Abstract Submitted
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Investigating Heterogeneity within Sickle Cell Disease Using Deep Learning NIKSA PRALJAK, Cleveland State University, SHAMREEN IRAM, GUNDEEP SINGH, ALILIS HILL, UTKU GOREKE, UMUT GURKAN, MICHAEL HINCZEWSKI, Case Western Reserve University — SCD is an inherited red blood cell (RBC) disorder associated with abnormal hemoglobin S (HbS). Long fibers are formed by intracellular HbS molecules. These fibers lead to damaged cell membranes. In addition, the HbS polymerization increases the RBC-endothelial adhesion within vascular tubules by damaging the RBC membrane. A key component to SCD morbidity is periodic recurrence of painful vaso-occlusion and blood flow alteration. The lack of diagnosis and early treatment can be better tackled with access to economically and operationally light point of care (POC) screening and monitoring tools. Creative POC technologies could offer cost-efficient and reliable screening strategies for SCD. Our collaborators at CWRU School of Engineering have designed a sickle cell disease monitoring platform (SCD Biochip) [Alapan et al. Translational Research, 173, 74-91, (2016)] which runs clinical whole blood samples through protein functionalized microchannels in experiments designed to mimic conditions in microvasculature. We propose a workflow that will attempt to investigate the heterogeneity within the biophysical properties and descriptions that link to pathological markers by implementing artificial intelligence alongside the SCD Biochip under various dynamics.

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