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Work:
 Department of Medical Physics
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My research interests pertain to medical physics and computation. As a clinical physicist, I particularly enjoy translating emerging computational technologies into clinical practice. I'm an advocate of [open source software](#) and much of the software I write is [freely available](#).

I enjoy working on intricate problems, and have a passion for long-term goals.

CITIZENSHIP

Canadian.

EDUCATION

CAMPEP Residency ◦ Medical Physics ◦ 2019 ◦ [BC Cancer Surrey](#).

Ph.D. in Physics ◦ Medical Physics ◦ 2017 ◦ [University of British Columbia](#).

M.Sc. in Physics ◦ Medical Physics ◦ 2013 ◦ [University of British Columbia](#).

B.Sc. (First Class Honours) in Physics ◦ 2010 ◦ [University of Alberta](#).

GRANTS

2021 ■ BioTalent Canada (\$7000, competitive).

Grant for the Student Work Placement Program (Naomi Jung). PI/Supervisor: Haley Clark.

2021 ■ BC Cancer Surrey Radiation Oncology Research Fund (\$5500, non-competitive).

Grant for large-scale retrospective study of how breast cancer nodal dosimetry relates to recurrence. PI: Hamid Raziee.

2021 ■ Siemens Healthcare Limited In-Kind Equipment/Software Loan.

One year industrial in-kind research loan of 'Advanced Diffusion Sequence' and Syngo via.Frontier analysis toolkit. PI: Haley Clark.

2021 ■ BC Cancer Diagnostic Imaging MR Scanner Time (approx. \$11k, non-competitive).

Granted time on clinical MR scanner for 20 imaging bookings plus technical development time. Title: Intra-Voxel Incoherent Motion MR Imaging for Prediction of Radiotherapy-Induced Salivary Gland Dysfunction. PI: Haley Clark.

2017 ■ UBC 3T MR Imaging Pilot Study Time (approx. \$3k, non-competitive).

Granted pilot time on University of British Columbia's 3T Philips research MR scanner for 5 imaging bookings. Title: Parotid functional mapping using chemical exchange saturation transfer (CEST). PI: Nevin McVicar.

2015 ■ BiGART Travel Grant (\$1k, competitive).

Competitive travel grant to attend [13th Acta Oncologica Symposium on Biology-Guided Adaptive Radiotherapy](#), Århus, Denmark. June 10 → 12.

2014 ■ \$20k BC Cancer RCTAG Translational Research Award (\$20k, competitive).

"The purpose of this grant is to help foster research relationships with high level investigators and create inroads that will ultimately lead to larger grant opportunities."

Title: Investigation into the Regional Dose Susceptibility of Salivary Function Loss and Recovery. PI: Jonn Wu.

AWARDS

2018 ■ Dr. Harold Batho Award. Provincial competition.

Awarded for best medical physics resident presentation, BC Cancer Academic Day.

- 2016** ■ Walter C. Sumner Memorial Fellowship. National competition.
“Based on research ability or potential, industry, judgment, all-round scientific ability, communication skills, and interpersonal and leadership abilities.”
- 2015** ■ UBC Four Year Doctoral Fellowship. Institutional competition.
“Provides support to outstanding doctoral students. Based on academic excellence.”
- 2013** ■ Best Poster/Oral Presentation, **17th International Conference on the use of Computers in Radiation Therapy**, Melbourne, Australia. May 6 → 9.
- 2010** ■ NSERC Alexander Graham Bell Graduate Scholarship (CGSM). National competition.
“Scholarship offered to top-ranked high calibre scholar applicants.”
- 2010** ■ NSERC Undergraduate Research Award (USRA). National competition.
“Awarded to students to foster academic research over one summer.”
- 2010** ■ Dean’s Silver Medal in Science, University of Alberta. Institutional competition.
“Awarded to graduating students with superior academic achievement.”
- 2009** ■ NSERC Undergraduate Research Award. National competition.
- 2008** ■ Louise McKinney Scholarship. Provincial competition.
“Scholarship awarded to students with exceptional academic achievement.”
- 2008** ■ Jason Lang Scholarship. Provincial competition. (Awarded, but declined.)
“Scholarship given to students with outstanding academic achievement.”
- 2007** ■ Jason Lang Scholarship. Provincial competition.
- 2007** ■ Douglas M. Sheppard Scholarship, University of Alberta. Institutional competition.
“Scholarship awarded to students with superior academic achievement.”
- 2006** ■ Jason Lang Scholarship. Provincial competition.

NOMINATIONS **2020** ■ Target Insight 2020 *Innovation Award*
“Recognizes individuals/teams whose work in the areas of data science/big data/machine learning/artificial intelligence has resulted in a change in the practice of radiation oncology with an impact on patient outcomes.” (Conference cancelled due to COVID-19.)

AFFILIATIONS **Medical Physicist** **BC Cancer** (2017 → *present*).
Honourary Lecturer UBC, Physics and Astronomy (2020 → *present*).
Clinical Instructor UBC, Faculty of Medicine, Department of Surgery (2020 → *present*).
Member Canadian Organization of Medical Physicists (2013 → *present*).
Observer DICOM standardization (2015 → *present*).
Observer ISO C++ standardization (2012 → *present*).
Member American Association of Physicists in Medicine (2014 → 2020).

LEADERSHIP **2021** → *present* ■ Leading conversion of diagnostic MR to RT-simulator (ImageTech).
2021 → *present* ■ Member of the BC Cancer Physics Resident Education Committee.
2020 → *present* ■ Research dept. team lead (BC Cancer Surrey).
2020 → *present* ■ Clinical deformable registration dept. team lead (BC Cancer Surrey).

- 2020 ■ Clinical protocol development (RAPID Spine) for increasing patient throughput using a streamlined VMAT radiotherapy planning procedure.
- 2019 ■ International collaborations with Universities at Johns Hopkins, Aarhus (Denmark), Vanderbilt, as well as Memorial Sloan Kettering Cancer Centre.
- 2018 ■ BC Cancer Resident Education Committee resident representative. Represented medical physics residents throughout BC at education hearings.
- 2018 ■ Developed a number of software tools for clinical operations at BC Cancer Surrey. Tools include a static beam optimizer for treatment planning, picket fence QA analysis tool, light-radiation field coincidence annual QA tool, and a treatment plan development tool for patients with second cancers.
- 2015 → 2016 ■ Proposed and co-developed a new graduate course at the University of British Columbia. Proposed course was a formalized extension of the graduate student seminar series, with addition of practical matters (e.g., writing abstracts).
- 2014 → 2015 ■ Developed and ran a medical physics journal club jointly hosted by the University of British Columbia and BC Cancer. My lectures on **ethics** and **the early history of medical physics** are available on YouTube.
- 2012 → 2015 ■ Host and organizer of the bi-monthly *graduate student seminar series* in the Department of Physics and Astronomy at the University of British Columbia.
- 2014 ■ Proposed and implemented a data exchange framework at the BC Cancer Agency. Using this framework, patient data can be exported, anonymized, and processed in bulk. It successfully processed 2000 **DICOM data sets** for a salivary function study.

TEACHING

- 2021/2022 ■ UBC Phys 534, graduate course in medical physics. Course instructor.
- 2020/2021 ■ UBC Phys 546, clinical shadowing for UBC graduate students in medical physics program. Total body irradiation technique and clinical workflow, including presentation, hands-on demonstration, and review session.
- 2020/2021 ■ UBC Phys 534, graduate course in medical physics. Volunteer work preparing teaching material, handling student questions, and providing office hours.
- 2019/2020 ■ UBC Phys 534, graduate course in medical physics. Volunteer work handling student questions, providing office hours, and proctoring.
- 2019/2020 ■ UBC Phys 546, clinical shadowing for UBC graduate students in medical physics program. Total body irradiation technique and clinical workflow, including presentation, hands-on demonstration, and review session.
- 2019/2020 ■ Clinical shadowing for BC Cancer radiation oncology residents and medical physics residents. Total body irradiation technique and clinical workflow, including presentation, hands-on demonstration, and review session.

SUPERVISION

- 2021-2022 academic year ■ **Aaron Chris Manalo**, 3rd year B.Sc. in math+physics at UAlberta. Project aim: establish clinical guidelines for ensuring patients with extensive tattooing can be safely scanned by MR simulator for radiotherapy purposes.
- 2021-2022 academic year ■ **Bowen Luo, Joey Gaffney, Karina Lei, and Lina Nguyen**, capstone project team of 4th year B.Sc. students in engineering physics at UBC. Project aim: implementation of a deformable image registration algorithm in DICOMautomaton.

- 2021-2022 academic year** ■ **Evan Wingert, Forbes Choy, Leo Zhao, and Vladimir Novakovic**, capstone project team of 4th year B.Sc. students in engineering physics at UBC. Project aim: continue development of hand-held LiDAR scanner prototype device for fully-virtual radiotherapy collision check simulations.
- 2021 summer** ■ **Naomi Jung**, 2nd year B.Sc. in physics at UBC. Summer work co-op project aim: Work co-op project: build a medical image segmentation model with tailored salivary structures (oral cavity; parotid, submandibular, tubarial, and sublingual glands).
- 2020-2021 academic year** ■ **Brennen Dobberthien**, Junior Physicist at BC Cancer. Project aim: development of a process and clinical workflow for quality assurance monitoring of deformable registration.
- 2020-2021 academic year** ■ **Brendan Posehn**, 5th year B.Sc. in engineering physics at UBC. Project aim: create a LiDAR-based patient scanning system to virtually simulate radiotherapy treatment dry-runs.
- 2021** → *present* ■ **Lorna Tu**, Ph.D. in physics at UBC. Thesis aim: use radiomics to generate patient-specific modifications to standard radiotherapy treatments to maximize patient outcomes. (Note: I proposed this project but have taken a consulting role.)
- 2020-2021 academic year** ■ **Jackson Gayda, Krysten Zissos, Mojan Jamalzadeh, and Tianna Hudak**, capstone project team of 4th year B.Sc. students in engineering physics at UBC. Project aim: implement a convolutional blood perfusion model algorithm and GPU accelerate a more advanced novel liver perfusion model.
- 2020-2021 academic year** ■ **Anthony Ho, Carlos Doebelli, Julia Rosenrauch, and Cailin Ringstrom**, capstone project team of 4th year B.Sc. students in engineering physics at UBC. Project aim: implement a point cloud and image deformation algorithm to improve radiotherapy targeting.
- 2019** → *present* ■ **Caleb Sample**, Ph.D. in physics at UBC. Thesis aim: evaluate feasibility of incorporating sub-organ radiotherapy optimization weights to account for variations in organ-at-risk dose-outcomes susceptibility.

RESEARCH

- 2021** → *present* ■ Quantitative assessment of the impact of radiotherapy on radiation-induced salivary dysfunction. This project employs quantitative Magnetic Resonance and Positron Emission Tomography imaging of Prostate-Specific Membrane Antigen positive salivary tissues. The aim is to produce a model capable of predicting an individual patient's response to a specific radiotherapy plan via quantifying sub-organ tissue criticality. A prospective trial is currently underway at BC Cancer.
- 2019** → *present* ■ Development of novel, robust registration methods that can be applied to degenerate and low-dimensional embedded data. These situations can arise in many clinical situations, including 2D-3D registration, fiducial marker matching, MR distortion characterization, and underspecified registration problems.
- 2017** → *present* ■ Development of clinical tooling for productive and efficient development of radiation therapy treatment plans. Automation of the treatment planning process is stymied by several limiting factors that must be manually performed: contouring, field selection and placement, beam modeling, optimization, and evaluation of plans, especially when a significant clinical compromise must be made. The broad aim of this work is to provide support tooling to automate the planning, plan-checking,

and quality assurance process as much as possible. This will be accomplished through use of automated contouring tools built on machine learning, speculative treatment planning that will allow the Pareto-optimal parameter space manifold to be explored effectively without having to manually iterate the planning process, development of a reliable open source particle transport solver to support dosimetric assessment, and implementation of a robust multi-objective optimizer tuned for radiotherapy applications. Work is ongoing.

- 2012 → 2020** ■ Investigation of radiation-induced **xerostomia** using radiation dose and outcomes data. Using a large body of patient data and salivary flow measurements, the underlying nature of xerostomia was investigated. Emphasis was on quantitative assessment of regional dose susceptibility within the parotid gland. The motivational aim of the research was mitigation of disease onset by altering dose delivery. A clinical trial was undertaken ([NCT02294838](#)). Work was mostly computational in nature, requiring the development of a large automated analysis framework, multiple imaging modalities, and the development of a new imaging protocol and accompanying analysis technique, but apparatus design work was also required.
- 2015 → 2020** ■ Quantitative assessment of **liver perfusion** changes for patients undergoing **stereotactic ablative radiotherapy** for surgically unresectable hepatocellular carcinomas. In this project, I was responsible for (1) iterating an imaging protocol that was not reliably yielding perfusion images, and (2) correcting for abdominal motion and implementing a method for quantitative assessment of perfusion. The imaging protocol was amended and this work resulted in the development of a novel computational method for perfusion assessment. A follow-up clinical trial ([NCT02847767](#)) concluded in 2020.
- 2010 → 2011** ■ Computational simulation of Bosonic systems. Research focused on the application of the WORM algorithm ([Phys. Rev. Lett. 96, 070601, 2006](#)) for path integral Monte Carlo to Bosonic systems such as condensate liquids.
- 2010** ■ A variational method for computation of the ground state and excited states of dipositronium ($e^-e^-e^+e^+$) was implemented. Research focus was on improving computational speed and accuracy. Energies found were both more accurate and more efficient than a preceding implementation.
- 2009** ■ Development of compressed sensing technique for novel optical sensors. Work began as an experimental project and evolved into a theoretical study.
- Experimental* ○ Study of **whispering gallery modes** in optical fibres. Focus on detecting small mode shifts and developing a mechanism to probe such shifts. Work was in progress to develop the technology so that a single surface-bound DNA nucleotide could be detected.
- Theoretical* ○ Examination of the *minimum data* problem. In the context of the project, this was the question of how little data is necessary to reliably detect a mode shift. Developed software to clean and mesh data from multiple sources and utilize the periodicity of repeating signals for error removal.
- 2008** ■ Volunteer undergraduate work for Dr. Jan Jung and graduate student Mehmet Egilmez. Research probed the structure of high-temperature superconducting rings by inducing a persistent current and varying sample temperature. All work involved data collection using computer controlled hardware.

NON-ROUTINE CLINICAL CONTRIBUTIONS

- 2020 ■ Developed a low-cost, hand-held LiDAR scanning system for virtual collision checks.
- 2019 ■ Developed an ultra low-cost MR QA paradigm using 3D printed phantoms.
- 2018 ■ Carried clinical primary support pager continuously for 8 months.
- 2018 ■ Developed clinical tool for 2nd cancer replanning technique (“*dose cropping*”).
- 2018 ■ Acting PA for 3 months while department understaffed (i.e., routine & post-service QA).
- 2018 ■ Created clinical plan optimizer for 3D-CRT lung SABR.
- 2018 ■ Developed a novel, robust analysis method & clinical tool for picket fence analysis.
- 2018 ■ Created high-throughput, open source DICOM anonymizer.
- 2018 ■ Created high-throughput, open source deformable image registration clinical appliance.
- 2017 ■ Created software tools for robust CPQR linac QA analysis.
- 2014 ■ Connected DICOM-Q/R service tool to Aria DICOM DB for mass dataset export.
- 2013 ■ Developed Vancouver department website.

ARTICLES PUBLISHED IN REFEREED JOURNALS

1. C. Sample, J. Wu, S. Thomas, and **H. Clark**.
 “Incorporating parotid gland inhomogeneity into head and neck treatment optimization through the use of artificial base plans.”
 In the Journal of Applied Clinical Medical Physics, vol. 22, no. 3, p. 141-149. Elsevier, 2021. [Video Abstract on YouTube](#).
2. **H. Clark**, F. Cao, C. Leong, and E. Berthelet.
 “A practical radiotherapy treatment planning technique for second-incidence cancers that incorporates complete organ-at-risk dose history.”
 In the Journal of Medical Imaging and Radiation Sciences, vol. 50, no. 1, p. 74-81. Elsevier, 2019.
3. **H. Clark**, S. Thomas, S. Reinsberg, V. Moiseenko, A. Hovan, and J. Wu.
 “Heterogeneous radiotherapy dose-outcomes response in parotid glands.”
 In Convergent Science Physical Oncology, vol. 4, no. 3, p. 035001. IOP Publishing, 2018.
4. C. Nguyen, S. Lin, **H. Clark**, A. Hovan, and J. Wu.
 “Stimulated saliva rate following intensity modulated radiation therapy.”
 In the Journal of the American Dental Association, vol. 149, no. 6, p. 432-441. Elsevier, 2018.
5. J. Wong, **H. Clark**, R. Corns, and S. Tyldesley.
 “Assessing health implications of the potential radiation exposure in the community during pregnancy: a case study.”
 In Cureus, vol. 9, no. 10, p. e1770. Cureus Inc., 2017.
6. M. Thor, A. Owosho, **H. Clark**, J. Hun Oh, N Riaz, *et al.*
 “Internal and external generalizability of temporal dose-response relationships for xerostomia following IMRT for head and neck cancer.”
 In Radiotherapy and Oncology, vol. 122, no. 2, p. 200-206. Elsevier, 2017.
7. **H. Clark**, V. Moiseenko, T. Rackley, S. Thomas, J. Wu, and S. Reinsberg.
 “Development of a method for functional aspect identification in parotid using dynamic contrast-enhanced magnetic resonance imaging and concurrent stimulation.”
 In Acta Oncologica, vol. 54, no. 9, p. 1686-1690. Taylor & Francis, 2015.

8. **H. Clark**, A. Hovan, V. Moiseenko, S. Thomas, J. Wu, and S. Reinsberg.
“Regional radiation dose susceptibility within the parotid gland: Effects on salivary loss and recovery.”
In *Medical Physics*, vol. 42, no. 4, p. 2064-2071. American Association of Physicists in Medicine, 2015.
9. **H. Clark**, S. Thomas, V. Moiseenko, R. Lee, B. Gill, C. Duzenli, and J. Wu.
“Automated segmentation and dose-volume analysis with DICOMautomaton.”
In *Journal of Physics: Conference Series*, vol. 489, no. 1, p. 012009. IOP Publishing, 2014.
10. **H. Clark**, J. Wu, V. Moiseenko, R. Lee, B. Gill, C. Duzenli, and S. Thomas.
“Semi-automated contour recognition using DICOMautomaton.”
In *Journal of Physics: Conference Series*, vol. 489, no. 1, p. 012088. IOP Publishing, 2014.

SUBMISSIONS IN-REVIEW OR IN-PROGRESS¹

1. C. Sample[†], A. Rahmim, G. Chausse, J. Wu, F. Benard, C. Uribe, and **H. Clark**.
“Estimating patient-specific functional importance of parotid gland sub-segments using PSMA PET imaging for head-and-neck radiotherapy”
Abstract submitted to the *Society of Nuclear Medicine and Molecular Imaging (SNMMI) annual meeting*. Vancouver, Canada. June 14 → 14, 2022.
2. **N. Jung**, H. Clark, G. Chausse, J. Wu, F. Benard, A. Rahmim, C. Uribe, and C. Sample.
“A Cross-Modality Autosegmentation Model for the Tubarial Salivary Glands”
Abstract submitted to BC Cancer Summit 2021. To be held virtually. November 18 → 20, 2021.
3. **J. Poon**, R. Thompson, M. Deyell, D. Schellenberg, H. Clark, and S. Thomas. (In-progress.)
“Analysis of left ventricle regional myocardial motion for cardiac radioablation.”
Manuscript in-progress.
4. **H. Clark**[†].
“A methodology and open source tool for radiotherapy dose transformation QA.”
Abstract submitted to *AAPM 63rd annual meeting*. To be held virtually. July 25 → 29, 2021.
5. C. Sample[†] and **H. Clark**.
“Plan n Check: an open-source tool for automatic head-and-neck VMAT planning in Varian EclipseTM.”
Abstract submitted to *AAPM 63rd annual meeting*. To be held virtually. July 25 → 29, 2021.
6. C. Sample[†] and **H. Clark**.
“Sub-segmentation of laryngopharynx whole-mean dose constraints for reducing intra-organ dose variability.”
Abstract submitted to *AAPM 63rd annual meeting*. To be held virtually. July 25 → 29, 2021.
7. B. Posehn[†] and **H. Clark**.
“Virtual collision checks with a laser scanning and depth sensing camera.”
Abstract submitted to *AAPM 63rd annual meeting*. To be held virtually. July 25 → 29, 2021.
8. J. Poon[†], R. Thompson, M. Deyell, D. Schellenberg, K. Kohli, **H. Clark**, and S. Thomas.
“Treatment window determination for Cardiac Synchronized VMAT.”
Abstract submitted to *AAPM 63rd annual meeting*. To be held virtually. July 25 → 29, 2021.
9. **H. Clark**, S. Reinsberg, S. Zhang, and S. Thomas. (In-progress.)
“A flexible method with tuneable level-of-detail for kinetic modeling using Chebyshev polynomials.”
Manuscript in-progress.

¹All submissions and latest drafts available upon request; only nearly submission-ready in-progress works are listed.

10. **H. Clark**, S. Reinsberg, V. Moiseenko, J. Wu, and S. Thomas. (In-progress.)
 “Prefer nested segmentation to compound segmentation.”
 Manuscript in-progress.

INVITED PRESENTATIONS²

1. **H. Clark**, S. Thomas, F. Mitchell, and S. Tyldesley.
 “Looking to the future of Radiotherapy in BC: use of diagnostic MR, MR-simulators, and MR-linacs.”
 Presented at the **BC Cancer Summit (virtual)**,
 Vancouver, Canada. November 19, 2021.
2. **H. Clark** and K. Otto.
 “Artificial Intelligence in Oncologic Care.”
 Presented at the **Canadian Lung Cancer Conference**,
 Vancouver, Canada. February 6, 2020.

OTHER REFEREED CONTRIBUTIONS^{3,4}

1. P. Han[†], **H. Clark**, H. Quon, S. Thomas, J. Wu, and T. McNutt
 “Using inter-institutional patient reported outcomes and dosimetry to enable hypothesis generation and model validation.”
Poster presentation at 2020 ASTRO Annual Meeting,
 Miami Beach, USA. October 25 → 28, 2020.
 Abstract published in International Journal of Radiation Oncology, Biology, Physics, Vol. 108, Issue 3, e820-e821.
2. T. Zhang[†], **H. Clark**, S. Thomas, R. Olson, R. Ma, D. Schellenberg, S. Tyldesley, D. Palma, and M. Liu.
 “Stereotactic ablative radiotherapy (SABR) for oligometastases: risk stratification using positional uncertainty.”
Poster presentation at 2020 CARO Annual Scientific Meeting,
 Toronto, Canada. September 23 → 26, 2020.
3. C. Sample[†], J. Wu, S. Thomas, and **H. Clark**.
 “Incorporating parotid gland sub-region importance data into the radiotherapy treatment planning process.”
Poster presentation at 2020 Joint AAPM/COMP Meeting,
 Held virtually. July 12 → 16, 2020.
4. D. Smith[†], S. Thomas, **H. Clark**, A. Hovan, and J. Wu.
 “Prediction of reduced salivary function after radiation therapy using machine learning.”
 Abstract accepted for **2020 MASCC/ISOO Annual Meeting on Supportive Care in Cancer**,
 Seville, Spain. June 25 → 27, 2020 (conference postponed and then cancelled due to COVID-19).
5. K. Wachowicz, N. Dea, E. Dunne, M. Martin, **H. Clark**, H. Carolan, M. Liu, and S. Thomas[†].
 “Titanium susceptibility measurements of spine hardware.”
Oral presentation at 2020 WESCAN Medical Physics Conference,
 Victoria, Canada. March 12 → 14, 2020.

²Materials (abstracts, posters, slides, video, and audio) available upon request.

³Materials (abstracts, posters, slides, video, and audio) available upon request.

⁴Presenting author denoted with †.

6. S. Thomas[†], N. Dea, E. Dunne, M. Martin, **H. Clark**, ML. Camborde, H. Carolan, M. Liu, D. Ta, and K. Wachowicz.
“Susceptibility induced MRI geometric distortion prediction.”
Oral presentation at 2020 WESCAN Medical Physics Conference,
Victoria, Canada. March 12 → 14, 2020.
7. **H. Clark**[†].
“Can low-cost magnetic resonance distortion phantoms be 3D printed?”
Poster presentation at BC Cancer Summit and 20th Anniversary Genome Science Centre Symposium,
Vancouver, Canada. November 21 → 23, 2019.
8. **H. Clark**[†], S. Reinsberg, V. Moiseenko, J. Wu, and S. Thomas.
“Quantifying parotid compartment importance for post-radiotherapy function.”
Oral presentation at 19th International Conference on the use of Computers in Radiation Therapy,
Montreal, Canada. June 17 → 20, 2019.
9. O. Casares-Magaz, **H. Clark**[†], N. Pettersson, L. Muren, A. Hopper, R. Knopp, J. Hattangadi-Gluth, J. Einck, and V. Moiseenko.
“Tracking bladder surface dose during radiotherapy for prostate cancers.”
Oral presentation at 19th International Conference on the use of Computers in Radiation Therapy,
Montreal, Canada. June 17 → 20, 2019.
10. **H. Clark**[†], V. Huang, K. Kohli, D. Schellenberg, and A. Karvat.
“Validation of a radiomic feature extraction module in DICOMautomaton.”
Poster presentation at 19th International Conference on the use of Computers in Radiation Therapy,
Montreal, Canada. June 17 → 20, 2019.
11. **H. Clark**[†], Y. Zhao, I. Badragan, S. Szpala, and F. Cao.
“Robust picket fence quantification.”
Poster presentation at 19th International Conference on the use of Computers in Radiation Therapy,
Montreal, Canada. June 17 → 20, 2019.
12. **H. Clark**[†], F. Cao, C. Leong, and E. Berthelet.
“A radiotherapy treatment planning technique for second courses that incorporates complete organ-at-risk dose history.” *Poster presentation at COMP-CARO-CAMRT Joint Scientific Meeting*,
Montreal, Canada. September 12 → 15, 2018.
13. **H. Clark**[†], S. Reinsberg, V. Moiseenko, J. Wu, and S. Thomas.
“A procedure for generating isovolumetric organ compartments for organs-at-risk using planning contours.”
Poster presentation at COMP-CARO-CAMRT Joint Scientific Meeting,
Montreal, Canada. September 12 → 15, 2018.
14. **H. Clark**[†], S. Reinsberg, S. Zhang, and S. Thomas.
“A method of kinetic modeling with tunable level-of-detail suitable for sparse sampling.” *Poster presentation at COMP-CARO-CAMRT Joint Scientific Meeting*,
Montreal, Canada. September 12 → 15, 2018.
15. **H. Clark**, O. Casares-Magaz[†], N. Pettersson, L. Muren, A. Hopper, *et al.*
“Motion inclusive variations in bladder dose surface maps during the course of high-precision radiotherapy for prostate cancer.” *Oral presentation at 2nd European Congress of Medical Physics*,
Copenhagen, Denmark. August 23 → 25, 2018.
16. **H. Clark**, J. Beaudry, J. Wu, and S. Thomas[†].
“Making use of virtual dimensions for visualization and contouring.” *Poster presentation at 18th International Conference on the use of Computers in Radiation Therapy*,
London, UK. June 27 → 30, 2016.

17. **H. Clark**, S. Reinsberg, S. Zhang, and S. Thomas[†].
 “Optimal choice of deformable image registration reference for abdominal perfusion CT imaging with Volume Helical Shuttle mode.” *Poster presentation at 18th International Conference on the use of Computers in Radiation Therapy*, London, UK. June 27 → 30, 2016.
18. E. Khawandanh[†], C. Duzenli, **H. Clark**, J. Wu, S. Thomas, and E. Berthelet.
 “Performance optimization of atlas-based parotid gland autosegmentation using an in-house atlas library for head and neck radiotherapy planning.”
Oral presentation at 29th CARO Annual Scientific Meeting, Kelowna, BC, Canada, Sept. 29th, 2015.
19. **H. Clark**[†], V. Moiseenko, T. Rackley, S. Thomas, J. Wu, and S. Reinsberg.
 “Preliminary findings using dynamic contrast-enhanced magnetic resonance imaging to identify functional aspects within the parotid.” *Oral presentation at 13th Acta Oncologica Symposium on Biology-Guided Adaptive Radiotherapy*, Århus, Denmark. June 10 → 12, 2015.
20. S. Lin[†], **H. Clark**, J. Wu, A. Hovan, and C. Nguyen.
 “Stimulated Saliva Rate Following Intensity Modulated Radiation Therapy.”
Poster presentation at UBC Faculty of Dentistry Research Day, Vancouver, BC, Canada, Jan., 2015.
21. **H. Clark**[†], S. Thomas, V. Moiseenko, A. Hovan, and J. Wu.
 “The influence of regional dose sensitivity on salivary loss and recovery in the parotid gland.” *Oral presentation at COMP Annual Scientific Meeting*, Banff, Canada. July 9 → 12, 2014. [Video on YouTube](#).
22. **H. Clark**[†], J. Wu, V. Moiseenko, and S. Thomas.
 “Distributed, asynchronous, reactive dosimetric and outcomes analysis using DICOMautomaton.”
Poster presentation at COMP Annual Scientific Meeting, Banff, Canada. July 9 → 12, 2014.
23. **H. Clark**[†], S. Thomas, V. Moiseenko, R. Lee, B. Gill, C. Duzenli, and J. Wu.
 “Automated segmentation and dose-volume analysis with DICOMautomaton.”
Poster with accompanying oral presentation at 17th International Conference on the use of Computers in Radiation Therapy, Melbourne, Australia. May 6 → 9, 2013. [**Best poster award**].
24. **H. Clark**[†], J. Wu, V. Moiseenko, R. Lee, B. Gill, C. Duzenli, and S. Thomas.
 “Semi-automated contour recognition using DICOMautomaton.” *Oral presentation at 17th International Conference on the use of Computers in Radiation Therapy*, Melbourne, Australia. May 6 → 9, 2013.

OTHER INSTITUTIONAL CONTRIBUTIONS^{5,6}

1. *Organized* residency education seminar series, to fulfill missing aspects of CAMPEP accreditation. 2021 → present.
2. “Total body irradiation: principles and technique.”
Clinical shadowing instructor for UBC physics graduate students enrolled in Phys 546. October, 2020.
3. “Total body irradiation: principles and technique.”
Clinical shadowing instructor for BC Cancer medical physics residents. February, 2020.
4. “Total body irradiation: principles and technique.”
Clinical shadowing instructor for BC Cancer radiation oncology residents. January, 2020.
5. “Total body irradiation: principles and technique.”
Clinical shadowing instructor for UBC physics graduate students enrolled in Phys 546. October, 2019.

⁵Limited to contributions *not* presented or published elsewhere.

⁶If presented multiple times, only the most recent presentation is listed.

6. *Teaching support* for UBC graduate course PHYS 534. September → December, 2019.
7. “Radiation oncology rounds: research at BC Cancer Surrey.”
Oral presentation at BC Cancer, Surrey. November 2, 2018.
8. “SABRLIVER: Sparse imaging perfusion analysis.”
Oral presentation at BC Cancer SABR Day, Vancouver. June 26, 2018.
9. “A practical radiotherapy planning technique for second-incidence cancers that incorporates complete organ-at-risk dose history.”
Oral presentation at BC Cancer RT Program Annual Academic Day, Vancouver, Canada. June 15, 2018.
10. “RTIMAGE analysis: analyzing picket fences.”
In-service at BC Cancer, Surrey. March 29, 2018.
11. “X(-ray) marks the spot: the search for an outcomes ‘linchpin’ within the parotid gland.”
Oral presentation at Academic Grand Rounds, Vancouver (linked provincially). February 8, 2018.
12. “Job interviews, the MEDPHYS match, and what to expect in a Medical Physics residency.”
Invited guest lecturer for UBC graduate seminar series. February 15, 2018.
13. “The FVC area 4 linac removal.”
Article appearing in BCCA RT newsletter. December 27, 2017.
14. “Radiation safety refresher for general physics staff.”
In-service at BCCA, Surrey. August 18, 2017.
15. “A bit about spit – xerostomia research at the BCCA: DICOMautomaton.”
Oral presentation at BCCA SABR Day, Vancouver. February 28, 2014.
16. “Automated analysis of 3D dosimetric data.”
Oral presentation at OaSIS Retreat, Vancouver. June 20, 2012.

THESES

1. **H. Clark.** “Assessment of spatially inhomogeneous intra-organ radiation dose response in salivary glands.”
Ph.D. thesis, University of British Columbia, Vancouver, Canada. April 2017.
2. **H. Clark.** “On the regional susceptability of parotid gland function loss and recovery: an effort toward amelioration of radiotherapy-induced xerostomia.”
M.Sc. thesis, University of British Columbia, Vancouver, Canada. September 2013.
3. **H. Clark.** “Effective field variational method study of di-positronium ($e^+e^-e^+e^-$).”
B.Sc. (first class honours) thesis, University of Alberta, Edmonton, Canada. April 2010.

JOURNAL REVIEWING

- Journal of Applied Clinical Medical Physics
- International Journal of Radiation Oncology * Biology * Physics (“Red Journal”)
- Medical Physics
- Current Medical Imaging Reviews
- Journal of Oral and Maxillofacial Radiology

- Scientific Reports (Nature)
- Invited reviewer for ‘*Systematic review on interventions for the prevention and treatment of salivary gland hypofunction and xerostomia induced by cancer therapies 2020*’ performed by Oral Care Study Group, International Society of Oral Oncology (ISOO).

CONFERENCES ATTENDED

- 2021 ■ BC Cancer Summit (virtual), Vancouver, Canada. November 18 → 20.
- 2021 ■ 9th International Workshop on OpenCL and SYCL (virtual). April 26 → 29.
- 2020 ■ Joint AAPM/COMP Meeting (virtual), Vancouver, Canada. July 12 → 16.
- 2020 ■ UBC Medical Physics Retreat (virtual), Vancouver, Canada. June 17.
- 2019 ■ BC Cancer Summit, Vancouver, Canada. November 21 → 23.
- 2019 ■ 2nd International Conference on Monte Carlo Techniques for Medical Applications, Montreal, Canada. June 19 → 21.
- 2019 ■ 19th International Conference on the use of Computers in Radiation Therapy, Montreal, Canada. June 17 → 20.
- 2019 ■ BC Cancer SABR Physics (QA and Immobilization) Day, Vancouver, Canada. January 11.
- 2018 ■ BC Cancer Summit, Vancouver, Canada. November 23 → 24.
- 2018 ■ COMP-CARO-CAMRT Joint Scientific Meeting, Montreal, Canada. September 12 → 15.
- 2018 ■ BC Cancer SABR Day, Vancouver, Canada. June 26.
- 2018 ■ BC Cancer RT Program Annual Academic Day, Vancouver, Canada. June 15.
- 2017 ■ BCCA RT Professional Practice Day, Surrey, Canada. September 30.
- 2017 ■ BCCA RT Program Academic Day, Vancouver (linked to Surrey), Canada. June 15.
- 2016 ■ BCCA HN Tumour Retreat, Vancouver, Canada. June 15.
- 2015 ■ 13th Acta Oncologica Symposium on Biology-Guided Adaptive Radiotherapy, Århus, Denmark. June 10 → 12.
- 2014 ■ BCCA SABR Day, Vancouver, Canada. February 28.
- 2014 ■ BCCA Oral Oncology Annual Conference, Vancouver, Canada. November 14.
- 2014 ■ COMP Annual Scientific Meeting, Banff, Canada. July 9 → 12.
- 2013 ■ 17th International Conference on the use of Computers in Radiation Therapy, Melbourne, Australia. May 6 → 9.
- 2012 ■ BCCA OaSIS Retreat, Vancouver, Canada. June 20.
- 2011 ■ Joint AAPM/COMP Meeting, Vancouver, Canada. July 31 → August 4.
- 2009 ■ 45th Canadian Undergraduate Physics Conference, University of Alberta, Edmonton, Canada. October 1 → 5.

TRAINING

- 2018** ■ Collaborative Institutional Training Initiative (CITI) course: Good Clinical Practice for Investigators. July 4 → 5.
- 2017** ■ Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Course on Research Ethics (TCPS 2: CORE). April 17.

CLINICAL RESPONSIBILITIES

- 2020** → present ■ Lead, Research and Development Group, Medical Physics, BC Cancer Surrey.
- 2020** → present ■ Lead, Clinical Registration Group, Medical Physics, BC Cancer Surrey.
- 2020** → present ■ Member, Clinical Trials Administration Group, BC Cancer Surrey.
- 2020** → present ■ Member, Radiation Oncology Management Group (Provincial), BC Cancer.
- 2020** → present ■ Member, Computational Resource Management Group, BC Cancer Surrey.
- 2019** → **2020** ■ Member, Clinical Registration Group, Medical Physics, BC Cancer Vancouver.
- 2019** → **2020** ■ Member, Total-Body Irradiation Program, Medical Physics, BC Cancer Vancouver.