Deep Learning to quantitatively study the prognostic value of the tumor stroma ratio in rectal cancer patients treated with neoadjuvant therapy. A preliminary study.

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Colorectal cancer is one of the deadliest cancer types with close to 1.000.000 associated deaths a year. However, the survival probability being dependent on the cancer stage at the time of diagnosis from this point on surgery or neoadjuvant therapy (NAT) being recommended. Nevertheless, the use of NAT is still administered with caution due to the side effects it carries. To further guide the treatment the use of biomarkers is widely used. In this study we preliminarily study the prognostic value of the tumor stroma ratio (TSR) in post treated rectal cancer patients using deep learning models. To achieve this goal a combination of U-Net and ResNet 18 frameworks was created to then be applied in whole slide images from patients treated with NAT. Having the traditional TSR scoring method in mind several TSR scoring methods were assessed with no statically significant results. Several problems and solutions were detected for the computational study of TSR. This included the increased performance in data generation using Masson's Trichrome staining, the limitations of computational TSR scoring in non-treated and treated patients and problems related to the data availability.

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