

# ODETTE RIOS IBACACHE

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## EDUCATION

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**McGill University** September 2024 - Present, Montreal, Canada  
*Ph.D. Physics Student (Medical Radiation Physics Concentration).*

**McGill University** September 2022 - August 2024, Montreal, Canada  
*M.Sc. in Medical Radiation Physics. GPA: 3.97/4.00*

- Thesis Title: “Development of geometrical parameters to describe anatomical changes and predict the need for radiotherapy replanning in head and neck cancer patients”  
*Supervisor: Prof. John Kildea*

**Pontificia Universidad Católica de Chile (PUC)** March 2017 - July 2021, Santiago, Chile  
*Licenciatura en Física (Licentiate degree in Physics). GPA: 6.4/7.0*

- Thesis Title: “Development of a model based on magnetic resonance images information and automatic learning tools to predict risk group of prostate cancer”  
*Supervisor: Prof. Paola Caprile, Co-Supervisor: Prof. Domingo Mery*

## AWARDS AND SCHOLARSHIPS/FELLOWSHIPS

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- **Best Poster Presentation Award at the Cancer Translational Research Horizons 2024 event**
- **Young Rising Stars Competition at the XXth International Conference on the use of Computers in Radiation therapy (ICCR 2024): Third Place**
- **2024 AAPM/RSNA Doctoral Fellowship:** Granted by the American Association of Physicists in Medicine (AAPM). This fellowship is given to two first-year doctoral students.
- **Science Slam Competition at 5th DKFZ Summer School in Medical Physics 2023: Data Science and Machine Learning in Radiotherapy: Second Place**
- **RI-MUHC Studentship 2023:** *Granted by Research Institute McGill University Health Centre (RI-MUHC) from January to December 2023*
- **Graduate Excellence Fellowship Award 2023:** *Granted by Medical Physics Unit, McGill University.*
- **Graduate Excellence Fellowship Award 2022:** *Granted by Medical Physics Unit, McGill University, to highly qualified students who are registering in the Medical Physics Graduate Program.*
- **Differential Fee Waiver for International Students Award:** *Granted by McGill University for the first academic year. It exempts students from international tuition supplements and allows them to have tuition fees equal to those of a Quebec resident student*
- **Summer Physics Research Fellowship:** *Month stipend granted by the Department of Physics at the Pontificia Universidad Catolica de Chile.*
- **Padre Hurtado Award:** *Full tuition fee waiver, granted by the Pontificia Universidad Católica de Chile for undergraduate studies, corresponded to the academic years from 2017 to 2021. This award is granted to students who come from a low-income background and achieved high performance on the University Selection Test (PSU: Prueba de Selección Universitaria).*
- **Bicentenario Scholarship:** *Partial tuition fee waiver for higher education students who had a high academic performance in high school and are from low-income backgrounds. Granted by the Government of Chile, for academic years from 2017 to 2021.*
- **Presidente de la República Scholarship:** *Monthly stipend granted by the Government of Chile from 2015 until 2017. This scholarship is granted to superior education students in high-vulnerability economic conditions with high academic performance.*

## MEMBERSHIPS OF PROFESSIONAL SOCIETIES

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- Canadian Organization of Medical Physicists (COMP)
- American Association of Physicists in Medicine (AAPM)
- Association Québécoise des Physicien(ne)s Médicaux Cliniques (AQPMC)

## RESEARCH EXPERIENCE

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### McGill University

May 2023 - August 2024

*PhD Research Student*

#### **“Towards the development of an mCODE-radiomics extension and knowledge base for digital twins in radiotherapy”**

- Development of a radiomics feature-extractor module mCODE-extension to build a Knowledge Base and Digital Twins for patients diagnosed with gliomas and predict their treatment outcomes using artificial intelligence tools.

*Supervisor: Dr. John Kildea, Co-Supervisor: Dr. Amal Zouaq*

### McGill University

May 2023 - Present

*Master Research Student*

#### **“Development and evaluation of a novel artificial intelligence model to predict radiotherapy replanning for head and neck cancer”**

- Definition of geometrical metrics to describe and quantify anatomical changes that head and neck cancer patients experience throughout radiotherapy treatment, and development of a Machine Learning model based on the metrics to predict if treatment replanning is needed.

*Supervisor: Dr. John Kildea*

### Pontificia Universidad Católica de Chile

January 2022 - July 2022

#### **iHealth Group - Millennium Institute for Intelligent Healthcare Engineering**

*Research Assistant*

#### **“Automatic segmentation of prostate lesions using machine and deep learning tools based on MRI series.”**

- Development of an artificial intelligence model to automatically segment intraprostatic lesions in Magnetic Resonance Images of patients diagnosed with prostate cancer. iHealth Group is a national scientific research collaboration between Chilean universities to improve healthcare using AI.

*Supervisor: Dr. Domingo Mery, Co-supervisor: M.D. Cecilia Besa*

### Pontificia Universidad Católica de Chile

March 2020 - July 2022

*Undergraduate Research Student*

#### **“MRI-based surrogate imaging markers of aggressiveness in prostate cancer”**

- Creation of a pipeline to extract Radiomic feature information from intraprostatic lesions found in prostate bi-parametric Magnetic Resonance Images (bpMRI), doing comprehensive statistical analysis, and building a Machine Learning model to predict the aggressiveness group for patients diagnosed with prostate cancer based on Gleason Score. This research was part of the National Fund for Scientific and Technological Development (FONDECYT) of Chile.

*Supervisor: Dr. Paola Caprile, Co-supervisor: M.D. Cecilia Besa*

### Pontificia Universidad Católica de Chile - Instituto de Física

January 2019

*Undergraduate Research Student (Summer Full Time Internship)*

#### **“Fabrication of nanohybrid structures using porous alumina membranes”**

- Summer internship in the field of nanotechnology. The project was based on the fabrication of hybrid nanostructures using porous alumina membranes. The aim was to design a new protocol and method to make the porous larger for electrical applications by using different chemicals (such as perchloric acid) and an anodization process.

*Supervisor: Dr. Samuel Hevia*

## SHADOWING EXPERIENCE

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### Radiotherapy Medical Physics Shadowing

- I followed two therapy medical physicists at McGill University Health Centre to gain insight into daily, monthly, and annual QA for radiotherapy machines, in 2 one-day sessions. I observed and understood the treatment planning procedures for head and neck cancer, breast cancer, and stereotactic surgery.

### Brachytherapy Medical Physics Shadowing

- I followed a brachytherapy medical physicist at McGill University Health Centre to gain insight into brachytherapy procedures, during 2 one-day sessions, where I observed two lung cancer treatment procedures.

## PUBLICATIONS, RESEARCH PRESENTATIONS, AND OTHERS

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### Peer-reviewed Scientific Publications and International Conferences

- **Rios-Ibacache O.**, Manalad J., Andrade Hernandez AX., O'Sullivan-Steben K., Galarneau L. & Kildea J. "Quantification of head and neck cancer patients' anatomical changes: prediction of radiotherapy replanning need". *Expected to be submitted to Physics in Medicine and Biology Journal*.
- Dominguez J<sup>†</sup>, **Rios-Ibacache O<sup>†</sup>**, Caprile P., Gonzalez J., San Francisco I.F. & Besa C. "MRI-Based Surrogate Imaging Markers of Aggressiveness in Prostate Cancer: Development of a Machine Learning Model Based on Radiomic features". **Diagnostics** **2023**, 13, 2779. 10.3390/diagnostics13172779. († co-first authorship).

### Oral Research Presentations (International: 1. National: 1. Provincial: 2. Institutional: 6; **Total:10**)

- **Rios-Ibacache, O. et al. (2024)**. "Towards the quantification of anatomical changes in head and neck cancer patients". **Science des données responsable dans le domaine de la santé annual retreat 2024**. (Provincial).
- **Rios-Ibacache, O. et al. (2024)**. "Development of geometrical parameters for characterizing anatomical alterations in head and neck cancer patients and evaluating radiotherapy replanning". **70th COMP Annual Scientific Meeting (ASM)** held in Regina, Saskatchewan, Canada, from June 5th - 8th, 2024. (National).
- **Rios-Ibacache, O., et al. (2024)**. "Development and evaluation of a novel artificial intelligence model to predict radiotherapy replanning for head and neck cancer". McGill Medical Physics Friday Morning Talk. Montreal. (Institutional).
- **Rios-Ibacache, O. et al. (2024)**. "Development and evaluation of novel parameters for describing anatomical changes and predicting radiotherapy replanning for head and neck cancer patients". (oral presentation, 5 min.). **3rd annual Celebration of Research and Training in Oncology (CORTO) 2024** held at the McGill Desautels Faculty of Management, Bronfman Building, May 14th 2024. **Top 10 Best Student Research Abstracts**. (Institutional)
- **Rios-Ibacache, O. et al. (2023)**. "Development and evaluation of a novel artificial intelligence model to predict radiotherapy replanning for head and neck cancer". Research Presentation at the Scientific Congress 2023 hosted by **Association Quebecoise des Physicien(ne)s Medicaux Cliniques (AQPMC)**. (Provincial).
- **Rios-Ibacache, O. et al. (2023)**. "Development and evaluation of a novel artificial intelligence model to predict radiotherapy replanning for head and neck cancer". Friday Morning Talk presentation at Medical Physics Unit, McGill University. (Institutional).
- **Rios-Ibacache, O. et al. (2023)**. "Development and evaluation of a novel artificial intelligence model to predict radiotherapy replanning for head and neck cancer". Science Slam competition in 5th International Summer School in Medical Physics 2023: Data Science and Machine Learning in Radiotherapy, hosted by the **German Cancer Center (DKFZ)**. (International).
- **Rios-Ibacache O. et al. (2022)** "On the study of Prostate Cancer using AI tools and MRI series". Research Presentation in **PizzaSeminar Series 2022** at Jorge Krause Auditorium of Pontificia Universidad Catolica de Chile, Santiago de Chile. Faculty of Physics. ([https://youtu.be/N\\_9-nshU-4U](https://youtu.be/N_9-nshU-4U)). (Institutional).

- **Rios-Ibacache O. (2021)** “Development of a model based on magnetic resonance image information and automatic learning tools to predict risk group of prostate cancer”. Bachelor Research Thesis Presentation/Defense at Pontificia Universidad Catolica de Chile, Santiago de Chile. (Institutional).
- **Rios-Ibacache O. (2019)** “Fabrication of alumina membranes of 150 - 200 nm diameter”. (oral presentation, 15 min.). Internship Research Presentation at Jorge Krause Auditorium of Pontificia Universidad Catolica de Chile, Santiago de Chile. (Institutional).

**Poster Research Presentations** (International: 3. National: 0. Provincial: 1. Institutional: 2; **Total:6**)

- **Rios-Ibacache O. et al. (2024).** “Towards the quantification of anatomical changes in head and neck cancer patients to evaluate radiotherapy replanning”. **RI-MUHC 2030 Vision: A Day of Discovery event.** November 22nd. (Institutional).
- **Rios-Ibacache O. et al. (2024).** “Towards the quantification of anatomical changes in head and neck cancer patients to evaluate radiotherapy replanning”. **Cancer Translational Research Horizons 2024 event.** November 21st. (Institutional).
- **Rios-Ibacache O. et al. (2024).** “Development and evaluation of novel parameters for describing anatomical changes and predicting radiotherapy replanning for head and neck cancer patients”. **XXth International Conference on the use of Computers in Radiation Therapy (ICCR) 2024** held in Lyon, France, from 8th – 11th July (Poster as part of the **Young Rising Stars Competition, top 20 abstracts**). (International).
- O’Sullivan-Steben K., **Rios-Ibacache O. et al. (2024).** “A Pipeline for Generating Longitudinal Head and Neck Cancer Radiotherapy Datasets for Machine Learning”. **ICCR 2024** held in Lyon, France, from 8th – 11th July. (International).
- **Rios-Ibacache O. et al. (2023).** “Development and evaluation of a novel artificial intelligence model to predict radiotherapy replanning for head and neck cancer”. **Science des données responsable dans le domaine de la santé annual retreat 2023.** (Provincial).
- **Rios-Ibacache O. et al. (2022).** “Development of an MRI radiomic-based ML model to predict the aggressiveness of prostate cancer”. **ESTRO2022.** (International).

## Other Publications

- **Rios-Ibacache, O. et al. (2024).** Conference Abstract. “Development and evaluation of novel parameters for describing anatomical changes and predicting radiotherapy replanning for head and neck cancer patients”. Published in HAL, which is a multidisciplinary open archive. In France, HAL is the national archive chosen by the French scientific and academic community for the open dissemination of research results.
- O’Sullivan-Steben K., **Rios-Ibacache, O., et al. (2024).** Conference Abstract. “A pipeline for generating longitudinal head and neck cancer radiotherapy datasets for machine learning”. To be published in HAL.
- **Rios-Ibacache O. et al. (2024).** Conference Abstract. “Development of geometrical parameters for characterizing anatomical alterations in head and neck cancer patients and evaluating radiotherapy replanning”. Medical Physics, 51(8), 5785-5835.
- **Rios-Ibacache, O. et al. (2024).** MSc thesis, McGill University. “Development of geometrical parameters to describe anatomical changes and predict the need for radiotherapy replanning in head and neck cancer patients”.
- **Rios-Ibacache O. et al., (2022).** Conference Proceedings. “Development of an MRI radiomic-based ML model to predict the aggressiveness of prostate cancer”. ESTRO2022. Elsevier. 17. 10.1016/s0167-8140(22)03731.
- Dominguez I., Caprile P., **Rios-Ibacache O. et al. (2022).** Conference Abstract. “Development of a MRI radiomic-based ML model to predict aggressiveness of prostate cancer”. International Society for Magnetic Resonance in Medicine (ISMRM) Annual Meeting.

## TEACHING EXPERIENCE

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Note that in Chile the Fall term is from mid-March to mid-July while the Spring term is from August to December. The Summer term corresponds to January (Students can only take one course because it is full-time work, i.e. the work done in a term is done in only one month).

### Teaching Assistant at McGill University

- Radiotherapy Physics Laboratory (MDPH603): *Winter 2025 (Confirmed)*
- Radiotherapy Physics (MDPH602): *Winter 2025 (Confirmed)*
- Radiation Physics (MDPH601): *Fall 2024*

### Tutoring at Pontificia Universidad Católica de Chile

- Linear Algebra (MAT1203): *Fall 2022*

### Teaching Assistant at Pontificia Universidad Católica de Chile

- Precalculus (MAT1000): *Fall 2022*
- Calculus 1 - Differential Calculus (MAT1610): *Fall 2022 and Summer 2022*
- Dynamics (FIS1514): *Spring 2021, Fall 2022*
- Introduction to Mathematics (PIMUB): *Fall 2020*
- Calculus 2 - Series and Multivariable Differential Calculus (MAT1620): *Fall 2019, Spring 2020, Summer 2020, Fall and Spring 2021*
- Static and Dynamics (FIS1513): *Spring 2018*

### Laboratory Assistant at Pontificia Universidad Católica de Chile

- Laboratory of Electricity and electromagnetism (FIS0153): *Spring 2021*
- Laboratory of Calculus 1 - Differential Calculus (MAT1610L): *Fall and Spring 2020, Fall 2022*
- Laboratory of Calculus 3 - Vector Calculus (MAT1630L): *Spring 2019, Fall 2022*
- Laboratory of Differential Equations (MAT1640L): *Spring 2019, Fall 2020*
- Laboratory Calculus 2 - Series and Multivariable Differential Calculus (MAT1620L): *Spring 2018, Spring 2020, Fall and Spring 2021, Fall 2022*

### Grader Assistant at Pontificia Universidad Católica de Chile

- Calculus 3 - Vector Calculus (MAT1630): *Fall 2022*
- Electricity and electromagnetism (FIS1533): *Fall 2021*

### Personal Tutoring

- Math and Physics personal teaching at superprof.com: *Fall and Spring 2021*

## TECHNICAL SKILLS

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### Programming Languages

- Wolfram
- Mathematica
- Python
- SQL
- Fortran
- L<sup>A</sup>T<sub>E</sub>X
- R

### Medical Imaging Tools

- 3D Slicer
- Medical Image Merge (MIM) Maestro

## LANGUAGES

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- **Spanish:** Native/Fluent
- **French:** Currently learning
- **English:** Professional Working Proficiency

## OUTREACH AND SERVICE

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- Judge and Mentor at Physics Hackathon 2024** November 15th - 17th, 2024
- Mentor and judge at the yearly Hackathon event hosted by the Department of Physics at McGill University, which consists of a computer programming competition.
- Representative in the Equity, Diversity Inclusion (EDI) Subcommittee at the Medical Physics Unit** September 2024 - Present
- Duties involve the promotion of awareness of the EDI values by the organization of workshops, coffee meetings, and talks.
- Member of the McGill Medical Physics Student Council** September 2024 - Present
- Representative among the Medical Physics student community by acting as a link for instructors and students and promoting a sense of community by planning departmental activities and events.
- Medical Physics Journal Club Coordinator at McGill University** September 2024 - Present
- Organize weekly departmental student research article reviews, including scheduling, collecting, talk moderation, and audio-visual setup and troubleshooting.
- VP Communications the Cancer Research Program Trainee Council within the Research Institute of McGill University Health Centre** September 2024 - Present
- Student representative among the CRP students (Medical Physics is part of the CRP program at McGill University). Duties include taking meeting minutes of the council meetings, assisting in the promotion of academic and
- Volunteering at the Physics Outreach Group** September 2024 - Present
- The Physics Outreach group from the Department of Physics, McGill University, has the initiative to promote science to the general public in Montreal.
- Social Media Coordinator in the Cancer Research Program Trainee Council within the Research Institute of McGill University Health Centre** October 2023 - August 2024
- Student representative among the CRP students. Duties involve posting on social media about various events organized by the Cancer Research Program Trainee Council (CRP TC). The CRP TC is a student council that arranges activities aimed at enhancing the academic and research skills of cancer research students.
- Laurie Hendren Symposium On Patient-in-the-Loop Data** August 28th 2024
- Student volunteering in the Laurie Hendren Symposium which discussed the pros and cons of the patient-in-the-loop data model as well as the barriers and facilitators to implementing it in Quebec.
- Judge at Physics Hackathon 2023** November 3rd - 5th 2023
- Judge at the yearly Hackathon event hosted by the Department of Physics at McGill University, which consists of a computer programming competition.
- Novatas por un día (female first-year students for a day) at PUC** July 2022
- Fair counselor to orientate and answer questions related to the undergraduate program in Physics at Pontificia Universidad Católica de Chile. This was a whole-day activity related to women in physical sciences and oriented to high school students.
- COANIQUEM Burned Center AID for Children Foundation** 2021 - July 2022
- Volunteering to share knowledge and raise awareness about burn injuries, particularly in children, through social media (social marketing).

**Teletón Chile**

October 2021 - December 2021

- Social marketing volunteering to raise money in the yearly Teletón fundraising event in Chile. The money raised goes to the Teletón Institute (rehabilitation centers), which gives treatment to people with physical disabilities.

**Virtual Exposition for future prospective students 2022 at PUC**

October 2021

- Ambassador at a virtual fair to orientate high school students and answer questions related to the undergraduate program in Physics at Pontificia Universidad Católica de Chile.

**Fundación Nuestros Hijos**

October - November 2021

- Volunteering to raise money for Fundación Nuestros Hijos, which has the goal of covering the cost of treatments against cancer for children from low-income backgrounds.

**First-year students welcome at Faculty of Physics PUC**

January 2018

- Preparing interactive material to welcome the new students of the physics and astrophysics undergraduate program, at the Faculty of Physics at PUC.

**Second Version of Scientific Fair at Pontificia Universidad Católica de Chile**

2017

- Feria Científica (Scientific Fair) at Institute of Physics PUC. Activity to promote and motivate science in secondary and high school students at Santiago of Chile organized by Professor Donovan Diaz.

**Buenas Prácticas UC: Enseñar a otros para aprender Física (Video)**

2017

- Participation in a video intended for promoting science, Desarrollo Docente UC (Teaching Development Center). <https://youtu.be/pQ2DMWafUEw>.

**COANIQUEM Burned Center AID for Children Foundation**

2016

- Volunteering for raising money for Coaniquem Foundation, which has the task of rehabilitating and giving treatment to children with burns injuries.

**WORK AND OTHER EXPERIENCES**

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**Test Proctor at Pontificia Universidad Católica de Chile**

August 2018 - July 2022

*Test proctor during the academic year. The activity consists of supervising the students during their exams.*

- Facultad de Matemáticas (Faculty of Mathematics)
- Facultad de Física (Faculty of Physics)

**Store Assistant at Fashion's Park Store San Bernardo**

December 2018

**HOBBIES AND INTERESTS**

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- **Playing music:** traverse flute and guitar
- **Creative writing**
- **Drawing and painting**