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.**
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Project Description	**Summary** 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. 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. 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. **Specific aims of the project** • 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. **Aims and benefits of the master/bachelor project** As an intern who would focus on an international computational pathology project, you will learn: • 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 The master/bachelor's project aim will be: • 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. 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/. **Outcome** 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.

	Application Those interested are requested to contact the above-mentioned supervisor and/or the Onderwijsbureau Urologie by the 30th of December 2022. e-mail: m.domscheit@erasmusmc.nl, phone 010-7034795, room Sp-3432, Erasmus MC-Sophia, gang B third floor