1-1-2018

Application of MicroRNA Markers for Early Detection of Latent Tuberculosis Transitioning to Active Tuberculosis

Robert A. Ollar
New York Medical College

Follow this and additional works at: https://touroscholar.touro.edu/nymc_fac_pubs

Recommended Citation

This Editorial is brought to you for free and open access by the Faculty at Touro Scholar. It has been accepted for inclusion in NYMC Faculty Publications by an authorized administrator of Touro Scholar. For more information, please contact jogrady@nymc.edu.
Application of MicroRNA Markers for Early Detection of Latent Tuberculosis Transitioning to Active Tuberculosis

**INTRODUCTION**

**Latent tuberculosis**

Patients with latent tuberculosis are asymptomatic even though these individuals are, however, infected with *Mycobacterium tuberculosis*, which are alive but are not active.\(^1\) These patients have a normal chest X-Ray and have a negative sputum assay. Those patients with latent are not infectious and cannot spread a tuberculosis (TB) infections to others.\(^1\)

**Active Tuberculosis**

The classic symptoms of active TB are a chronic cough with blood-containing sputum, fever, night sweats, and weight loss. The historical term “consumption” came about due to the weight loss. Infection of other organs can cause a wide range of symptoms.\(^2\)

TB is spread through the air when people who have active TB in their lungs cough, spit, speak, or sneeze.\(^2\) Diagnosis of active TB is based on chest X-rays, as well as microscopic examination and culture of body fluids. Diagnosis of latent TB relies on the tuberculin skin test or blood tests.\(^1,2\)

**MicroRNA Expression**

MicroRNA’s (microRNA’s) are abundant small, regulatory noncoding ribonucleic acid molecules that able to inhibit gene expression.\(^3\) The occurrence of these epigenetic markers have been found to be present in many cancers, neurodegenerative diseases, as well as in a host of infectious diseases.\(^2\) What makes these microRNA markers so interesting is that they are found in a large variety of biological specimens (i.e., peripheral blood, cerebrospinal fluid, and sputum), and their presence is seen as early indicators of pathology long before the appearance of other markers. This particular fact makes them quite potentially useful in the realm of clinical application as relates to diagnostics, as well as, a potential indicator of the efficacy of a therapeutic regimen. Their potential clinical application as relates to the discipline of mycobacteriology, especially in cases of suspected TB would be of enormous benefit to clinicians.

**MicroRNA expression in cases of latent and active tuberculosis**

The mechanisms associated with latent TB are still rather elusive.\(^4\) These microRNA markers have been observed to occur in the early onset of disease and would therefore be quite useful to clinicians monitoring latent TB patients. This is especially the scenario when a patient has reached a point of inflection when latent TB is transitioning to active TB. MicroRNA markers would thus enable a clinician to make an accurate determination that a patient is transitioning from latent to active long before the classical markers of active TB are positive. The presence of these microRNAs, therefore, facilitates the application of an antibiotic therapeutic regimen earlier on. The clinical usefulness of microRNA’s for TB and other mycobacterial. Pathogens have been investigated in several research studies involving peripheral mononuclear cells and sputum specimens derived from patients with latent and active TB.\(^4,5\) These early research studies did indicate that microRNAs were differentially expressed in patients with latent and active TB.\(^6\)

**MicroRNA presence in sputum in active tuberculosis**

Yi et al. found that when sputum samples of patients with pulmonary TB were compared with control sputum samples; there was a difference in expression of microRNA’s in the active TB patient sputum samples.\(^3\) This research study observed that there was an over-expression of miR-179, miR-147, and underexpression of miR-19b-2 in TB group compared with controls.\(^5\) This study thus provided the basis for a potential utilization of microRNAs in the clinical realm for therapeutic-based applications.\(^9\)

**MicroRNA signature in the peripheral blood of patients with in pulmonary tuberculosis**

The of investigation of Latorre et al. found that there occurred a microRNA signature in whole peripheral blood derived from patients with pulmonary TB.\(^6\)

**Conclusion**

Research investigations involving microRNA’s derived from mononuclear cells, sputum, and whole peripheral blood specimens derived from patients with active TB when compared with control patient and latent patient groups have shown that these epigenetic markers have a potentially useful application for clinicians. The utility of these microRNA epigenetic markers is especially interesting as relates to diagnostics and applications for early detection of TB, as well as, a potential for monitoring the efficacy of specific therapeutic regimens based on changes in microRNA presence. These microRNA markers could also be of great worth to clinicians monitoring patients with latent TB since the changes in microRNA presence could be an early indicator of when a patient with latent TB converts to a case of active TB long before traditional markers for active TB disease turn positive!
Ollar: microRNA's in active TB

Robert A. Ollar1,2

1Department of Neurology, New York Medical College, Valhalla, New York, USA,
2Department of Microbiology, Mahatma Gandhi Institute of Medical Sciences, Wardha, Maharashtra, India

Address for correspondence: Dr. Robert A. Ollar,
Department of Neurology, New York Medical College, Valhalla, New York, USA.
E-mail: robertaollar@gmail.com

REFERENCES


This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.