

Department	Urology
Title	Improving diagnosis and prognosis of high-risk non-muscle-invasive bladder cancer patients using computational pathology, For students with (bio)medical interest.
Contact details	Farbod Khoraminia, biomedical engineer, PhD candidate at Erasmus Medical Center f.khoraminia@erasmusmc.nl
Project Description	<p>Summary</p> <p>Choosing the appropriate therapy for bladder cancer (BC) patients to prevent over-or under-treatment is diagnosis-dependent. Even though current risk stratification systems are based on clinicopathological characteristics, pathological evaluation suffers from high intra/inter-observer variability that results in over or under-treatment. Therefore, a clinically applicable method (i.e., accurate, fast, and affordable) is required to improve diagnosis and prognosis of BC. Previous studies on using computer-aided detection (CAD) for histopathological image analysis have shown their effectiveness in detecting cancer tissue, molecular subtype, and grading in BC.</p> <p>Non-muscle-invasive bladder cancer (NMIBC) patients comprise 75% of newly diagnosed BC patients. A subgroup of these patients is high-risk non-muscle-invasive bladder cancer (HR-NMIBC), and they have the highest risk of recurrence and progression. The gold standard treatment for HR-NMIBC patients is transurethral resection of the bladder tumor followed by intravesical BCG treatment. Approximately 30-50% of patients will not respond to BCG. Therefore, there is an urgent need to predict before treatment which patients will benefit from treatment and which patients need an alternative treatment.</p> <p>Our hypothesis is that analyzing morphological features in histopathological H&E stained images from HR-NMIBC patients using a deep learning approach can predict response to BCG treatment.</p> <p>Specific aims of the project</p> <ul style="list-style-type: none"> • Predicting response to BCG treatment by analyzing H&E stained images. • Providing grading and staging diagnosis. • Predicting molecular subtype by analyzing H&E stained images. • Providing a guideline to label whole slide images more efficiently. <p>Aims and benefits of the master/bachelor project</p> <p>As an intern who would focus on an international computational pathology project, you will learn:</p> <ul style="list-style-type: none"> • Pathological and technical principles of digital pathology • How to manage patient data in a research study • How to work with state of the art digital pathology platforms • How to present your work and improve teamwork skills <p>The master/bachelor's project aim will be:</p> <ul style="list-style-type: none"> • Annotate pathological images to improve algorithm performance. • Managing patient consent to participate in the study and managing patient information. • Analyzing annotated images with deep learning algorithms to improve diagnosis and prognosis. <p>The student will join in on our weekly lab meetings and monthly journal club meetings. The student will be a part of the Erasmus MC Urothelial Cancer Research Group (EUCRG), in which we learn, share, and enjoy together www.erasmusmcfoundation.nl/projecten/ki-bij-blaaskanker/.</p> <p>Outcome</p> <p>These specific sub aims are part of a European Commission-supported project (clarify-project.eu) to develop a research infrastructure based on digital image processing and artificial intelligence. A significant contribution of the student to the project will lead to a co-authorship in publications.</p>

	Application

Those interested are requested to contact the above-mentioned supervisor and/or the Onderwijsbureau Urologie by the 30th of December 2022.

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