

Fathers of Bacteriology

Subjects: Microbiology | Infectious Diseases

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Abstract

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Dr. Robert Koch was a German microbiologist and Nobel Laureate perhaps best known for his research and discovery of the Tubercle Bacille (TB) bacterium in the late 19th century. However, he is also often considered one of the “fathers of bacteriology” for propagating the germ theory of disease and developing four basic criteria to demonstrate that disease is caused by a particular organism, which is now known as Koch’s postulates. In his 1881 paper “Zur Untersuchung von Pathogenen Organismen” (On the Examination of Pathogenic Organisms), Koch demonstrates why he is also referred to as the “grandfather of cloning,” as he describes a technique to grow isolated colonies of bacteria that would lay the foundation for one of the most commonly used laboratory techniques today: the cell culture ^[1].

While the application of cell culture in an investigational context is most associated with creating model systems to study basic cell biology, disease mechanisms, or novel drug toxicities, its use in a clinical context holds significant value as a diagnostic tool. The standard urine culture is a primary example as it is the current gold standard for diagnosing urinary tract infections (UTI’s), a leading cause of bacterial infections in the United States. UTI’s account for an estimated seven million office visits, one million emergency department visits, and over 100,000 hospitalizations annually ^{[2][3]}. As a result of its high incidence, UTI’s are responsible for \$1.6 billion in annual healthcare costs, which represents a clear burden in the national healthcare system ^[4].

While it is a relatively reliable test, the standard urine culture (SUC) has many inefficiencies that contribute to overwhelming healthcare expenditure ^[5]. In a time where scientific/medical innovation is spurred by inefficiencies in clinical practice, new technologies such as PCR, expanded quantitative urine culture (EQUC), and Next Generation Sequencing (NGS) have arisen in hopes of revolutionizing UTI diagnostics.

References

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Keywords

UTI;urinary tract infection;urine culture;NGS;next generation sequencing;EQUC;expanded quantitative urine culture
