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Paper Poster Session
Influenza - clinical epidemiology

A novel diagnostic approach to detection of respiratory tract infections in immunocompromised patients based on the NanoCHIP® microarray system

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Background: Respiratory diseases are significant causes of morbidity and mortality among immunocompromised patients. The etiologies of these infections include a diverse array of pathogens. Current diagnosis is often made challenging due to the need to detect viral, bacterial as well as fungal pathogens, and therefore involves different laboratories, technologies and diagnostic methodologies. Consequently the process may become time-consuming and laborious, and thus critical in view of the vulnerability of these patients to infections. Savyon Diagnostics has recently developed a respiratory tract infections panel (RTIP) diagnostic test, based on the NanoCHIP® molecular microarray system. The test is designed for multiplexed detection of bacterial (*Legionella pneumophila),* viral *(Influenza A* and *B*, *Parainfluenza* (1, 2, and 3)*, RSV A/B*, *Adenovirus*, *CMV ,HSV* (1 and 2))*,* and fungal (*Aspergillus fumigatus,* and *Pneumocystis jirovecii*) pathogens in specimens taken from immunocompromised patients. The test demonstrates a unique feature of simultaneous detection of various types of microorganisms, i.e. RNA and DNA viruses, bacteria, and fungi in one tube. The aim of this work is to demonstrate the utility of the NanoCHIP® RTIP test for detection of the aforementioned pathogens in immunocompromised patients.

Material/methods: DNA and RNA were extracted from 138 characterized clinical samples. Target genes were amplified through PCR that involves reversed transcriptase and polymerase activities in a continuous sequence, and then the resulted amplicons were subjected to the NC400 NanoCHIP® system for detection and analysis. The generated amplicons were electronically addressed to discrete loci on the NanoCHIP® cartridge pre-activated with specific capture oligonucleotides. Detection was achieved through specific fluorescent reporter oligonucleotides. The output analysis of each sample was compared to the original characterization of the respective sample, as determined in the clinical laboratory.

Results: The NanoCHIP® Respiratory test identified 58 samples positives for RNA viruses, including: 13 *Influenza A,* 14 *Influenza B*, 16 *Parainfluenza* 1/2/3*,* and 15 *RSV A/B*, as well as 37 samples that were identified as positives for DNA viruses, including: 11 *Adenovirus*, 12 *CMV,* and 14 *HSV* 1/2. In addition the system detected 23 fungal and bacterial positive samples, including 9 *Aspergillus fumigatus,* 11 *Pneumocystis jirovecii*, *and* 3 *Legionella pneumophila.* These results were in accordance with the original characterization of the tested samples. The NanoCHIP® provided clear detection of each of the pathogens composing the panel within a working day.

Conclusions: The new test demonstrates the ability to diagnose simultaneously the most abundant pathogens that present high risk to immunocompromised patients. This NanoCHIP®-based test is expected to improve laboratory workflow, to require minimal hands-on time and to be cost-effective. The test presents a novel and efficient solution to current needs in immunocompromised patient management.