

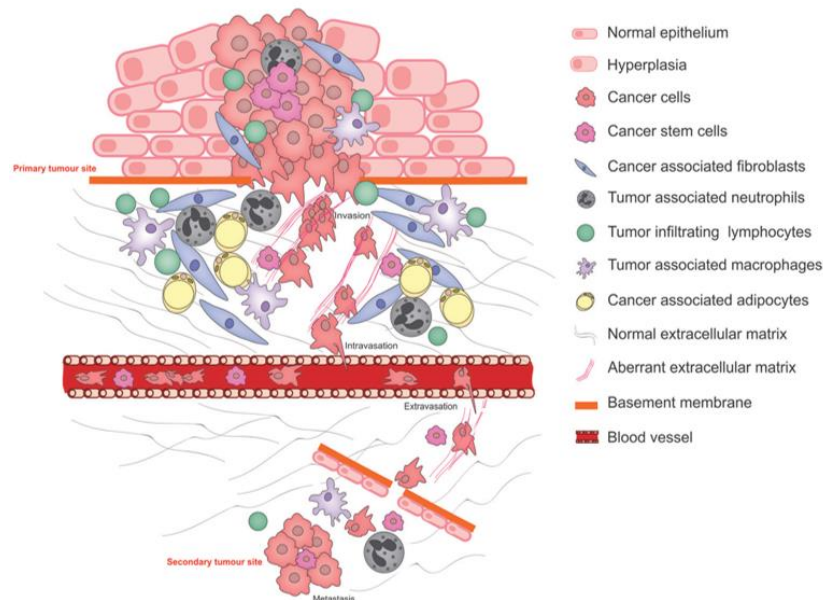
MSc Project:

Yielding of tumour spheroids subject to shear flow

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Background:

The cancer metastasis mechanism is defined as the migration of a primary tumour, which occurs when cancer cells disseminate from a locally growing tumour: detached cancer cells undergo intra- and extravasation and settle in other organs to initiate secondary tumours. Cells in the tissue are densely packed and held together with their neighbouring cells in a so-called jammed state. When forces applied to the jammed tissue increase, transition or **yielding** occurs and the jammed tissue turns entirely fluid-like, leading to individual cells or cluster to migrate. Hence, tumour biomechanics has an important role in jamming and unjamming transition, leading to "metastasis".



Research project:

The project aims to develop microfluidic platforms to perform shear deformation of spheroids encapsulated in a layer of hydrogel and subject to shear flow of culture media, to answer the question of whether spheroids deform, unjam or remain undeformed when varying the shear. If the expected deformation and unjamming happen, changes in the mechanical properties of individual cells/clusters will be evaluated. Furthermore, the wide geometry options given by soft lithography and microfluidics make it possible to involve different geometries to relate the mechanics of spheroids to their microscopic and macroscopic response under shear conditions.

Who we are looking for:

We are looking for a motivated MSc student with a good understanding of cell biology and fluid mechanics, interested to work in a multi-disciplinary area of soft matter and microfluidics for 7-8

months. The nature of the project is experimental: the student will spend time in the lab learning on how to culture cells, grow spheroids, prepare microfluidic chip and measure mechanical properties. The student should also develop critical thinking towards literature and experimental results. This project is intended to develop hands-on expertise and develop skills in the area of **cell culture**, **immunostaining**, **soft-lithography**, **microscopy techniques** and **microfluidics**.

Contacts:

Interested students can contact Margherita Tavasso (M.tavasso@tudelft.nl) or Dr. Pouyan E. Boukany (P.Boukany@tudelft.nl) at the Product and Process Engineering Research group in the Department of Chemical Engineering