

MicroTAS 2021 Workshop 3 Information

WORKSHOP TITLE: Liquid biopsies - latest developments in extra-cellular vesicles and free-circulating nucleic acids as biomarkers for cancer detection and patient follow-up

PRESENTER AFFILIATION:

[Valérie Taly](#), Université de Paris, France

Link:

<http://recherche.parisdescartes.fr/UMRS1147/Translational-Research-Microfluidics>

Yong Zeng, University of Florida, US

Link: <http://www.zenggroup.org>

WORKSHOP DESCRIPTION:

In recent years, liquid biopsies have emerged as important technological tools in medical sciences and engineering with considerable potential for early detection, diagnosis, prognosis, therapeutic outcome prediction, and evaluation of recurrence or disease progression. Unlike conventional tissue biopsy, which requires invasive extraction of small tissue samples through costly and stressful surgical procedures, this alternative biopsy method examines tumor components circulating freely in body fluids, such as blood. Many research groups have been developing innovative technologies allowing for the highly sensitive detection of disease biomarkers in bodily fluids. In case of cancer, circulating tumor cells (CTCs), circulating extracellular vesicles (EVs, e.g. exosomes) and circulating tumor nucleic acids (including circulating tumor DNA, micro-RNA or long non coding RNA) are often targeted within liquid biopsy.

Microfluidic technologies have transformed the field of liquid biopsy by enabling highly efficient detection, isolation, quantification and characterization of these rare disease biomarkers. Combined with the strong development of molecular assays, liquid biopsy is rapidly evolving to be a robust clinical tool. The MicroTAS 2021 workshop on Liquid Biopsy will introduce the participants to latest advances in the liquid biopsy field focusing on ctDNAs and EVs. The workshop will address the critical design considerations for developing micro-nanotechnologies to isolate and analyze liquid biopsy circulating markers. It will outline how microfluidics combined with molecular assays have allowed for

detection and quantification of circulating tumor DNA (ctDNA) in patient samples, with unprecedented sensitivity and accuracy and with the ability to perform real time follow-up of cancer patients. In particular, the workshop will present illustrative examples showing that ctDNA monitoring has great potential, both for patient monitoring including evaluation of patient prognostic, early treatment efficiency and cancer progression. Applications of digital PCR to COVID19 patients monitoring will also be presenting. Moreover, we will highlight recent progress in microfluidics and nanotechnology platforms combined with molecular assays to leverage the isolation and molecular profiling of tumor-derived EVs. The application of these innovative platforms to non-invasive cancer diagnosis and monitoring will be presented to demonstrate the potential impact on the field of liquid biopsy for precision medicine.

OVERVIEW OF MATERIAL TO BE COVERED AND WHAT ATTENDEES CAN EXPECT TO TAKE AWAY FROM THE WORKSHOP:

This workshop part contains 2 lectures:

- (i) The first lecture gives a historical overview of the development of digital PCR from early proof-of-principle to its use within large prospective cancer patient cohorts demonstrating clinical potential of this technology. New technologies and potential complementary of liquid biopsy components will also be underlined opening potential for new developments.
- (ii) The second lecture presents an overview of recent technical advances, existing challenges, and future development in microfluidic innovations to advance isolation and molecular characterization of circulating extracellular vesicles towards the clinical utilities in early diagnosis and precision medicine of cancer.

WHO SHOULD ATTEND:

The workshop is intended for a broad audience, such as biologists, chemists, and engineers, and is particularly suited for scientists with interest in liquid biopsy. Additionally, Graduate/undergraduate students, postdocs, research fellows and scientists who are interested in developing microfluidic technologies for liquid biopsy and biomarkers.

PARTICIPANTS WILL NEED THE FOLLOWING:

Ability to watch pre-recorded Zoom video: Appropriate computer with software to watch pre-recorded Zoom video.

For those attending in-person, a laptop or iPad with headphones are required.