



Interventional Radiology Teaching. How we do It

De Gregorio MA^{1*}, Sierre S², Abadal JM³, Cho KJ⁴, Mendez S⁵, Serrano-Casorran C¹, Bonastre C¹, Urbano J⁶ and Guirola JA⁷

¹University of Zaragoza, Minimally Invasive Techniques Research Group (GITMI), Spain

²Interventional Radiology, Hospital Universitario Austral, Argentina

³Interventional Radiology, Hospital Severo Ochoa, Spain

⁴Department of Radiology, Division of Interventional Radiology, University of Michigan Medical School, USA

⁵Interventional Radiology, Hospital Puerta de Hierro Madrid, Spain

⁶Interventional Radiology, Hospital Ramon y Cajal Madrid, Spain

⁷Minimally Invasive Techniques Research Group (GITMI), Hospital Clínico Universitario Lozano Blesa, University of Zaragoza, Spain

Abbreviations

CIRSE: Cardiovascular and Interventional Radiological Society of Europe; EBIR: European Board of Interventional Radiology; ECTS: European Credit Transfer System; IR: Interventional Radiology; IRs: Interventional Radiologist; GITMI: Research Group on Minimally Invasive Techniques; MDC: Master's Degree Course; SERVEI: Vascular Radiology and Interventional Spanish Society; SIDI: Ibero-American Interventional Radiology; UEMS: Union of European Medical Specialists

Introduction

In some countries, neither a validated Interventional Radiology (IR) teaching program nor practical training is available. In Spain, for example, in a 4-year DR program, the IR rotation lasts between three and six months, and after said rotation, a radiologist is legally authorized to perform IR procedures [1].

Twenty years ago, in 2003, the University of Zaragoza (UNIZAR), in the Faculty of Veterinary Medicine, launched a Master's Degree (MDC) for the teaching of IR with theoretical and practical contents. The MDC consists of four theoretical modules (Figure 1) with 60 ECTS credits, (1800 hours).

The practices are mandatory and face-to-face in live animal models and simulators. The contents are evaluated by means of self-assessment for the theoretical contents and face-to-face tests for the practical ones. MDC is endorsed by the Societies SERVEI (Spanish Society of Vascular and Interventional Radiology) and SIDI (Ibero-American Society of Interventionism). Spanish is the official language of the MDC.

The MDC faculty includes professors from the University of Zaragoza and other Spanish and foreign universities. UNIZAR's Department of Radiology and Physical Medicine is the guarantor of the organization of the MDC. The students anonymously evaluate the program and the professors at the end of the course.

Since 2003, (207 students of 16 nationalities have participated in the 18 editions (Table 1). They admit 12 to 15 students per course and the admission criteria were: Medical degree, residency in radiology, general surgery or vascular surgery. The Curriculum Vitae (CV) and the personal interview complete the elements of judgment for the selection of students.

Nationality of Students

The theoretical modules are taught through UNIZAR's Moodle II digital platform (<https://moodle.unizar.es/add/>), uploading the theoretical content progressively and programmed throughout the course. There is a scientific tutor who answers questions and facilitates understanding. The tutor stimulates the participation of the students in the didactic forums. At the end of each module, the student performs a self-assessment that allows the acquisition of ECTS credits. The teachers of the MDC prepared a book with all the interventionist theoretical contents. This book was given to the students as didactic materials.

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*Correspondence:

Miguel Angel de Gregorio, University of Zaragoza, Minimally Invasive Techniques Research Group (GITMI), GITMI University of Zaragoza, Spain, E-mail: mgregori@unizar.es

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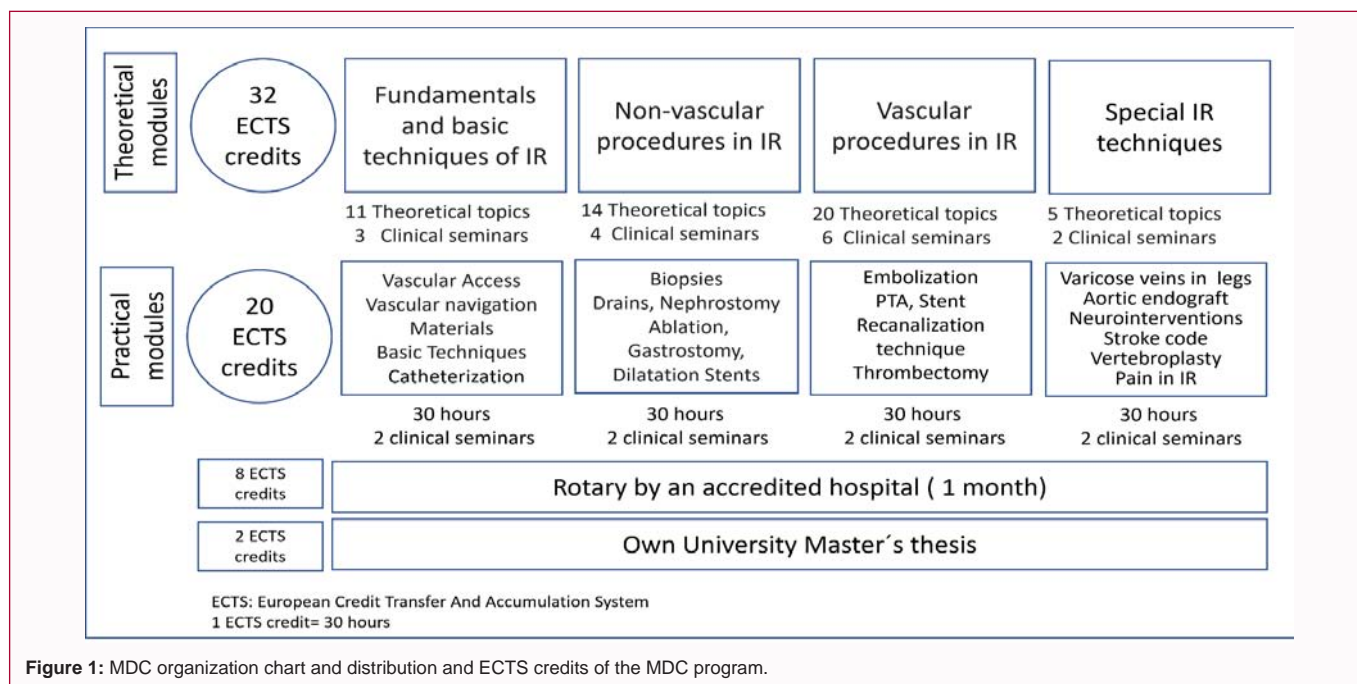


Figure 1: MDC organization chart and distribution and ECTS credits of the MDC program.

Table 1: 207 students of 16 nationalities have participated in the 18 editions.

Country	#	%
Spain	84	41.5
Colombia	46	22.3
Chile	16	7.7
Mexico	14	6.7
Venezuela	12	5.8
Costa Rica	8	3.8
Peru	6	2.9
Panama	5	2.4
Argentina	5	2.4
Guatemala	2	0.9
Dominican Republic	2	0.9
Bolivia	2	0.9
Nicaragua	2	0.9
Czech Republic	1	0.4
Guadalupe	1	0.4
Ecuador	1	0.4

Practical teaching and training are carried out in simulators and animal models in the GITMI laboratory of the UNIZAR Veterinary School (Zaragoza), equipped with a C-arm X-ray machine, M-mode and Doppler ultrasound, radiofrequency ablation, laser, microwave generators and Intravascular Ultrasound (IVUS). The students are divided into three groups of 4 to 6 students each and the procedures are supervised by a teacher. The seminar (12-15 days long) is offered twice a year (January and September). At the end of each practical

Table 2: Satisfaction level of students.

	Much (9-10)	Quite (7-8)	Rule (5-6)	Little bit (3-4)	Disappointing (1-3)	Total
Degree of satisfaction	127 (72.5%)	34 (19.4%)	10 (5.7%)	3 (1.7%)	0.57	9.0/10
Utility for your training	143 (81.7%)	26 (14.8%)	5 (2.8%)	1 (0.5%)		9.3/10

*Submitted Surveys 206. answered 175 (4.9%)

module, a test is used to assess student learning; passing the test is mandatory.

The Program includes a mandatory rotation in an RI service (several RI services are offered for the student to choose from) to learn the clinical practice of IR.

It is also mandatory for students to carry out a scientific work, free final of the Master's Thesis). The evaluation and adaptation of the final project of the MDC is carried out by the director and the professors of the MDC (Max: 2 credits).

The subspecialties of the students were radiology (117/56.5%), general surgery (40/19.3%), vascular surgery (14/6.7%), and others (34/16.4%).

The satisfaction and utility survey were carried out anonymously after each theoretical and practical module. The survey results showed a high level of satisfaction (median 9.0 (range 8.5-10) and 9.3 (range 8.5-10) on a rating scale of 1-10) (Table 2).

Another survey was carried out before the writing of this article via WhatsApp/e-mail to the 207 students: 175 (84.5%) students responded to the survey. In the survey, the students were asked about their current dedication to IR, and the results are shown in Table 3.

Since the beginning of the MDC, 94 teachers have participated in the teaching of theoretical and practical content; 68% of the teachers were from Spain (SERVEI), 20% from Latin America (SID), 8% from North America (SID, SIR) and 4% from Europe (CIRSE).

When the student has passed all the evaluations, rotated to the hospital IR service and completed a Master's Thesis, they receive a master's degree signed by the Rector of the University of Zaragoza.

Table 3: Current dedication of students.

Current dedication	Full IR	70% IR	50% IR	<50%	No IR dedication
	49 (28.9%)	86 (49.1%)	22 (15.5%)	11 (6.28%)	7 (4%)

*Submitted Surveys 206. answered 175 (4.9%)

The validity of the MDC program in interventional radiology learning could not be verified, but our 20 years of experience with favorable participant survey results indicates that the program is an effective alternative method of teaching interventional radiology.

The use of live animal models for a teaching program such as the MDC complies with current legislation. The treatment of the animals is controlled by expert veterinarians in accordance with the Animal Ethics Commission of the University of Zaragoza.

In conclusion, the practical teaching of IR can be done with different didactic modalities. Teaching with animal models, as developed in the UNIZAR MDC, is a different modality that has

proven to be possible and effective (Table 2). In the future, the integration of this type of programs with other more traditional ones may become the ideal path for the development of interventional radiology in this specialty [2].

References

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