Two-year Postdoctoral position **Start: first semester 2021**

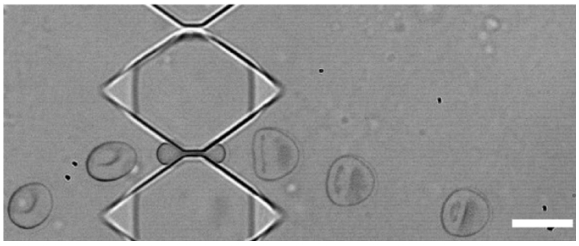
Department : Physique et ingénierie pour le vivant, Centre interdisciplinaire de nanoscience de Marseille, domaine Universitaire de Luminy, Marseille France
Contact : Dr. Annie Viallat, annie.viallat@univ-amu.fr

Microfluidic approach for the splenic filtration of red blood cells

This project is part of the ongoing collaboration between our group in Marseille with biologists in Paris (BIGR unit) and clinicians. It is funded by the ANR SpleenMark.

Our final objective is to improve the relevance and applicability of splenic function markers, prior to clinical studies to fully validate their prognostic & theranostic value. The spleen contains very narrow slits through which red blood cells (RBC) must pass as they circulate through the vascular system. RBC that are too stiff to pass through are trapped and eliminated. The small, rigid bodies contained by RBC are also removed (pitted) from the cells by the splenic slits. The number of RBC that are stiff or contain small bodies is supposed to be a marker of the spleen function. This marker could be used to predict the severity of diseases that cause hyposplenism, thus guiding major treatment decisions.

Our team has developed the only available worldwide microfluidic chips that enable direct video-microscopic observation of RBCs squeezing through slits narrower than 1 μm.
The first objective of the postdoc will to quantify the deformability of RBC based on their passage, retention and dynamics of their deformation in the narrow slits. He/she will design high throughput microfluidic devices based on multiplexed chips with channels in parallel operated by micro-valves. He/she will measure the dynamics of RBC passage through the slits and provide a quantitative and mechanistic analysis of differences in deformability of RBC in splenectomized, hyposplenic and SCD patients. The second objective of the postdoc will be to separate the small bodies in RBC from their hosting RBC by having them pitted and sorted in the slits. A specific microfluidic chip will have to be conceived and prepared, that will enable to sort and collect pitted RBC for electronic microscopy analysis, and small bodies for proteomic and lipidomic analysis.



Time lapse of a red blood cell crossing a slit of submicron width

Expected candidate profile
- PhD in microfluidics, physics, biophysics, biomedical engineering
- Strong research experience in microfluidics applied to living cells or droplets.
- Strong skills in experimental work, (advanced) notions about living cells
- High motivation, autonomy, strong interest for interdisciplinarity and good communication skills

Candidates should send a CV and a motivation letter to Annie Viallat annie.viallat@univ-amu.fr and arrange two reference letters to be sent to the same address

Ref: P. Gambhire, S. Atwell, C. Iss, E. Helfer, F. Bedu, Igor Ozerov, C. Badens, A. Viallat, and A. Charrier High aspect ratio sub-micron channels using wet etching: Biomimetic spleen slits for red blood cell studies, Small 13 (32), 1700967, 2017