

Collaboration between medical physics and radiation oncology residency programs

McGill University
Residency Program in Radiation Oncology Physics

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Centre universitaire
de santé McGill



McGill University
Health Centre



Program History (2000-2015)

- CAMPEP accreditation in 2000, started by Ervin Podgorsak
- Based at Montreal General Hospital until 2015
- Jewish General Hospital affiliated with program since 2000
- 4 additional affiliated sites since 2010
- 35 CAMPEP graduates
- Reaccredited in 2005, 2010, 2015

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McGill University CAMPEP Accredited Residency in Radiation Oncology Physics
Summary of intake and graduates to July 2016

YEAR	# Accepted	Graduated*	Certified**	# Clinical	Employment: # Academic # Industry
2000	2	2	1	1	1
2001	3	3	2	3	
2002	-	-	-	-	
2003	-	-	-	-	
2004	4	4	4	4	
2005	-	-	-	-	
2006	3	1	1	1	
2007	3	3	3	3	
2008	2	1	1	1	
2009	2	2	2	2	
2010	4	4	4	4	
2011	4	3	3	3	
2012	3	3	3	3	
2013	4	4	4	4	
2014	5	5	5	5	
2015	5	-	-	-	
2016	2	-	-	-	
TOTALS	49	35	31	35	0 1

Program History (2015-2016) – “the move”



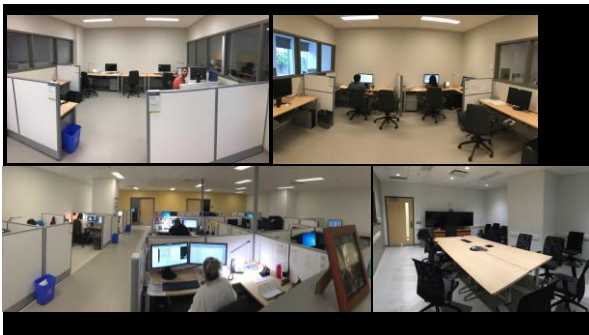


Cedars Cancer Centre Radiation Oncology

- 70,000 sq. foot facility
- 150 staff including:
 - 14 MDs + 14 residents
 - 14 Phys + 9 dosi + 4 res
 - 45 RTTs
- 2500 new patient starts per year
- 160 treatments per day
- 60 MD visits per day
- 7 treatment units
- 3 CTs
- 1 brachytherapy
- 1 MRI
- 50 planning stations








Program Curriculum - nutshell

- Rotations (6 months each)
 1. Treatment Planning 1
 2. Treatment Planning 2
 3. QA, Rad Safety, professional
 4. Clinical
- Exams/Evaluation
 - Oral exam after each rotation, plus final exam encompassing entire program



- Weekly teaching sessions
 - 1 hour teaching
 - 1 hour case review
- Clinical project
 - Collaborate with MD residents

Current Program

- 12 residents
 - 10 Canadian
 - 1 US
 - 1 Oman
- Administered at MUHC site
- All exams have director or clinical coordinator present
- Teaching sessions at main site
- Large number of staff available to residents

Site	Staff-resident ratio	Residents	Academic Staff	Clinical Staff	Certified staff
MUHC	4:1	4	3	13	14
JGH	4:1	2	0	8	7
SPH	5:1	1	0	5	4
CHUM	6:1	3	1	16	15
CHUG	10:1	2	3	20	3
CHUQ	10:1	1	0	12	2

Collaboration with RO program

- RO program director is member of RTPC
- MP program director is member of ROTPC
- Exploit common learning opportunities
- Share common teaching opportunities



Residency Training Program Committee

Voting members:

Co-Chairs:

William Parker, M.Sc., FCCPM, Program Director
Jan Bourgeois, Ph.D., FCCPM, Graduate Program Director

Secretary:

Emile Simson, Ph.D., OME, MCCPM, DABR

Clinical Coordinator
Hiroshi Patonishi, M.Sc., FCCPM, DABR

Physician Members:

Russell Poir, M.Sc., MCCPM, DABR
Stephen Davis, Ph.D., MCCPM, DABR
Francois Delbecq, Ph.D., FCCPM (JGH site coordinator)
Normand Theriault, Ph.D., MCCPM (CHUQ site coordinator)
Jean-Francois Carrier, Ph.D., MCCPM (CHUM site coordinator)
Frederic Lacroix, Ph.D., MCCPM (CHUG site coordinator)
Laurence Frenette, Ph.D., DABR (SPH site coordinator)

Physician Members:

Joanne Albert, MD, FRCPC
Treatment Planning Dosimetry
Christopher Kaufmann, RT, (A.C.), GMD (Dosimetry Coordinator)

Non-Voting members:

Resident representatives:

Senior resident

MPU graduate program secretary:

Margery Kresowatz

Collaborations with RO program

- Projects and presentations
- Case review rounds
- Shadowing
- Friendly quizzes
- Common teaching sessions



CIMC cartoon

Cartoon credit: Canadian Interprofessional Health Collaborative

CIMC X

RO residency training program

- Accredited by RCPSC
- 14 residents, 5 fellows
- 2 sites plus community rotation
- 5 year program
- Heavy emphasis on physics:
 - 4 fundamental courses: Properties of Radiation, Apparatus, Dosimetry 1 and 2
 - Weekly clinical physics sessions (1.5 hrs)
 - Bi-Weekly case review (1 hr)

Content and sequence of training

The content of the residency program is designed to comply with the Radiation Oncology training requirements of the Royal College of Physicians and Surgeons of Canada. It includes as a minimum:

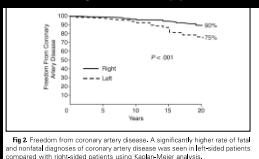
PGY 1	Medicine 2 med CTU, 2 med CTU, 1 ER, 1 neurology, 1 nephrology, 1 surgery, 1 spine Onc, 1 M&M oncology, 1 Surgical Oncology + 1 rotation of the following: Urology, gynaecology, neurosurgery, hepatobiliary
PGY 2	1 pathology case
PGY 3	1 period of epidemiology
PGY 4	1 radiotherapy rotation 1 pathology 1 community rotation 1 dosimetry 2 periods radiation oncology (including M&M resident service)
PGY 5	1 med onc 1 weekly theme email weeks per onc 2 periods radiation oncology (including Brachy I, Brachy II)
PGY 6	2 periods of radiation oncology (including Brachy I, Brachy II) 2 electives Conductable as to 6 periods can be research relevant to the specialty
PGY 8	13 periods of radiation oncology (or other approved format)

Project or review

- Clinical project**
 - Residents must make an alliance with RO resident (or staff) and work on a short project/review topic and co-present results internally
 - Stimulates cooperation, collaboration, and understanding
- Examples**
 - Re-commissioning rotational total skin electron irradiation
 - Intra-fraction tumor assessment for lung SBRT in patients treated without an immobilization device
 - Moving towards a linac based TBI technique
 - Hippocampal Sparing in Prophylactic Cranial Irradiation
 - DIBH experience at MGH

Deep inspiration breath hold example project

- RO resident presented studies about radiation-induced heart disease following radiotherapy at RO rounds



breast cancer

Breast cancer: evaluating radiotherapy for breast cancer: Comparison of the existing practice with the breast hold technique

Local control, distant control, toxicity, quality of life, cost

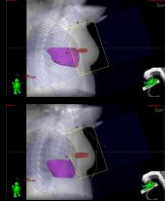
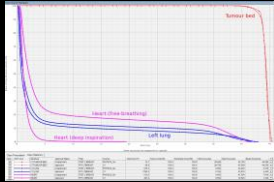
randomized controlled trial

Chen et al (2005) evaluating noninvasive dose sparing with breath-hold adapted radiotherapy techniques

	Right	Left	P-value
Median Heart Vol > 50% dose	18.2%	2.8%	0.001
Local control	88.2%	88.2%	0.4%
Distant control	88.2%	88.2%	0.4%
Local control & distant control	88.2%	88.2%	0.4%

Deep inspiration breath hold example project

- Physics resident provided information about implementation of DIBH and specific examples

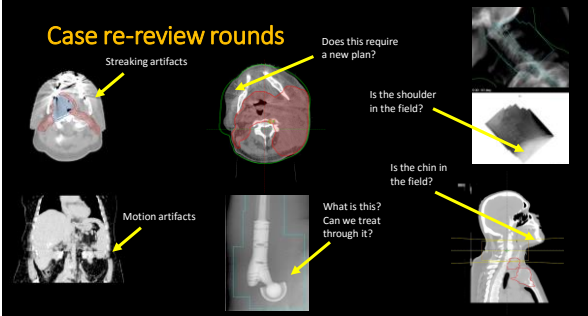


Case re-review rounds

- Weekly 1 hour sessions reviewing interesting cases from case review rounds
- Physics residents and RO residents in attendance
- Cases chosen by residents and staff participating in the rounds
- Try to mix medical and physics aspects in discussion

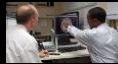


Case re-review rounds



Shadowing program* (new this year)

- For one week at the beginning of residency, MP and RO residents will be paired and shadow each other's activities
- The goals:
 - MP resident to get to know RO residents and vice versa
 - MP resident attends clinics and experiences what MDs deal with



"WE CANNOT
SOLVE OUR
PROBLEMS
WITH THE SAME
THINKING WE
USED WHEN WE
CREATED THEM"

Common teaching sessions

- Clinical physics course for RO residents are useful for MP residents
- MP residents will be aware of level of physics that ROs have
- Sessions are didactic/discussion
- Fosters camaraderie between professions

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Date	Subject	Speaker
September 11, 2015	Basic Treatment Planning Strategy	MP
September 16, 2015	Emergency RT	MP
September 23, 2015	Planning Systems	RS
October 1, 2015	Immunotherapy Connections	RS
October 8, 2015	Pain Assessment: Basics	MP
October 16, 2015	RPRT optimization and assessment	MP
October 23, 2015	Pain Assessment: Basics	MP
October 30, 2015	Pain Assessment: Thoracic	MP
November 6, 2015	Pain Assessment: Pelvic	MP
November 13, 2015	Pain Assessment: CNS/Brain	MP
November 20, 2015	IGRT	MP
November 27, 2015	IGRT	RS
December 4, 2015	Brachytherapy I	MP
December 11, 2015	Brachytherapy II	MP
December 18, 2015	IGRT	MP/RS
December 25, 2015		
January 1, 2016		
January 8, 2016	Basic Clinical Physics: Calibration	MP
January 15, 2016	Basic Clinical Physics: Dose Rate	MP
January 22, 2016	Basic Clinical Physics: QA Lab	MP
January 29, 2016	Clinical Setup on machine	MP
February 5, 2016	ImmunotherapyConnections	MP
February 12, 2016	Site planning	MP
February 19, 2016	ImmunotherapyConnections	MP
February 26, 2016	Genetic Spinal mutations	MP
March 5, 2016	Head & Neck metastases	MP
March 12, 2016	Head & Neck metastases	MP
March 19, 2016	Target Site metastases	MP
March 26, 2016	Patients with prosthetic implants	MP
April 2, 2016		
April 9, 2016	Patients with prosthetics	MP
April 16, 2016	Respiration and measurement	RS
April 23, 2016	Rad Bio for treatment planning	MP
April 30, 2016	Rad production and safety	MP
May 7, 2016	Rad Safety	RS
May 14, 2016	IGRT	MP

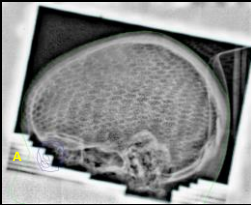
Let's finish with a Quiz! - Quizzes

- Twice a year
- Formative quizzes
- Taken together
- Graded together
- Based 100% on clinical cases

Rad Onc Residents End of year Quiz

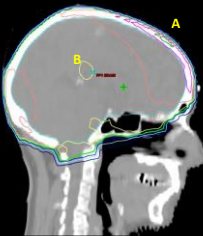
2016

WBI



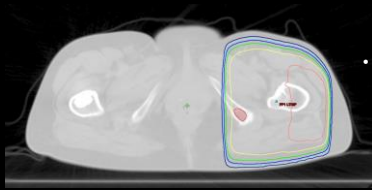
- Estimate the dose to the lenses?
- What are the black lines indicated by A?
- What is the dose under A?

WBI



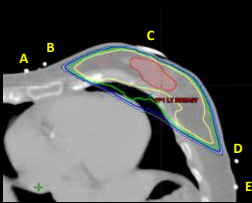
- What is the expected maximum dose for a case like this (A)?
- Is B a hot spot or cold spot?

Hip hop...



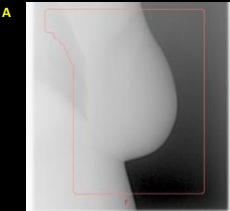
- What energy was used for this treatment?
- What information do you need to assess if the PTV is covered by the RX dose?

Breast setup



- Identify the markers A – E.
- Are heterogeneity corrections on?

Breast and Super C: Are these acceptable?

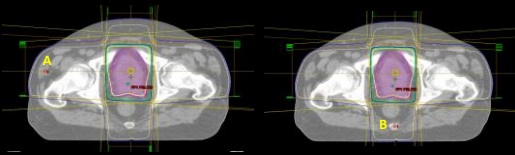


Ear, ear, electrons!



- Why is the wax there?
- Rx is 8 Gy / 1 at 80% with 6 MeV electrons:
 - What is the max dose?
 - What is the surface dose?

Tell me the dose...iso gets 100% - 10 MV



Summary

- Collaborations between MP and RO residency programs are beneficial to both groups
- Encourages new teaching methods and revamping educational opportunities
- Examples at McGill:
 - Projects and presentations
 - Case review rounds
 - Shadowing
 - Friendly quizzes
 - Common teaching sessions
