting a diagnosis used to mean making a trip to the doctor's office or to a hospital. The examination often required providing a blood or tissue sample. Collection of these samples involved insertion of needles into blood vessels or cutting away a small area of the tissue (a biopsy).
- The blood or tissue samples were labeled and sent to a laboratory for testing. Typically, patients waited several days for the results. In many cases, they were asked to schedule follow up visits for additional, often expensive, tests that further narrowed down the possible diagnosis.
- Most tests detected full blown disease. Few were sensitive enough to detect subtle biochemical changes that might indicate a developing health condition. No test analyzed saliva or was available for easy use in the home.

Today

- Currently available salivary diagnostic tests include various hormonal, HIV, and alcohol tests. Each test requires a small amount of saliva and produces rapid and highly accurate results.
- In 2010, NIH funded two exciting new studies entitled "Salivary biomarkers for early oral cancer detection" and "Salivary proteomic and genomic biomarkers for primary Sjogren's Syndrome."
- Scientists have identified the genes and proteins that are expressed in the salivary glands. With these vast catalogues as their guide, they will define the patterns and certain conditions under which these genes and proteins are expressed in the salivary glands and how these parts function as a fully integrated biological system.

Tomorrow

- Salivary diagnostic tests will provide immediate results to patients. The portable tests will initially

approximate the size of a Personal Digital Assistant (PDA). The fully integrated diagnostic systems will have the potential to measure from one to possibly hundreds of compounds in saliva within a matter of minutes.

- An emergency medical technician will, with a patient's consent, collect a small saliva sample, load it into the fully automated test, and have an extensive saliva panel readout ready by the time the ambulance brings the patient to the emergency room. The readout will contain a profile of various proteins in the patient's mouth that are associated with various systemic diseases or conditions.
- As miniaturization of the technology advances, it may become possible to attach a tiny device to a patient's tooth, allowing personalized monitoring of medication levels and the detection of biomarkers for specific disease states.

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