

HOW DIGITAL PCR CAN HELP CLINICAL DIAGNOSTICS



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Dr Alexandre Alanio is an M.D., Ph.D., expert in medical mycology and medical parasitology. He is currently Associate Professor in Paris VII University (Saint Louis Hospital, Paris, France), Permanent Researcher in the molecular mycology unit and Collaborator of the French National Reference Center for Mycoses and Antifungals. He received his M.D. from Paris V university medical and its Ph.D. from Paris VII University. He owns more than 90 international publications and 4 international patents. He is currently teaching at the Paris VII Medical University for medical students, at the Paris Sorbonne Paris Cité Master I Microbiology course (IMVI), and at the Medical Mycology Course of the Institut Pasteur.

He is interested in dormancy and metabolism in Fungi, in particular in *Cryptococcus neoformans* and in pathophysiology of invasive fungal infections. He aims at bridging medical mycology with basic research on the pathophysiology of invasive fungal infections and translating new biological tools (bench) into diagnostic test for fungal and parasitic infections (bedside).

He has been a partner in the InfectERA 2015 CryptoView project (PI: Uwe Himmelreich) and is currently responsible for a microbiology substudy in the large EDTCP funded Ambition clinical trial (PI: Joe Jarvis, Tom Harrison). He is fellow of and study coordinator for the ECMM and member of ECCMID, ISHAM and ASM societies. He is currently associate editor for *New Microbes* and *New infections* and for *Journal of Clinical Microbiology* (ASM), *Frontiers in cellular and infection Microbiology and Pathogens*.

Could you describe the current focus of your work in clinical molecular diagnostics?

My work focuses on designing diagnostic tests using real-time PCR in Medical Mycology, to improve the existing diagnostic tests. I optimize assays from the extraction to the detection and quantification for all invasive fungal diseases.

What are the key benefits in using digital PCR for Copy Number Variant Analysis?

The key benefits are the fact that you don't need to optimize the qPCR too much because the quantification will be independent of the PCR efficiency.

Are there any challenges that you have faced within your work that digital PCR has helped you to overcome?

The main challenge is being able to have an assay that produces enough fluorescence to be able to determine a good threshold for the beads to be considered as negative or positive. This is sometimes not so easy to determine. This is crucial when digital PCR is considered as a diagnostic test where 1 or 2 beads should be able to be considered as positive, suggesting the presence of the target at very low load in the specimen.

What are some of the priorities of the organisations you work with in this field over the next year?

The priority is to implement workflows that will allow us to deliver a result within a day, so that the clinical decision will be able to

be made based on the result of the PCR and not just based on the clinical probability of the infection. This helps to save useless antimicrobial treatment, which is important considering the impact of antimicrobial treatment on the emergence of resistant bugs.

Looking forward, what future innovations are you expecting to see within digital PCR?

The generalisation of the automation of the droplet formation and distribution in 96 well plates will be a good point for the future of the molecular biology. For diagnosis, Multiplexing will be a major requirement in the future with panel validation for diagnosis multiple relevant infections in one reaction.

In your opinion, how do you believe digital PCR can be further utilised in diagnostics?

Comprehensive automation and straightforward workflows will be the next challenges for digital PCR to be implemented easily in diagnostics. The digital PCR will be interesting for the diagnosis of invasive fungal infections and parasitic infections to follow the evolution of the load during therapy to detect the efficacy or recurrence in those patients. The quantitative aspects as given by the digital PCR in copies/ μ L of specimen will be a major benefit in this context.

Alexandre Alanio will be speaking at our Inaugural Digital PCR Congress, 7 – 8 November 2019, London, UK