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Detection of Breast and Colon Cancer Via Fractal Dimension LIAM ELKINGTON, PRAKASH ADHIKARI, PRABHAKAR PRADHAN, Mississippi State University — Cancer, a leading cause of death in the world, can affect many regions of the body with serious, lethal effect. Breast and Colon cancers are two of the most prevalent cancer types in the world. Despite their lethality rates, these cancers are easily treated if diagnosed at early stages. This leads to a necessity for early, accurate diagnosis methods. One method for diagnosing these cancers involves quantifying a tissue sample's fractal dimension. Fractals are structures exhibiting self-similarity in their mass distribution. Fractals appear in many natural structures including tissues which are a spatially heterogenous medium. In cells/tissues, the presence of cancer alters the fractal dimension by increased cell replication. The heightened replication causes cell density in a tissue to increase which increases the fractal dimension so as the stage of cancer increases, so does fractal dimension. Breast and colon tissue samples are imaged using commercially available paraffin embedded tissue microarray (TMA) slides arranging multiple samples on one slide. Light transmission intensity patterns through the thin samples are analyzed as they are proportional to the mass density pattern which affects the fractal dimension. This quantitative method's results show a correlation between increasing stages of cancer and increasing fractal dimension. The ease and accuracy of this test shows great potential for improving cancer diagnosis in the future.

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