

## Fact Sheet: Salivary Diagnostics

### Overview

Oral and systemic diseases can be difficult to diagnose, involving complex clinical evaluation and/or blood and urine tests that are labor intensive, expensive, and invasive. Now, after many years of research, saliva is poised to be used as a non-invasive diagnostic fluid for a number of oral and systemic conditions. Saliva, a protective fluid of the oral cavity, combats bacteria and viruses that enter the mouth and serves as a first line of defense in oral and systemic diseases. Saliva is also a mirror of the body, containing many compounds indicating a person's overall health and disease status and, like blood or urine, its composition may be altered in the presence of a disease. Saliva is very easy to collect, providing a major advantage over the use of blood or urine for diagnostic tests. In the past, use of saliva as a diagnostic fluid was limited because informative analytes in saliva are present in lower amounts than in blood or urine. However, the same biomarkers that are in blood or urine are also in saliva and new highly sensitive techniques have been developed so that this is no longer a limitation.

### Oral Cancer

- Oral cancer affects 38,000 Americans each year and 350,000 people worldwide. The death rate associated with this cancer is especially high due to delayed diagnosis.
- Elevated levels of distinct, cancer-associated molecules in saliva can be detected in individuals with oral cancer.
- Tests already exist that can detect four distinct oral cancer-associated molecules with greater than 90% accuracy. Further development will soon lead to commercial diagnostic tests with the 99+% percent accuracy expected for such tests.
- Researchers are developing a Point of Care (POC) diagnostic system (real-time) for rapid onsite detection of saliva-based tumor markers.
- Early detection of oral cancer will increase survival rate, improve the quality of life of cancer patients, and will result in a significant reduction in health care costs (first stage diagnosis rather than a late stage will result in 40-60% higher survival rate and \$200,000 in health care cost savings per patient)

### Other Potential Uses

- **HIV/AIDS** - Salivary diagnostic techniques have already been developed for and are being used to detect HIV.
- **Cancer and Heart Diseases** - Research is being conducted to identify molecular determinants in saliva that may be useful in diagnosing various types of cancer,

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- cardiovascular diseases and other systemic conditions. A complete list of proteins found in saliva of healthy individuals has been assembled and can be used to distinguish between healthy patients and those with disease.
- **Inflammation** - Researchers have been able to detect elevated levels of *C-reactive protein*- a marker for inflammation that can predict periodontal disease (gum disease) or increased risk of cardiovascular disease.
  - **Disease Progression** - Saliva could be used as a potential monitor of disease progression in systemic disorders, including Alzheimer's disease, cystic fibrosis and diabetes.
  - **Health Monitoring** - Saliva is also effective in monitoring levels of hormones and therapeutic medications.
  - **Drugs/Alcohol/Environmental Exposure** - Molecular markers in saliva can be used to detect drug and alcohol abuse, as well as to determine exposure to chemical or biological agents.

Imagine

- **New Diagnostic Tests** - Saliva-based tests to detect oral cancer and many other types of cancer and systemic diseases will be used for quick and accurate diagnoses.
- **Rapid Results** - Doctor's will be able to use portable devices that can diagnose both oral and systemic diseases onsite with just an oral sample. The results of the test would be available almost immediately - no more need for sending blood or urine samples to an offsite lab and waiting 2-3 days for results.
- **Exposure Detection** - Non-invasive, self-administered saliva test kits will be available to detect exposure to environmental, occupational, and biological agents.
- **New Opportunities** - Point of Care (POC) diagnostics is set to be one of the greatest health care improvements of the new century. New technologies will offer huge clinical and commercial opportunity and may catalyze a shift in our current healthcare system of disease detection to real-time health surveillance.
- **Other Potential Uses** - New research may lead to understanding detectable changes in saliva that involve such areas as genetics, nutritional status, and age-specific changes.

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