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Patient-specific in-vivo QA in MRGRT: 3D EPID dosimetry for the Unity MR-linac

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Citation

Torres Xirau, I. (2020, September 15). *Patient-specific in-vivo QA in MRGRT: 3D EPID dosimetry for the Unity MR-linac*. Retrieved from <https://hdl.handle.net/1887/136754>

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Title: Patient-specific in-vivo QA in MRGRT: 3D EPID dosimetry for the Unity MR-linac

Issue Date: 2020-09-15

10.

ACKNOWLEDGMENTS

Uulke, first of all I would like to thank you for taking me under your supervision. You guided me thoroughly and spend time supporting and encouraging me to pursue my thesis. You gave me confidence and motivation to work towards my goals when I probably hesitated. It has been a pleasure to fall into your research group and benefit from your guidance. **Anton**, since the first day you trusted my capabilities on accomplishing this thesis. I would like to thank you for giving me the opportunity to work in such a rewarding environment as the NKI, for guiding and squeezing your busy agenda to have periodical meetings that served me to gain insight in the field.

A special thank you goes to my paranymphs **Igor** and **Tessa**, whom, in very different ways, played such a huge role during my PhD. I'm proud to say we are not just colleagues but also good friends. **Igor**, durante mis años en el NKI te has convertido en una especie de hermano mayor en Ámsterdam: me has cuidado dentro y fuera del departamento y te has preocupado para que me sintiera como en casa. He aprendido muchísimo contigo, de tu espectacular tarea en el NKI, pero sobre todo de tu positivismo y entusiasmo en la vida. Ha sido un placer trabajar a diario contigo durante estos años (y ver crecer a tus peques). Sin ti esta tesis no habría sido posible (y definitivamente menos divertida). **Tessa**, you've been the only PhD in the office I've share my entire NKI life with. That's every day! We got along so well that you hired me for the borrel committee. We've shared Incredible memories of dinners, parties, conferences and finally of my wedding (and your 'wedding' too). You were always there for me: in the funniest times, babysitting Berlin, and having endless coffees, but also during the toughest moments you were very supportive and I appreciate it most.

Zeno and **Bruno, completing the old guard**. It's been a total pleasure to share moments with both of you in the pitch and outside of it. **Zeno**, thanks for introducing me to your football team when I arrived

in town, you opened that door to me when I was barely a stranger. It was wonderful to get to know you better through football and borrels. **Bruno**, it was such a relief when you arrived to the NKI: finally some Latin blood to team up with at everything. I have the feeling that for some reason you and I immediately build some strong bonds and we just understood each other so well. I am so happy of you moving to Barcelona. **Roel** and **Patrick**, you were the dream team of the EPID room when I joined, you were a true inspiration to my research. **Ben**, your wise support and documented advise help me conduct rigorous science. **Begoña**, **Thjis**, **Jochem**, thanks for being always so supportive and willing to collaborate with tedious measurements I always needed. To **Jonas**, **Anja**, **Natashja**, **Martin**, it has been fun and a great pleasure to spend these years next to you. **Diedie** and **Patricia**, thank you for always being available to solve any problem, you are the safety net of this department. **Mathjis**, **Sander**, **Gauti**, **Vineet**, **Theo**, **Nikita**, **Anke**, it was short but intense. **Catarina**, **Natasja**, **Kleopatra**, **Tom**, **Uros**, **Edzo**, **Chris**, **Lucas**, I had the pleasure to share few years with you. To **you all** thanks for being the party people any PhD student can only dream about.

To all friends in Amsterdam, whom in one way or another were present and supportive. A special mention goes to: **Mar** for your continuous wisdom councils. Your ability to listen and positivity fueled me with energy when I needed it. **David**, **Laura** (and **Clara**), living in Ten Kate was probably the funniest time in Amsterdam. Thanks for your patience and joy. To **Carla**, **Nuria**, **Anaka**, **Marus**, **Paul** and **Anna**, each of you in a different way contributed to the feeling that Amsterdam was home during these years. To **Reinout**, my *Berlin's Dutch friend*. Wikipedia should have a picture of you next to the word *Friendship*. To all my friends in **Sabadell**, gràcies als terroristes, per fer que cada escapada a Sabadell ens omplís d'energia per tornar a Amsterdam fins la propera visita. To my **ETB brotherhood** friends, for our yearly reunions proving

that Berlin was just a stepping Stone of our friendship.

Georgina. Gràcies per tot. Per sempre. Per fer-me creure capaç de tot. Per demostrar-me que venir a Amsterdam va ser la millor decisió de la meua vida. Per acompanyar-me en els bons moments i sobretot per fer-me costat en els dolents. Per no rendir-nos mai. Per dir-me “sí, vull” a la caleta. Per acceptar casar-nos a Can Torres i per seguir caminant junts. Per fer-me feliç. A l'**Axel** per fer-me sentir sempre tan especial, tan valent, tan segur. Per fer-me sentir privilegiat al repetir-me l'enveja que et feia l'experiència que he viscut tots aquests anys fora. Al **Papa**, per la teua serenor, per cuidar-nos i ajudar-nos sempre. Incondicionalment. Per aguantar els cops de la manera que ho has fet. Has sigut un exemple i estic orgullós de tu. A la **Mama**, perquè has sigut i seràs sempre el motor que em dona tota l'energia positiva. Et trobo moltíssim a faltar. Cada dia. T'estimo.

11.

LIST OF PUBLICATIONS

This thesis is based on the following publications:

A back-projection algorithm in the presence of an extra attenuating medium: towards portal dosimetry for the MR-linac.

Torres-Xirau I, Olaciregui-Ruiz I, Rozendaal R, González P, J Mijnheer B, Sonke J-J, et al.

Phys. Med. Biol. 2017;62:6322–6340.

DOI: 10.1088/1361-6560/aa779e

Characterization of the A-Si EPID in the Unity MR-Linac for dosimetric applications.

Torres-Xirau I, Olaciregui-Ruiz I, Baldvinsson G, Mijnheer BJ, Van Der Heide UA, Mans A.

Phys. Med. Biol. IOP Publishing; 2018;63.

DOI: 10.1088/1361-6560/aa9dbf

Two-dimensional EPID dosimetry for the MR-linac: proof of concept.

Torres-Xirau I, Olaciregui-Ruiz I, van der Heide UA, Mans A.

Med. Phys. 2019; mp.13664.

DOI: 10.1002/mp.13664

Clinical validation 3D in-vivo EPID dosimetry in the Unity MR-linac.

Torres-Xirau I, Olaciregui-Ruiz I, Kaas J, Nowee E Marlies, van der Heide UA, Mans A.

Rad. Onc. 2020; RO-D-19-00826R2.

DOI: 10.1016/j.radonc.2020.02.010

A Deep Learning-based correction to EPID dosimetry for attenuation and scatter in the Unity MR-Linac system.

Torres-Xirau I*, Olaciregui-Ruiz I*, Teuwen J, van der Heide UA, Mans A.

Phys. Medica, 2020, EJMP-D-19-00638;

DOI: 10.1016/j.ejmp.2020.02.020

Other publications:

Fast Approximate Nearest-Neighbour Field by Cascaded Spherical Hashing

Torres-Xirau I, Jordi Salvador, Eduardo Pérez-Pellitero.

ACCV 2014; Proc. Asian Conf. on Computer Vision 2014

DOI: 10.1007/978-3-319-16817-3_30

Fast Super-Resolution via Dense Local Training and Inverse Regressor Search

Eduardo Pérez-Pellitero, Jordi Salvador, Torres-Xirau I, Javier Ruiz-Hidalgo, Bodo Rosenhahn

ACCV 2014; Proc. Asian Conf. on Computer Vision 2014

DOI: 10.1007/978-3-319-16811-1_23

Conference abstracts:

2016 - Towards Portal Dosimetry for the MR-linac: back-projection algorithm in the presence of MRI scanner

I. Torres Xirau, R. Rozendaal, I. Olaciregui-Ruiz, P. Gonzalez, U. van der Heide, J.J. Sonke, A. Mans;

ESTRO 35

**Oral presentation*

2017 - A back-projection algorithm in the presence of an extra attenuating medium: towards portal dosimetry for the MR-Linac

I. Torres Xirau, R. Rozendaal, I. Olaciregui-Ruiz, P. Gonzalez, U. van der Heide, J.J. Sonke, A. Mans

Institute Quantivision Conference 2017

**Oral presentation*

2017 - EPID dose response in the MR-Linac with and without presence of a magnetic field

I. Torres Xirau, I. Olaciregui-Ruiz, B. J. Mijnheer, U. A. van der Heide, A. Mans

ESTRO 36

**Oral presentation*

2017 - Geometric validation of a 4D-MRI guided correction strategy on the MR-Linac

van de Lindt T. N., Koopman R., van de Schoot A., **Torres-Xirau I.**, van der Heide U. A., Sonke J.J.

ESTRO 36

**Poster*

2017 - Towards EPID dosimetry for the MR-Linac: current status

I. Torres Xirau, I. Olaciregui-Ruiz, B. J. Mijnheer, U. A. van der Heide, A. Mans

ESTRO 1st Physics Workshop

**Oral presentation*

2018 - 2-D EPID dosimetry for the MR-Linac: proof of concept

I. Torres Xirau, I. Olaciregui-Ruiz, B. J. Mijnheer, U. A. van der Heide, A. Mans

ESTRO 37

**Oral presentation*

2019 - Correction of EPID images in the MR-Linac using Deep learning

I. Torres Xirau, J. Teuwen, I. Olaciregui-Ruiz, U. A. van der Heide, A. Mans

Institute Quantivision Conference 2019

**Oral presentation*

2019 - Pre-treatment portal dosimetry for the MR-Linac

I. Torres Xirau, I. Olaciregui-Ruiz, U. A. van der Heide, A. Mans

ESTRO 38

**Oral poster presentation*

2019 - Attenuation and scatter correction of portal images in the MR-Linac using Deep learning – ICCR 2019

I. Torres Xirau, J. Teuwen, I. Olaciregui-Ruiz, U. A. van der Heide, A. Mans

ICCR 2019

**Oral presentation*

CURRICULUM VITAE

My name is Iban Torres Xirau, and I was born in Barcelona on the 5th of September of 1987. I grew up in Sabadell, where I went to school and still lived during my university time. It was in 2005 when I started an integrated bachelor's and master's program in Telecommunications Engineering at the Polytechnic University of Catalonia (UPC). In the winter of 2012, as part of my degree, I applied to an Erasmus at the Technische Universität of Berlin (TUB), and for around a year I attended to several signal and image processing courses at the Computer Vision department of the TUB. Meanwhile, I also joined the Fraunhofer Institute IPK in Berlin, where I wrote my Master Thesis as a joint project between the institute, the TUB and advised by the UPC. During this period, I focused on developing an image processing software that could detect anomalies in the production of mechanical components such as screws, bolts and nuts. Then I applied for an internship as a junior researcher at the Image processing and computer vision lab of Technicolor in Hannover, where I worked for a year on topics related to image super-resolution and fast-search structures. After a very successful year at Technicolor with 2 contributions to scientific conferences, I realized I became very interested on image processing and computer vision, but most importantly on research, so I applied for a PhD at the Radiotherapy department of Netherlands Cancer Institute. This thesis describes the research conducted during this PhD on the use of EPIDs for dosimetry in the Unity MR-linac and how we paved the way from the existing back-projection algorithm for conventional linacs to the actual use of our adapted algorithm in clinical practice.

