

NANO-RHEOLOGICAL BIOMARKERS FOR IMPROVED MONITORING OF PATHOLOGIES ASSOCIATED WITH ALTERED RED BLOOD CELL DEFORMABILITY

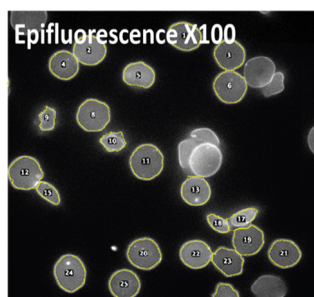
ERG\NEO

L'AVENIR EST FAIT D'AUDACE

This innovative method aims to generate novel rheological data and identify new biomarkers for improved diagnosis and prognosis of hereditary spherocytosis and sickle cell disease.

PRESENTATION

Erythrocyte disorders such as sickle cell disease and hereditary spherocytosis represent a growing public health challenge due to the increasing diversity of the French population. Ektacytometry, the reference technique for measuring erythrocyte deformability, has intrinsic technical limitations: it measures the average deformability of red blood cell populations without capturing cellular heterogeneity, and its cost remains high. To overcome these challenges, the inventors have developed a method based on molecular rotors whose fluorescence emission is correlated to red blood cell rigidity. This technology can quantify both single-cell rheology and the mechanical heterogeneity within cell populations, a key parameter in determining the severity of erythrocyte disorders. This innovative approach aims to improve the diagnosis of membrane disorders pathologies and the prognosis of both sickle cell-anemia and spherocytosis.



Drepanocytosis - Spherocytosis - Red blood cell
Ektacytometry - Molecular rotor

DEVELOPMENT PHASE

■ TRL 3-4

INTELLECTUAL PROPERTY

WO2020/249823

INSTITUTIONS

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APPLICATIONS

- Spherocytosis diagnostic
- Drepanocytosis diagnostic
- Erythrocyte disorders

COMPETITIVE ADVANTAGES

- Quantification of the mechanical heterogeneity in cell population
- Costs
- Easy-to-use

PUBLICATIONS

- -A. Briole, M. Marin, C. Le Van Kim & B. Abou (2025), Molecular Rotors probe hemoglobin concentration in red blood cells, *J. Rheol.* 69, 463
- -A. Briole & B. Abou (2022), Molecular rotors in BSA and Hb proteins, *J. R. Soc. Interface* 19: 20220709
- -A. Briole, T. Podgorski & B. Abou (2021), Molecular rotors as intracellular probes of red blood cells rigidity, *Soft Matter* 17, 4525