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Molecular microbiology as a modern platform for rapid, specific, sensitive and unlimited detection of pathogenic microorganisms

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Molecular microbiology is a novel concept that opens fascinating possibilities in the pathogen detection. Many microorganisms are fastidious or uncultivable; their cultivation time is unacceptably long; are of high epidemiological importance; or require sophisticated cultivation conditions. Molecular techniques allow for quantitative detection of microorganisms based solely on the presence of their unique DNA or RNA sequences. Molecular microbiology enables to identify causative infectious agents even in those situations when standard cultivation-based microbiology fails. Since 2006, we have developed over 500 single and multiplex quantitative Real-Time PCR assays to detect pathogenic and opportunistic infectious agents relevant for both human and veterinary clinical settings. We have implemented pandetection approach to detect bacteria and fungi based on Sanger sequencing. For the most challenging biological samples (gut microbiome) we have also developed a pandetection strategy based on Next Generation Sequencing (NGS). Using this combined approach, we can identify microbial agents with the widest detection range possible (pandetection), quantify the load of individual microorganisms in the sample and provide the clinician with the result within hours (Real-Time PCR), or 2-3 days maximum (Sanger sequencing or NGS). Over the past 10 years, we have diagnosed more than 30,000 biological samples, originating from both human and veterinary patients. They covered hyperacute clinical settings (sepsis), chronic and underdiagnosed diseases, and emerging zoonoses (our finding of a novel zoonotic agent *Candidatus, Neoehrlichia Mikurensis* transmissible by a tick bite, with unexpected Central and Western European geographic occurrence).

Biography

Tereza Jancuskova has completed her Graduation from Charles University in Prague, Czech Republic in 2008. She has continued her PhD studies at the Third Medical Faculty, Charles University in Prague, specializing in Genetics, Molecular Biology and Virology. She has received her PhD degree in 2015. She has extensive expertise in Molecular Haemato-Oncology and Molecular Genetics, both in human and veterinary medicine.

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