Role of oxidative stress on the cell mechanical properties of suspended and adherent cells

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Increase in oxidative stress has been linked to many haematological and neurological disorders. Reactive oxygen species (ROS) are one of the primary sources of oxidative stress which are associated with essential alterations in cell physiology[1]. Mechanical properties have long been established as a label-free biomarker, but their interplay with alternating levels of ROS has not been thoroughly investigated. This study focusses on understanding the impact of oxidative stress on the mechanical properties of the human leukaemia cell line (HL-60) and immortalized rat brain C6 glioma cells. In an *in-vitro* assay, mitochondrial superoxide was generated by exposing cells to varying concentrations of hydrogen peroxide. Using real-time fluorescence deformability cytometry[2], we link for the first time the molecular phenotype of ROS using MitoSOX-red a fluorescent marker to changes in the mechanical phenotype which is a label-free biomarker. We show for micromolar concentrations of H_2O_2 that an increase in ROS induces alterations in cell mechanical properties. For adherent cells, we find a decrease in the Young's modulus, which is in contrast to previous results for concentrations in the millimolar range[3]. For suspended cells, we observe a different cell response to oxidative stress of increased elastic modulus.

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