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Preliminary Investigation of the Mechanical Properties of Tissue Biopsies

Cancer induction and progression have been significant challenges that face humanity. Several procedures and methods have been used to detect the different stages within the clinical setting. However, many of these clinical tests are geared towards biochemical cues. This study studied the inherent nanomechanical properties of two breast and colorectal biopsies. The tissues were obtained from a biobank and then stored in 10 % formalin for onward transportation to the laboratory. A slice from the tissue samples was cut out, attached to a disc, and placed inside a Cypher VRS atomic force microscope. The tissue was then hydrated with phosphate buffer saline. The indentation curves of the samples were then acquired. The indentation curves were then fit into the Hertz model to extract the mechanical properties needed. The range of Young' s modulus obtained for the colorectal normal biopsies was between 2.174±0.299 and 35.005±5.025 MPa, while the values obtained for the cancer biopsies range between 0.524±0.017 and 5.120±0.218 MPa. However, the range obtained for the normal breast biopsies was 113.319±7.770 and 140.202±11.696 kPa, while the range of Young's modulus obtained for the cancer breast tissues was between 1.009±0.040 and 4.038±0.282 kPa. The study concluded that there is a significant difference in the indentation measurements between cancer tissues, and these differences also vary with the tissues.

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Primary author: DADA, Kayode (University of Johannesburg)

Co-author: Dr MAVUNDA, Risimati (University of Johannesburg)

Presenter: DADA, Kayode (University of Johannesburg)

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