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# EACVI SURVEY ON MULTIMODALITY TRAINING IN ESC COUNTRIES

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## **Introduction**

Advances in cardiovascular techniques now allow for high quality cardiovascular imaging across a range of different imaging modalities including echocardiography, computed tomography, cardiovascular magnetic resonance and nuclear imaging. However, across Europe accessibility to some of the different modalities is variable as is physician training and collaboration with other specialists. One specific mission of the European Association of Cardiovascular Imaging (EACVI), is “to promote excellence in clinical diagnosis, research, technical development, and education in cardiovascular imaging” as described in the recent Statement on Multi Modality Imaging (MMI).[1] So, each expert in one modality should be encouraged to proceed with training in another modality so that ultimately they can also perform and report one or more of imaging techniques.

The aim of this survey was to evaluate the training and experience of imaging cardiologists across Europe, the organization of MMI in their centres and to explore their vision for how training in cardiac imaging should be delivered.

## **Methods**

The present survey was conducted by the EACVI Scientific Initiative Committee as described in detail in [2] in accordance with [3]. The survey was conducted from April 19<sup>th</sup> to 30<sup>th</sup>. Centers across Europe were invited to be a part of the EACVI survey network. This network is open to join for all EACVI member countries ([escardio.org/eacvi/surveys](http://escardio.org/eacvi/surveys)) A total of 111 cardiovascular imaging experts across Europe were asked to complete an online survey regarding their personal and national training in MMI, the organization of MMI in their Hospitals and their opinions regarding how cardiac imaging training should be delivered.

Twenty questions were asked, including demographics, training features and imaging competence, numbers and distribution of imaging examinations and modalities, preferences of imaging conferences and motivations of an imaging career.

## **Results**

### **Characteristics of responding centers**

In all, 58 (52%) centers from 19 different countries responded to the survey. Responding centers were located in: Spain (8), Norway (6), The Netherlands (6), Belgium (5), Italy (5), Poland (4),

Slovenia (4), France (3), Switzerland (3), Hungary (2), Lithuania (2), Malta (2), United Kingdom (2), Croatia (1), Denmark (1), Greece (1), Macedonia (1), Portugal (1), Turkey (1).

The majority of respondents were cardiologists between 36 and 40 years of age (35%) and 31% was between 41-50 years of age. The majority (83%) worked in tertiary centers / university hospitals, 59% was males, 83% was cardiologists and 3% were radiologists. Only 3% was still in training while 60% had completed its training in imaging more than 5 years previously. A total of 29% was the head of the imaging laboratory (Table 1).

93% of the responding centers performed standard and advanced echocardiography, 95% cardiac CT, 88% performed CMR, 74% performed SPECT and 53% PET.

### **Training features and imaging competence**

79% of respondents had national or EACVI accreditation in echocardiography, 27% in CMR, 10% in CT (EACVI certification available from 2018 [4,5]) and 3.5% in nuclear imaging (EACVI certification available from 2019) (Figure 1). 10% had not obtained any national or EACVI certification in any modalities. However, 15% declared that there is not a national certification program. For echocardiography, CMR and cardiac CT, EACVI certifications were more common than national accreditations. Level 3 accreditation was most frequent in echocardiography (78%) followed by 24% in CMR, 14% in CT and 7% in nuclear imaging.

64% of the imagers performed more than 40 echocardiographic exams per week, and 21% and 29% performed at least 10 CMR and cardiac CT per week, respectively. Nearly a half of respondents (47%) were not involved in the reporting of any nuclear exams.

Half of respondents (49%) wished to improve its knowledge in MMI, 12% wanted to improve the modality they currently performed, while 38% was satisfied with its level of imaging competence. The most common obstacles to improve imaging competence were a too busy clinical schedule (74%) and the lack of available local training at their centre (32%).

### **Structured imaging training and requirements for cardiology specialty**

The majority of centers (81%) offered structured training in echocardiography, 33% offered structured training for CMR, 21% for CT and 8% for nuclear imaging. Importantly 19% of centers offered no structural cardiovascular imaging training. Half of the involved centers required mandatory structured training in echocardiography to become a cardiologist, and a quarter mandated training also in the other modalities (Figure 2). Importantly, 24% responded that an additional obligatory imaging training was not necessary to become a cardiologist in their country.

In 55% of cases, only tertiary or University hospitals offered the possibility to start a fellowship in imaging after cardiology training.

### **Imaging conferences**

More than 70% (73%) of respondents attended imaging conferences during the year. The great majority (79%) preferred multimodality compared to single modality conferences.

### **Motivation of an imaging career**

The majority of respondents chose an imaging career based upon personal interest (79%) or because they believed imaging to be the subspecialty with the best future perspective for work (40%). A small minority had chosen imaging because other choices were not possible to achieve or due to other reasons (16%) (Figure 3). The main advantages to an imaging career included interesting and variable work tasks, the challenge of establishing accurate patient diagnoses, excellent future work prospects, research opportunities, and the low risks of harming patients (Figure 4). In contrast, the main reported drawbacks were heavy workload (55%), lower incomes compared to other subspecialties (45%), limited responsibility for patient management (22%) and limited variability of tasks (14%).

## **Discussion**

This EACVI survey showed the status of MMI training across Europe, involving 58 centers from 19 countries at all career levels. Most respondents worked in tertiary centres or university hospitals with good availability of all imaging modalities.

### **Imaging training features, competence and training requirements for cardiology specialty**

Echocardiography, with high level of competence, was the most used modality with the majority of respondents performing > 40 exams / week. Most of the responding imagers wanted more time to train in their current or in different imaging modalities but were limited by high clinical workload and lack of time.

Generally, hospitals offer structured training for echocardiography and this was considered a mandatory part of cardiology training in about half of centres. Importantly, no obligatory imaging

training was mandatory to become a cardiologist in almost a quarter of centres, indicating the variation in training strategies across Europe and the need for further work to include imaging as an integral part of cardiology training (e.g. by following the ESC Core curriculum [6] and accordingly to EACVI core syllabus as [7]). Given the expected development of multimodality imaging in the near future, further efforts are clearly required to guarantee a widespread access to MMI training with continued education. The educational efforts by the EACVI and other training initiatives by local organizations will be important to harmonize standards and to reduced differences in imaging training across Europe. In particular the creation of training networks across Europe, offering fellowships, also through grants,[8, 9] in centers with high expertise will be key. This will also depend on close collaboration with national societies that can help to facilitate the organization of educational programs. Fellowships in imaging were available in 55% of centers in this survey. Interestingly, 78% of centers had level 3 competence in echocardiography and EACVI certifications were more common than national certifications. These results show that the work by EACVI regarding standardization and competence improvement has been acknowledged by the imaging community, with widespread certification other modalities also expected to follow given their recent introduction.

### **Imaging conferences**

Most imagers attended imaging congresses during the year and multimodality conferences were both the most frequently attended and the preferred type of meeting. These results are well aligned with the EACVI strategy of joint MMI conferences (e.g. the EACVI Congress 2020 focused on MMI).

### **Motivation of an imaging career**

Imagers were satisfied with their choice of career and 80% rated imaging as the most interesting subspecialty. The impact on patients correct diagnosis was a great motivator, in addition to future perspectives and research opportunities. Imaging is an expanding field in cardiology with rapidly emerging new technologies and techniques. Furthermore, greater involvement of cardiologists in CMR, CT and nuclear imaging may encourage cardiologists to choose a MMI career. The main drawbacks of an imaging career included differences in income compared to other cardiology subspecialties and the limited impact on direct patient management.

### **Limitations**

The results of this survey give an insight into cardiac imaging training and MMI distribution in many European centres. However, a few limitations should be pointed out. In fact, the majority of

the respondents works in tertiary/university hospital in which the availability of resources is surely higher. Moreover, the overall number of centres is quite low and their distribution is not homogeneous across Europe with a low percentage from Eastern countries.

## **Conclusions**

The access to and the availability of national imaging training programs varies significantly across Europe and imaging training is not a mandatory part of cardiology training in all countries. The interest in multimodality CVI and the enthusiasm for further training in different techniques was high but was restricted by a lack of time and training programs. EACVI can play an important role to improve and advocate a continuous and complete education in all imaging modalities.

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**Table 1. General characteristics**

<b>Age (years)</b>	
25-30	5%
31-35	12%
36-40	35%
41-50	31%
51-50	14%
>60	3%
<b>Sex (male)</b>	
	58%
<b>Specialty</b>	
Cardiology	82%
Internal medicine	8%
Radiology	3%
<b>Stage of the career</b>	
In training	3%
Head of imaging lab	29%
Head of department	3%
Clinicians	65%

**Table 2. Centers features**

<b>Type of hospital</b>	
Primary level	-
Secondary level	13%
Tertiary level/university	84%
Private	3%
<b>Performed modalities in the Center</b>	
Standard echo	93%
Advanced echo	93%
CT	95%
CMR	88%
SPECT	74%
PET	53%
<b>Presence of a structured CVI training in the Center</b>	
No	19%
Yes, for echo	81%
Yes, for CMR	33%
Yes, for CT	21%
Yes, for nuclear	9%

## **Figure captions**

**Figure 1.** Graph showing the distribution of national/EACVI certification among the respondents.

**Figure 2.** Situation of mandatory training in cardiovascular imaging in the involved centres.

**Figure 3.** Main motivations of the respondents for the choice to become a cardiac imager.

**Figure 4.** Main advantages to become an imagers according to the experts involved in the survey.

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