

Training a new generation of radiation oncologists in Latin America

Celine K. Torzsok

FALP Santiago de Chile

19–20 September 2017

IAEA Scientific Forum

**Nuclear Techniques
in Human Health**

Prevention, Diagnosis, Treatment



fALP



Why a Master in Advanced Radiation Therapy?

Quick advances in technological skills and knowledge:

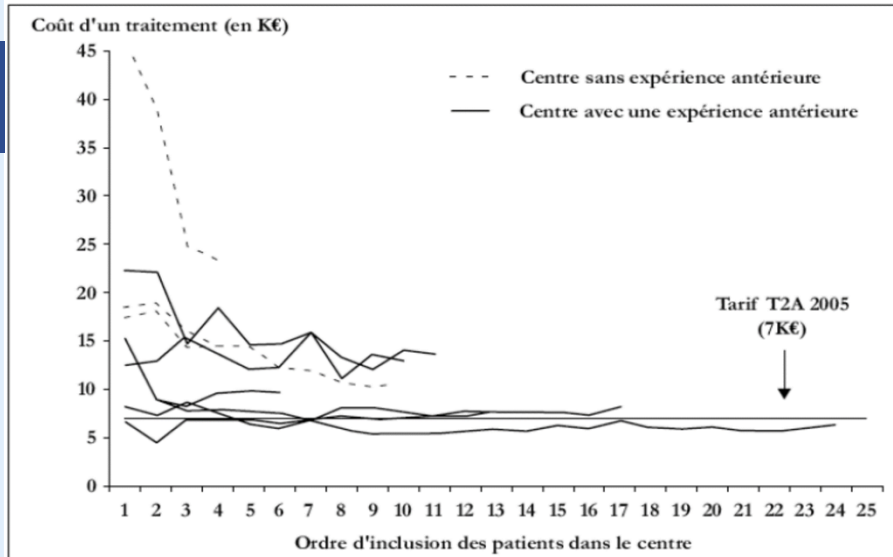
- “modern” Radiation Therapy of 5-8 years ago is no longer all that modern.
- High-tech Radiation Therapy makes for high precision treatments:
 - Less irradiation to the patient’s healthy tissues → Less toxicity.
 - Higher doses to the tumor → Higher possibility of therapeutic success.
 - Possibility of SBRT → Cure/control for “untreatable” diseases.



There is no program in high-tech RT in LATAM:

- Radiotherapists and residents have to travel to the US or Europe to train.

Cost per treatment
(in K€)



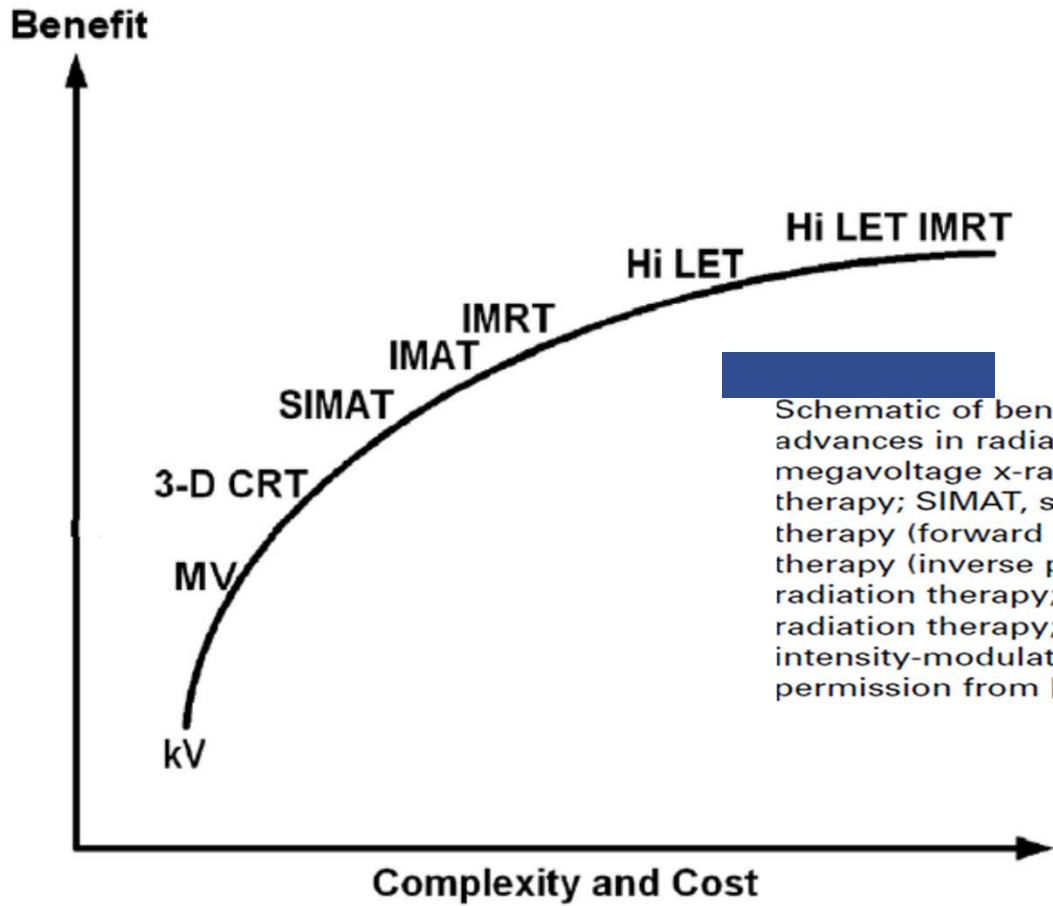
Centers without previous experience
Centers with previous experience

Price of RT treatment 2005
(7 K€)

Bonastre et al. Bull Cancer 2006

Patients' inclusion order | the center

Correlation between benefit and cost/complexity achieved through technical advances in RT



Schematic of benefit versus cost achieved with technical advances in radiation therapy. kV, kilovoltage x-rays; MV, megavoltage x-rays; 3-D CRT, 3-D conformal radiation therapy; SIMAT, simplified intensity-modulated arc therapy (forward planned); IMAT, intensity-modulated arc therapy (inverse planned); IMRT, intensity-modulated radiation therapy; Hi LET, High LET charged particle radiation therapy; Hi LET IMRT, High LET charged particle intensity-modulated radiation therapy. [Adapted with permission from [4].]

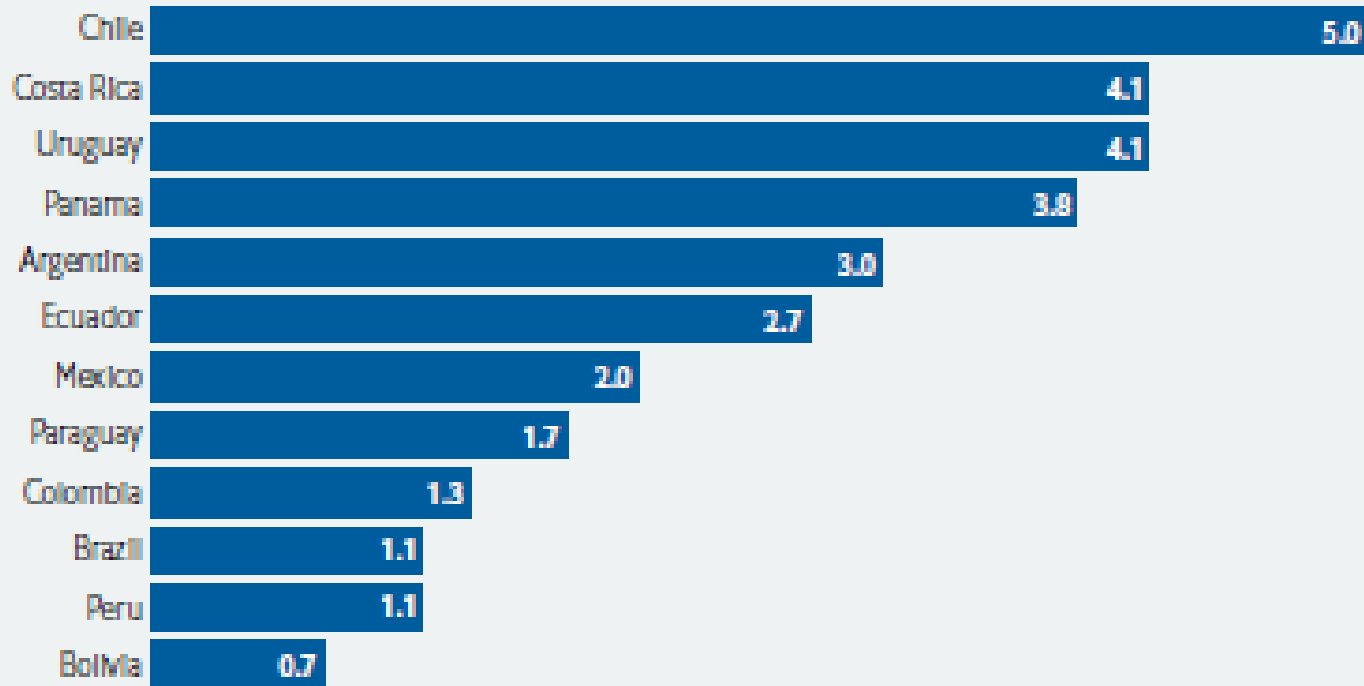
- Complexity
- Time Requirement
- QA Requirement
- Costs

Radiotherapy resources (2017)

Sources (The economist)

Chart 17

LACCS "Radiotherapy availability" domain results, 2017

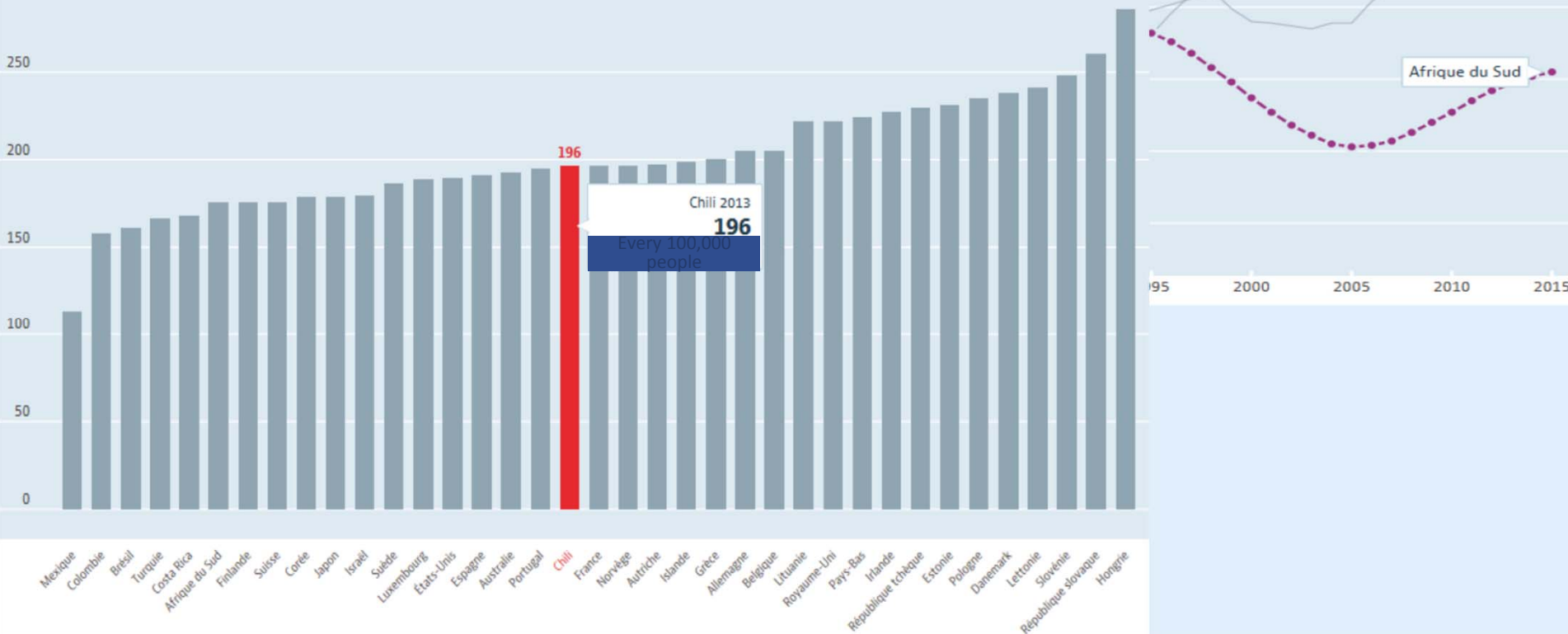


Note: This domain examines the availability of radiotherapy treatment in Latin America. This is of particular regional importance as late diagnosis increases the need for curative and palliative radiotherapy. Raw scores for each domain have been normalised to a scale of 1-5 (with 1 being the worst and 5 the best) to enable comparisons across domains.

Source: The Economist Intelligence Unit, The Latin America Cancer Control Scorecard (LACCS), 2017.

Life expectancy increase worldwide and Cancer mortality worldwide

OECD data



Radiation oncology education In Latin America Sources (DIRAC, ALATRO)

- N° radiation oncologists 1282
 - N° of radiation Physicists 607
 - N° radiation Technicians 2040
 - No reliable statistical data available.
 - 3-4 year post-graduate courses in 12 countries.
 - 35 centres offering training for technicians.
 - 50% in Argentina, Brazil and Cuba.
 - Mostly not validated by a university
- | | |
|-------------------------|-----|
| Radiotherapy Centers | 514 |
| Linear Accelerators | 464 |
| Cobalt-60 Units | 306 |
| Total | 770 |
| Brachytherapy equipment | 221 |

10 most pressing needs in the region to start Advanced Radiation Therapy

1. Lack of trained human resources.
2. Lack of clinical protocols and procedure manuals.
3. Technology management processes non complying with international standards.
4. Lack of quality management systems in most centers.
5. Lack of recognition of some key professions (medical physicists and others).
6. Limited application of quality control of treatment equipments
7. Inconsistent access to radiopharmaceuticals.
8. Insufficient human resources for equipment control and maintenances.
9. Shortage of databases on infrastructure and staff.
10. Lack of legislation and clear definitions of responsibilities and duties in Advanced RT

Towards strategic planning

- Develop and strengthen radiotherapy infrastructures.
- Systematically implement quality assurance programs.
- Systematically introduce paperless information management systems in advanced RT.
- Introduce the use of treatment guidelines and protocols compliant with international standards.
- Pay attention to the introduction and sustainability of radiological protection and regulation.
- Create databases on infrastructures and staff.
- Spread and share information.
- MASTER IN ADVANCED RADIATION THERAPY (first edition for radiation oncologists)
- Contribute to the basic and further education of professionals: medical physicists, technicians, IT, administratives...

Master in Advanced Radiotherapy 2017

1. Starting year: 2017.
2. Duration: 12 months theoretical PLUS practical sessions, thesis preparation
3. Working hours: monday to friday from 8:30 to 17:30.
4. Vacancies: 15 by IAEA.
5. Funding: IAEA will finance students' stay and roundtrip flight as well as teachers' and academic fees.
6. Patronage:

- Arturo Lopez Perez Foundation Cancer Center.
- Los Andes University School of Medicine.
- Chilean Society of Radiation Oncology, SOCHIRA.
- International Atomic Energy Agency, IAEA.
- Ibero-Latin-American Society of Radiation Oncology, ALATRO.
- Chilean Commission for Nuclear Energy, CCHEN.
- National Cancer Institute – Chile.
- IRAM Cancer Center.
- UC Christus Cancer Center.
- Viña Cancer Center.

7. Sponsorship: International Atomic Energy Agency, IAEA.



Universidad de
los Andes



IAEA
International Atomic Energy Agency



ALATRO



Master in Advanced Radiotherapy 2017

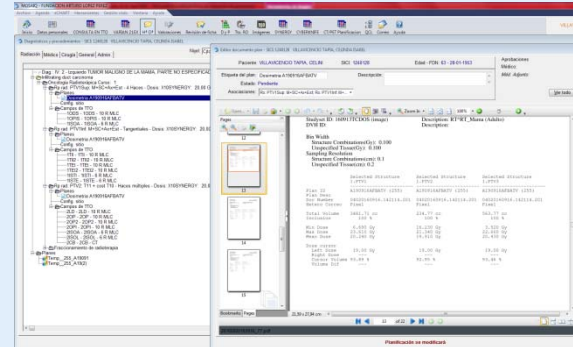
	MARIA CECILIA ATENCIO EMILIANO LISSANDRELLO
	LILIAN ZAMURIANO
	STEPHANIE LOPEZ
	MARIA ALTAGRACIA VASQUEZ
	SONIA DAVILA
	NALLELY BARRIENTOS
	FRANK ANTONIO SOTO
	ALDO TORRES
	EDGAR GUSTAVO LASTEROS
	LEANDRO RAUL RICAGNI
	NEYLA CARDOZO CASTELLANO SAMUEL QUIROZ HERRERA
	MILTON PEREZ CANTERO *
	FELIPE CARVAJAL *





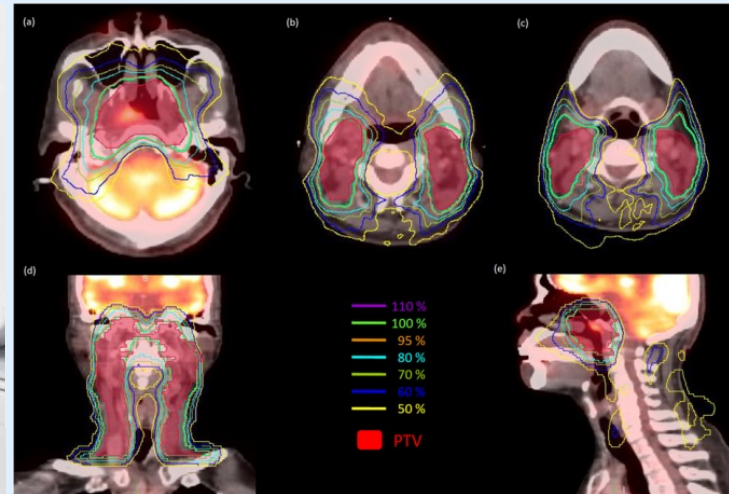
Inauguration Ceremony – June 5th, 2017

What does this Master offer?



PAPERLESS MOSAIQ ACCESS 50 LICENSES

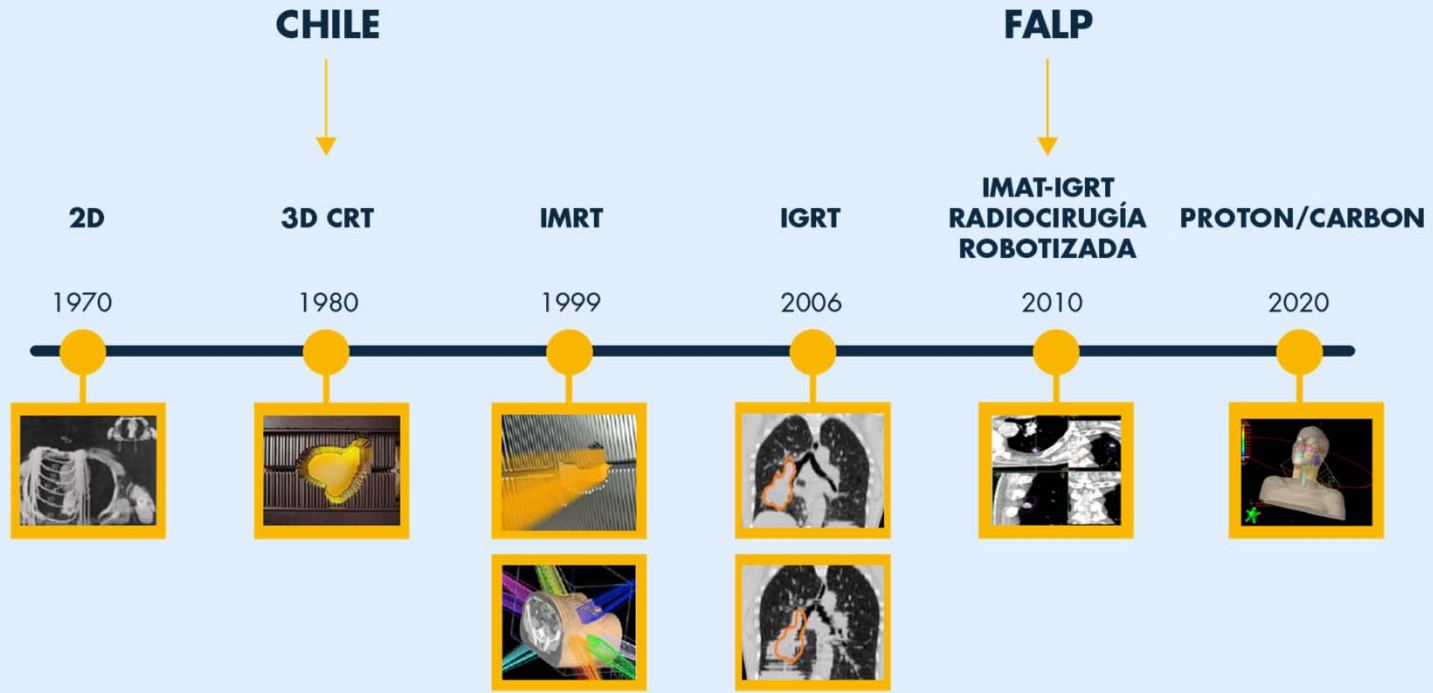
This makes for RT treatments based on the “functional” dissemination of the disease, which means a more precise target delimitation.



Big Bore PET CT for RT planning

IMAT-IGRT The pillars of advanced radiation therapy treatments trained in practise at Falp

Large comprehensive cancer centers worldwide treat 60% of their patients with RT. In Chile and South America in general only less than 20% have access to Radiation Therapy. The future-present is abandoning obsolete technologies: centers without 3D-full IMAT-IGRT



Learning the importance of quality assurance and paperless environment

ADVANCED RADIOTHERAPY

Activity Based Cost (ABC) Model



COST RADIO THERAPY ACTIVITIES

PATIENT QA; 8%

TREATMENT; 65%

DAILY, WEEKLY, ONTHLY, ETC. QA; 12%



- CLINICAL EVALUATION
- VISIT + RT PRESCRIPTION
- PROGRAM SCHEDULING
- CT, PET SCANS,IMMOBILIZATION
- VOLUME DEFINITION
- TREATMENT PLANNING
- REVISION + SIGNATURE TREATMENT PLAN
- EXPORT TO RV
- PATIENT QA
- TREATMENT
- PT EVALUATION DURING TREATMENT
- WEEKLY REVISION
- END OF TREATMENT
- BILLING
- FOLLOW UP
- DAILY, WEEKLY, ONTHLY, ETC. QA;

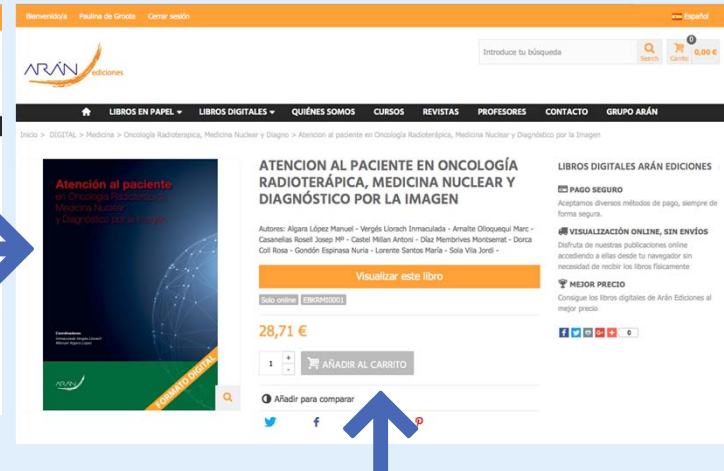
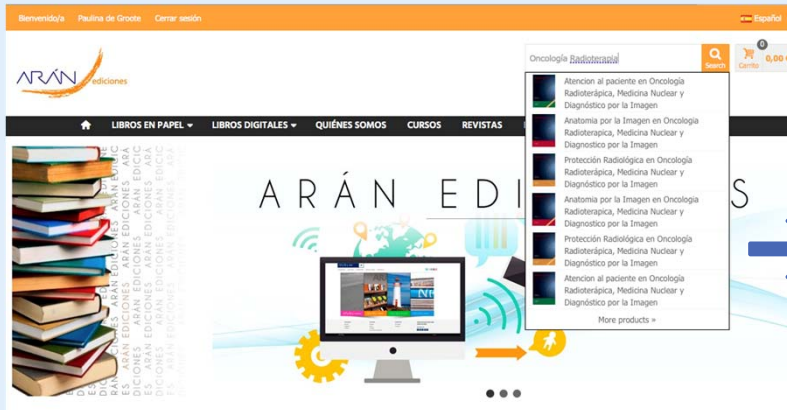


Full time Practical Onsite work + Online Manuals

Enter the website: ediciones.grupoaran.com/inicio-sesion

Type in your username and password
Once registered, you can:

1. Type in a search for: EBKRMI
or
2. Libros digitales/ Medicina/ Oncología
Radioterápica-Medicina Nuclear e
Imagen para el diagnóstico



Workshops: Robotic Radiosurgery



WORKSHOP TEÓRICO-PRÁCTICO
DE RADIOCIRUGÍA ROBÓTICA

Instituto Oncológico FALP | Auditorio 4º piso | Rancagua 878 – Providencia, Santiago.

08:30 - 08:40 Inauguración | Dr. Luis Marín

CONCEPTOS GENERALES | Lunes 21 de agosto | Moderadores: Dr. Christiann Vargas del Río | Dr. Hugo Marsiglia

08:40 - 09:40	Stereotactic RadioSurgery (SRS)	Dr. Kita Sallabanda
09:40 - 10:40	Stereotactic Body Radiation Therapy (SBRT)	Dr. Enrique Chajón
10:40 - 11:10	Café	
11:10 - 11:40	Aspectos prácticos del CyberKnife	FM. Celine K. Torszok
11:40 - 12:10	Bases físicas del CyberKnife	FM. Marcelo Ribeiro
12:10 - 12:40	Bases biológicas fraccionamientos extremos	Dr. Enrique Chajón
12:40 - 13:00	Multihojas: impacto clínico - tecnológico	Dr. Enrique Chajón

13:00 - 14:30 Almuerzo

14:30 - 15:00	Tracking SRS	FM. Celine K. Torszok
15:00 - 15:30	Neurinoma acústico	Dr. Kita Sallabanda
15:30 - 16:00	Meningiomas	Dra. Loreto Yáñez
16:00 - 16:30	Tumores de columna	Dr. Kita Sallabanda
16:30 - 17:00	Malformaciones Arteriovenosas	Dra. Loreto Yáñez
17:00 - 18:00	Casos Complejos SRS: Schwannoma Tumor Glómico Patología funcional	Dr. Kita Sallabanda - Dra. Loreto Yáñez Dra. Loreto Yáñez - Dr. Kita Sallabanda Dr. Kita Sallabanda

Café disponible en sala

DESARROLLOS TECNOLÓGICOS Y CLÍNICOS EN SBRT | Martes 22 de agosto | Moderadores: Dr. Hugo Recinos | Dr. Hugo Marsiglia

08:30 - 09:15	Importancia del control de calidad en Cyberknife	FM. Álvaro Ruiz
09:15 - 10:00	Método de inserción de semillas (pulmón-hígado-páncreas)	Dr. Enrique Chajón
10:00 - 10:30	Café	
10:30 - 11:15	SBRT en tumores de pulmón	Dr. Enrique Chajón
11:15 - 12:00	SBRT en tumores de hígado	Dr. Moisés Russo
12:00 - 12:45	SBRT en tumores de páncreas, metástasis suprarrenales y ganglionares	Dr. Enrique Chajón

12:45 - 14:15 Almuerzo

14:00 - 14:40	Próstata: posicionamiento de semillas	Dr. Camilo Sandoval
14:40 - 15:20	Próstata intra/extracapsular - recidivas	Dr. Piero Bettoli
15:20 - 16:00	ORL: casos complejos	Dra. Maribel Bruna
16:00 - 16:40	Próstata: casos complejos	Dr. Piero Bettoli
16:40 - 18:00	Conclusiones generales y cierre	Dr. Ariel Fariña

Café disponible en sala



WORKSHOP TEÓRICO-PRÁCTICO
DE RADIOCIRUGÍA ROBÓTICA

Instituto Oncológico FALP | Área Radioterapia Piso -2 | Rancagua 878 – Providencia, Santiago

TALLERES PRÁCTICOS | Miércoles 23 de agosto | Coordinador: Dr. Ariel Fariña

08:30 - 08:45	Talleres prácticos: Introducción	Dr. Hugo Marsiglia
08:45 - 09:45	GRUPO 1: planificación	T.M. Paulina Cantillana
09:45 - 10:45	GRUPO 2: planificación	T.M. Betsabé Díaz
10:45 - 11:45	GRUPO 3: planificación	T.M. Jorge Berrios
11:45 - 12:45	GRUPO 4: planificación	T.M. Valeria Zurita

12:45 - 14:00 Almuerzo

14:00 - 15:00	GRUPO 1: planificación	T.M. Paulina Cantillana
15:00 - 16:00	GRUPO 2: planificación	T.M. Betsabé Díaz
16:00 - 17:00	GRUPO 3: planificación	T.M. Jorge Berrios
17:00 - 18:00	GRUPO 4: planificación	T.M. Valeria Zurita

INCREMENTAL COST EFFECTIVENESS RATIO (ICER) COSTO EFICIENCIA DE LA RADIOTERAPIA AVANZADA | Jueves 24 de agosto

Moderadores: Dra. Lijia Avilés | Dr. Hugo Marsiglia

08:30 - 09:00	Impacto médico-clínico-económico de la Radioterapia Avanzada.	Dr. Hugo Marsiglia Ing. Cristián Ayala
09:00 - 09:30	Concepto ICER	Dr. Roberto Rosso
09:30 - 10:00	ICER: Metástasis - SRS (1 sesión) vs Radioterapia Whole Brain (10 sesiones)	Dr. Kita Sallabanda

10:00 - 10:30 Café

10:30 - 11:00	ICER: Tumores cerebrales benignos - SRS vs Neurocirugía	Dra. Loreto Yáñez
11:00 - 11:30	ICER: Malformaciones Arterio - Venosas - SRS vs Neurocirugía	Dr. Kita Sallabanda
11:30 - 12:00	ICER: Tumores Glómicos - SRS vs Neurocirugía	Dr. Felipe Carvajal
12:00 - 12:30	ICER: Oligometástasis - SBRT (1 sesión) vs Radioterapia 3D (10 sesiones)	Dr. Ariel Fariña

12:30 - 14:00 Almuerzo

14:00 - 14:40	ICER: Próstata - SBRT vs Cirugía Robótica Punto de vista del Cirujano Punto de vista del Oncólogo Radioterápico	Dr. Jorge Díaz Dr. Enrique Chajón
14:40 - 15:40	ICER: Hepatocarcinoma - Metástasis hepáticas SBRT vs Cirugía Punto de vista del Cirujano Punto de vista del Oncólogo Radioterápico	Dr. Nicolas Devaud Dr. Enrique Chajón
15:40 - 16:20	ICER: Pulmón - Metástasis pulmonar SBRT vs Cirugía Punto de vista del Cirujano Punto de vista del Oncólogo Radioterápico	Dr. Jorge Salguero Dr. Enrique Chajón

16:20 - 16:50 Café

PROGRAMAS FALP SBRT | Jueves 24 de agosto

16:50 - 17:10	CyberKnife de rescate en cáncer de próstata	Dra. Maribel Bruna
17:10 - 17:30	Tomotherapy - CyberKnife en cáncer prostático	Dr. Piero Bettoli
17:30 - 18:00	Conclusiones y cierre	Dr. Hugo Marsiglia

Master's Students Marks (June 2017)

Student's name	rectum	stomach	gliomas	breast	statistics	mean RT	Mean
ATENCIO MARIA CECILIA (Argentina)	5,1	4,6	6,1	4	3,9	5	4,7
BARRIENTOS NALLELY (Mexico)	2,9	3,4	5,4	2,3	4,5	3,5	3,7
CARDOZO NEYLA (Venezuela)	3,7	3,5	2,8	6,6	3,4	4,2	4
DAVILA SONIA (Guatemala)	2,9	3,6	4,5	5,1	3,4	4	3,9
LASTEROS EDGAR (Peru)	4,6	4,9	5,2	5	5,2	4,9	5
LISSANDRELLO EMILIANO (Argentina)	5	4,8	5,2	6	5,1	5,3	5,2
LOPEZ STEPHANIE (Costa Rica)	5,6	3,6	4,2		4	4,5	4,4
PEREZ MILTON (Colombia)	3,4	3,6	3,5	5,9	4	4,1	4,1
QUIROZ SAMUEL(Venezuela)	2,9	3,8		5,2	2,2	4	3,5
RICAGNI LEANDRO (Uruguay)	2	5	6,3	6	3,8	4,8	4,6
SOTO FRANK (Nicaragua)	3,3	4,6	5	1,7	2,7	3,7	3,5
TORRES ALDO (Paraguay)		1,9	2,8			2,4	2,4
VASQUEZ MARIA (Dominican Republic)	3,7	3,7	3,9	3,3	2,4	3,7	3,4
ZAMURIANO LILIAN (Bolivia)	2,7	3,9	3,7	3,7	1,6	3,5	3,1
CARVAJAL FELIPE (Chile)	7	6,9	6,7		6,8	6,9	6,9
VEILLON GABRIEL (2nd y RT spec. Chile)	5,3	4,1	4,5	6,5		5,1	5,1
Mean marks Master students	3,7	3,9	4,5	4,6	3,6	4,2	4,1

Marks from 1,0 to 7,0



Advantages of the program

- Improving the level of RT in LATAM by closely monitoring the evolution of students learning indicators:
 - Marks (after every practical module and workshop)
 - evaluations (after every course)
 - tests (random)
- Operational impact in order to build a learning model
- Geographically better suited than other similar programs outside LATAM.
- National and international well known teachers
- Understanding modern clinical and technical aspects of advanced radiation therapy
- Understanding Incremental Cost Efficiency Ratio (ICER).
- Report of a strategic plan to update radiotherapy in their own center/country.



Learning to work together



