

Emerging Analytical Technologies Applied to Human Sputum Proteomics for Improved Non-Invasive Diagnosis of Infectious Respiratory and Chronic Pulmonary Diseases.

Norberto A. Guzman, Ph.D., M.Sc. Princeton Biochemicals, Inc.,

Princeton, New Jersey 08543, USA Correspondence: guzman@affinityce.com; Tel.: +1-908-510-5258

Abstract

Many ailments can be diagnosed while they are asymptomatic, meaning that the patient has no signs or symptoms of a progressing disease. If caught in their initial stage of formation, these maladies can be effectively treated, leading to successful outcomes; curative therapies can halt diseases from advancing to improve the quality of life, and long-term survival of the patient. Still, cutting-edge upgrades in precision technologies are not only necessary for early, reliable, affordable, and rapid disease detection, but vital for the well-being of people and the future of global public health.

The emerging role of non-invasive approaches for medical diagnostics has been liquid biopsies based on genomic biomarkers. As such, biological fluids permit any measurable molecular indicator or signature to provide valuable information on individual's wellness and/or disease. Among the bodily secretions used for non-invasive diagnostics is sputum, a complex viscous hydrogel meshwork, that has gained growing recognition as a rich source of biomarkers to unveil infectious respiratory and chronic pulmonary diseases, and serve as a determinant to reveal other illnesses.

As per the World Health Organization, the burden of respiratory conditions is exacerbated by factors, ranging from considerable subjection to air pollution and occupational contaminants, to tobacco smoking and second-hand smoke, in addition to poor socio-economic status. Due to the likely increase of these determinants, respiratory tract ailments are on the rise, putting stress on healthcare facilities and services worldwide. I therefore highlight the need to use expectorated or induced sputum specimens as a routine source for testing valuable protein biomarkers to diagnosis these chronic maladies, to predict inflammation and disease progression, as well as to monitor the effectiveness of treatments. Further, I will discuss the urgency for fast and reliable point-of-care methods employing miniaturized analytical instruments to detect and quantify crucial protein biomarkers in sputum specimens, and limitations faced when dealing with their complex matrices.