

School/Department:	Departments of Radiology / Urology / Pathology / Medical informatics Erasmus University Medical Center Rotterdam, The Netherlands
Project Title:	Multiparametric MRI as a substitute for systematic prostate biopsy: is it feasible?
Abstract:	<p>Prostate cancer (PCa) is the most common malignancy and second leading cause of cancer-related death in men. PCa related metastasis and death are associated with high-grade PCa. Therefore accurate discrimination between high- and low-grade PCa is of utmost importance for the decision on treatment options and prognosis. In clinical practice, high- and low-grade PCa can only be distinguished by histopathology grading on prostate biopsy specimen, obtained by an invasive procedure with comorbidity. Multiparametric MRI (mpMRI) could offer a non-invasive alternative, however, first the discriminative power of mpMRI should be clearly established.</p> <p>The aim of this project is to develop and validate an objective MRI based method for the detection and grading of PCa. This method will be developed and validated based on mpMRI maps that are spatially matched with histopathology of prostate specimens obtained by radical prostatectomy.</p> <p>This method could be developed into a powerful non-invasive diagnostic and prognostic tool for detection and grading of PCa in-vivo and in helping to determine the appropriate treatment option. MRI may reduce the burden of biopsy for men and the health care system and may refine the biopsy strategy to maximize the detection of high-grade PCa.</p> <p>Objectives</p> <p>The aim of this project is to develop and validate an objective MRI based method for the detection and grading of prostate cancer (PCa). The method will be developed and validated based on multiparametric MRI (mpMRI) maps that are spatially matched with histopathology of prostate specimens obtained by radical prostatectomy.</p> <p>The following objectives are formulated:</p> <ol style="list-style-type: none"> 1. To develop quantitative maps of PCa histopathologic features of 50 prostate specimen, obtained by radical prostatectomy. 2. To define the best combination of mpMRI based features (quantitative imaging biomarkers) to detect and grade PCa based on a database of 50 spatially matched MRI and quantitative histology maps of whole prostate specimen. 3. To validate the mpMRI based classifiers in a retrospective study cohort of 100 patients with radical prostatectomy.

Erasmus University Rotterdam, the Netherlands
CSC PhD 2015 Project Description

	To assess the predictive value of the mpMRI based classifiers in a prospective study cohort of 100 patients with radical prostatectomy
Requirements of candidate:	<p>Master degree: Yes</p> <p>Background: Radiology, preferably have some knowledge on MRI and statistics.</p> <p>IELTS Grade: 7.0 (<i>minimal 6.0 per component</i>) or TOEFL: 100 (<i>minimal 20 per component</i>)</p>
Supervisor information:	<p>This project is a unique collaboration between the departments of Radiology, Medical Informatics, Pathology and Urology to develop a diagnostic tool for detection and grading of prostate cancer in-vivo to support optimal clinical decision-making. The department of Radiology has the expertise of state-of-the-art multi-parametric MRI imaging of prostate cancer the department of Medical Informatics has expertise on quantification of the different MR-sequences, the registration of MRI with pathology data and multi-dimensional data analysis. The department of Pathology has expertise on classification of PCa and creating detailed maps of cancer location in prostatectomy specimens. The department of Urology has expertise on diagnostic and treatment strategies of patients with prostate cancer.</p> <p><i>Group:</i> Prof. dr. G.P. Krestin / Prof. dr. Bangma / Dr. I.G. Schoots / Dr. J Veenland / Dr. van G.J. van Leenders</p> <p><i>Supervisors:</i> <u>Dr. J. F. Veenland</u> and <u>I.G. Schoots</u></p> <p>Department of Radiology, Erasmus MC Room Na-2602, P.O. Box 2040 3000 CA Rotterdam, The Netherlands phone +31 10 703 8191 (secretary. Bioinformatics / Radiology) <i>Email address</i> j.veenland@erasmusmc.nl i.schoots@erasmusmc.nl</p> <p>Recent publication list, preferably last 3-5 years Achievements of the group co-workers, relevant to this proposal.</p> <ol style="list-style-type: none"> 1. Cribriform growth is highly predictive for postoperative metastasis and disease-specific death in Gleason score 7 prostate cancer. Kweldam CF, Wildhagen MF, Steyerberg EW, Bangma CH, van der Kwast TH, van Leenders GJ. Mod Pathol. 2014 2. Feasibility of multimodal deformable registration for head and neck tumor treatment planning. Fortunati V, Verhaart RF, Angeloni F, van der Lugt A, Niessen WJ, Veenland JF, Paulides

	<p>MM, van Walsum T. Int J Radiat Oncol Biol Phys. 2014 Sep 1;90(1):85-93.</p> <p>3. Disease-specific death and metastasis do not occur in patients with Gleason score ≤ 6 on radical prostatectomy. Kweldam CF, Wildhagen MF, Bangma CH, van Leenders GJ. BJU Int. 2014</p> <p>4. Van der Kwast T, Bubendorf L, Mazerolles C, Raspollini MR, Van Leenders GJ, Pihl CG, Kujala P. Guidelines on processing and reporting of prostate biopsies: the 2013 update of the pathology committee of the European Randomized Study of Screening for Prostate Cancer (ERSPC). Virchows Archiv : an international journal of pathology. 2013;463(3):367-77.</p> <p>5. Somford DM, Hoeks CM, Hulsbergen-van de Kaa CA, Hambrock T, Futterer JJ, Witjes JA, Bangma CH, Vergunst H, Smits GA, Oddens JR, van Oort IM, Barentsz JO. Evaluation of diffusion-weighted MR imaging at inclusion in an active surveillance protocol for low-risk prostate cancer. Investigative radiology. 2013;48(3):152-7. Epub 2013/01/19.</p> <p>6. Roobol MJ, Zhu X, Schroder FH, van Leenders GJ, van Schaik RH, Bangma CH, Steyerberg EW. A Calculator for Prostate Cancer Risk 4 Years After an Initially Negative Screen: Findings from ERSPC Rotterdam. European urology. 2013;63(4):627-33. Epub 2012/07/31.</p> <p>7. Moore CM, Kasivisvanathan V, Eggener S, Emberton M, Futterer JJ, Gill IS, Grubb lii RL, Hadaschik B, Klotz L, Margolis DJ, Marks LS, Melamed J, Oto A, Palmer SL, Pinto P, Puech P, Punwani S, Rosenkrantz AB, Schoots IG, Simon R, Taneja SS, Turkbey B, Ukimura O, van der Meulen J, Villers A, Watanabe Y. Standards of reporting for MRI-targeted biopsy studies (START) of the prostate: recommendations from an International Working Group. European urology. 2013;64(4):544-52. Epub 2013/03/30.</p> <p>8. Fortunati V, Verhaart RF, van der Lijn F, Niessen WJ, Veenland JF, Paulides MM, van Walsum T. Tissue segmentation of head and neck CT images for treatment planning: a multiatlas approach combined with intensity modeling. Med Phys. 2013;40(7):071905. Epub 2013/07/05.</p> <p>9. Bol K, Haack JC, Groen HC, Niessen WJ, Bernsen MR, de Jong M, Veenland JF. Can DCE-MRI Explain the Heterogeneity in Radiopeptide Uptake Imaged by SPECT in a Pancreatic Neuroendocrine Tumor Model? PLoS One. 2013;8(10):e77076. Epub 2013/10/12.</p> <p>10. Bokhorst LP, Bangma CH, van Leenders GJ, Lous JJ, Moss SM, Schroder FH, Roobol MJ. Prostate-specific Antigen-Based</p>
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	<p>Prostate Cancer Screening: Reduction of Prostate Cancer Mortality After Correction for Nonattendance and Contamination in the Rotterdam Section of the European Randomized Study of Screening for Prostate Cancer. <i>European urology</i>. 2013. Epub 2013/08/21.</p> <p>11. Alic L, van Vliet M, Wielopolski PA, ten Hagen TL, van Dijke CF, Niessen WJ, Veenland JF. Regional heterogeneity changes in DCE-MRI as response to isolated limb perfusion in experimental soft-tissue sarcomas. <i>Contrast Media Mol Imaging</i>. 2013;8(4):340-9. Epub 2013/04/25.</p> <p>12. Wolters T, Montironi R, Mazzucchelli R, Scarpelli M, Roobol MJ, van den Bergh RC, van Leeuwen PJ, Hoedemaeker RF, van Leenders GJ, Schroder FH, van der Kwast TH. Comparison of incidentally detected prostate cancer with screen-detected prostate cancer treated by prostatectomy. <i>The Prostate</i>. 2012;72(1):108-15. Epub 2011/05/04.</p> <p>13. Schroder FH, Hugosson J, Roobol MJ, Tammela TL, Ciatto S, Nelen V, Kwiatkowski M, Lujan M, Lilja H, Zappa M, Denis LJ, Recker F, Paez A, Maattanen L, Bangma CH, Aus G, Carlsson S, Villers A, Rebillard X, van der Kwast T, Kujala PM, Blijenberg BG, Stenman UH, Huber A, Taari K, Hakama M, Moss SM, de Koning HJ, Auvinen A. Prostate-cancer mortality at 11 years of follow-up. <i>The New England journal of medicine</i>. 2012;366(11):981-90. Epub 2012/03/16.</p> <p>14. Roobol MJ, van Vugt HA, Loeb S, Zhu X, Bul M, Bangma CH, van Leenders AG, Steyerberg EW, Schroder FH. Prediction of prostate cancer risk: the role of prostate volume and digital rectal examination in the ERSPC risk calculators. <i>European urology</i>. 2012;61(3):577-83. Epub 2011/11/23.</p> <p>15. Bul M, Zhu X, Rannikko A, Staerman F, Valdagni R, Pickles T, Bangma CH, Roobol MJ. Radical prostatectomy for low-risk prostate cancer following initial active surveillance: results from a prospective observational study. <i>European urology</i>. 2012;62(2):195-200. Epub 2012/02/22.</p> <p>16. Bangma CH, Bul M, Roobol M. The Prostate cancer Research International: Active Surveillance study. <i>Current opinion in urology</i>. 2012;22(3):216-21. Epub 2012/03/29.</p> <p>17. Wolters T, Roobol MJ, van Leeuwen PJ, van den Bergh RC, Hoedemaeker RF, van Leenders GJ, Schroder FH, van der Kwast TH. A critical analysis of the tumor volume threshold for clinically insignificant prostate cancer using a data set of a randomized screening trial. <i>The Journal of urology</i>.</p>
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	<p>2011;185(1):121-5.</p> <p>18. Alic L, van Vliet M, van Dijke CF, Eggermont AM, Veenland JF, Niessen WJ. Heterogeneity in DCE-MRI parametric maps: a biomarker for treatment response? Physics in medicine and biology. 2011;56(6):1601-16. Epub 2011/02/22.</p> <p>19. Alic L, Haeck JC, Bol K, Klein S, van Tiel ST, Wielepolski PA, de Jong M, Niessen WJ, Bernsen M, Veenland JF. Facilitating tumor functional assessment by spatially relating 3D tumor histology and in vivo MRI: image registration approach. PLoS One. 2011;6(8):e22835. Epub 2011/09/08.</p>
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