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# Moving theory and reality closer together in cardio-oncology training

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**This article refers to ‘European Society of Cardiology Core Curriculum for cardio-oncology’ by T. López-Fernández et al., published in this issue on pages 754–771.**

The landscape of cancer survivorship has been significantly shaped by the success of modern anticancer treatments, leading to a growing number of individuals triumphing over cancer. According to World Health Organization, in 2022, there were 20 million new cases of cancer and 53.5 million individuals were alive 5 years after a cancer diagnosis.<sup>1</sup> In the United States (US) alone, the number of cancer survivors has increased from ~3 million in the 1970s to over 18 million in 2022.<sup>2</sup> However, this victory is not without challenges. The ever-increasing number of cancer therapeutics across the spectrum of chemotherapy, targeted therapies, immunotherapies and radiation therapy have been associated with a variety of cardiovascular (CV) toxicities ranging from cardiomyopathy and heart failure to arrhythmias, cardiometabolic disorders, hypertension, vascular disease and myocarditis.<sup>3</sup> Notably, CV disease and cancer therapy-related CV toxicity (CTR-CVT) is the second leading cause of mortality among cancer survivors.<sup>4</sup> Recognition of this critical intersection between oncology and cardiology has created a need to effectively train the international workforce for the growing cardio-oncology patient population.

Specialized cardio-oncology clinics and inpatient services have rapidly emerged as essential to addressing the unique CV concerns of individuals requiring treatment for cancer and for cancer survivors, especially in Europe<sup>5</sup> and the US.<sup>6</sup> Although there are at least 134 cardio-oncology programmes from 28 countries globally registered with the International Cardio-Oncology Society (IC-OS),<sup>7</sup> this is likely an underestimate as many healthcare systems and physician groups are providing cardio-oncology services that are not officially recognized.

The scope of cardio-oncologists has also broadened from the initial need of managing CTR-CVT to a pivotal role which now

encompasses its prevention, emphasizing a proactive approach to safeguard CV health of patients with cancer.<sup>8</sup> This continued essential growth of cardio-oncology has underlined not only the need for a formal subspecialty designation of cardio-oncology but also the need for formalized training programmes to equip healthcare professionals to effectively navigate the complexities of CV issues in the oncology setting.

The initiation of any training programme necessitates a foundational step: the meticulous definition of core knowledge and competencies essential to the discipline. This framework serves as the standardized guide for aspiring professionals, outlining the fundamental understanding and skills required for effective practice. This not only cultivates a common understanding within the discipline but also provides a structured path for individuals seeking expertise at the intersection of cardiology and oncology. This principle led to the creation of the European Society of Cardiology (ESC) Core Curriculum for cardio-oncology.<sup>9</sup>

The ESC curriculum<sup>9</sup> defines the necessary requirements for delivering comprehensive cardio-oncology care, recognizing the collaborative nature of patient care among oncologists, haematologists, cardio-oncology specialists, and other clinicians. The curriculum is organized into eight chapters, each focusing on specific entrustable professional activities (EPAs) essential for practice. EPAs include clinical competencies, CanMEDS roles, knowledge, skills, attitudes, and suggested assessment tools. The document discusses the levels of independence in the context of the ESC Core Curriculum for cardio-oncology training and distinguishes explicitly the levels of independence required for each EPA for general cardiologists and for cardio-oncologists, highlighting the need for incorporating cardio-oncology, albeit with a lower level of independence, into the core training of all cardiologists.

The establishment of a cardio-oncology core curriculum by the ESC is vital for several reasons. It provides a standardized framework across Europe for training cardiologists ensuring a uniform, consistent and high level of expertise. Uniform training

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standards establish a baseline level of proficiency, guaranteeing that cardio-oncologists across European countries possess a consistent and comprehensive understanding of the complexities involved. This consistency is vital for providing high-quality care and fostering patient confidence, regardless of the geographical location of the healthcare provider. Moreover, uniform training standards contribute to the development of a robust, cohesive and collaborative research community. And more importantly, the establishment of specific and uniform training standards will contribute to the effort of developing an adequate number of well-trained specialists to meet the demand across Europe.

Furthermore, the core curriculum acts as a guideline for educational institutions and healthcare organizations, facilitating the integration of cardio-oncology into existing medical education programmes. Since cardio-oncology is a relatively new field, its principles and didactics have not been uniformly integrated into training programmes for cardiology or oncology/haematology in most countries, with the exception of UK. Interestingly in Spain, cardio-oncology is included in the general training of oncologists. It is hoped that this document will spur changes, as the need is obvious and the requirements for the general cardiologists are clearly delineated.<sup>9</sup> After obtaining board certification or completing training in general cardiology, individuals seeking further specialization in cardio-oncology can pursue additional training and expertise through cardio-oncology fellowships in some countries (e.g. UK, Spain, France, US, Canada and Australia) or through post-graduate courses (e.g. Greece, Spain).

Training curricula have previously been proposed by the American College of Cardiology (ACC) Cardio-oncology Leadership Council (2020) and jointly by the IC-OS and Canadian Cardio-Oncology Network (CCON) (2016).<sup>10,11</sup> Comparing them and the ESC proposal demonstrates that each document emphasizes certain facets of training, but with significant overlap in emphasizing the importance of achieving knowledge-based milestones in cardio-oncologic principles and clinical care (Figure 1). Further, the US document emphasizes the importance of multi-disciplinary collaboration with pharmacists and advanced practice providers, in addition to minimum clinical volumes to achieve competency and milestones in the field. Such differences between the documents are to be expected based on differences in the organization, clinical practice, and needs of cardio-oncology between the continents. However, they should be used as synergistic documents supplementary to each other; they can be invaluable guides to leverage unique strengths and gaps that are present in each cardio-oncology programme across the world. Notably, there remains a relative paucity of advanced cardio-oncology subspecialty training, particularly in the US. At the time of this writing, there are ~9 centres which have declared formal cardio-oncology fellowship programmes, mostly of 1 year duration with a few offering 2-year training with a significant research component.<sup>12</sup> Each of these programmes is affiliated with a large US National Cancer Institute designated Cancer Center.

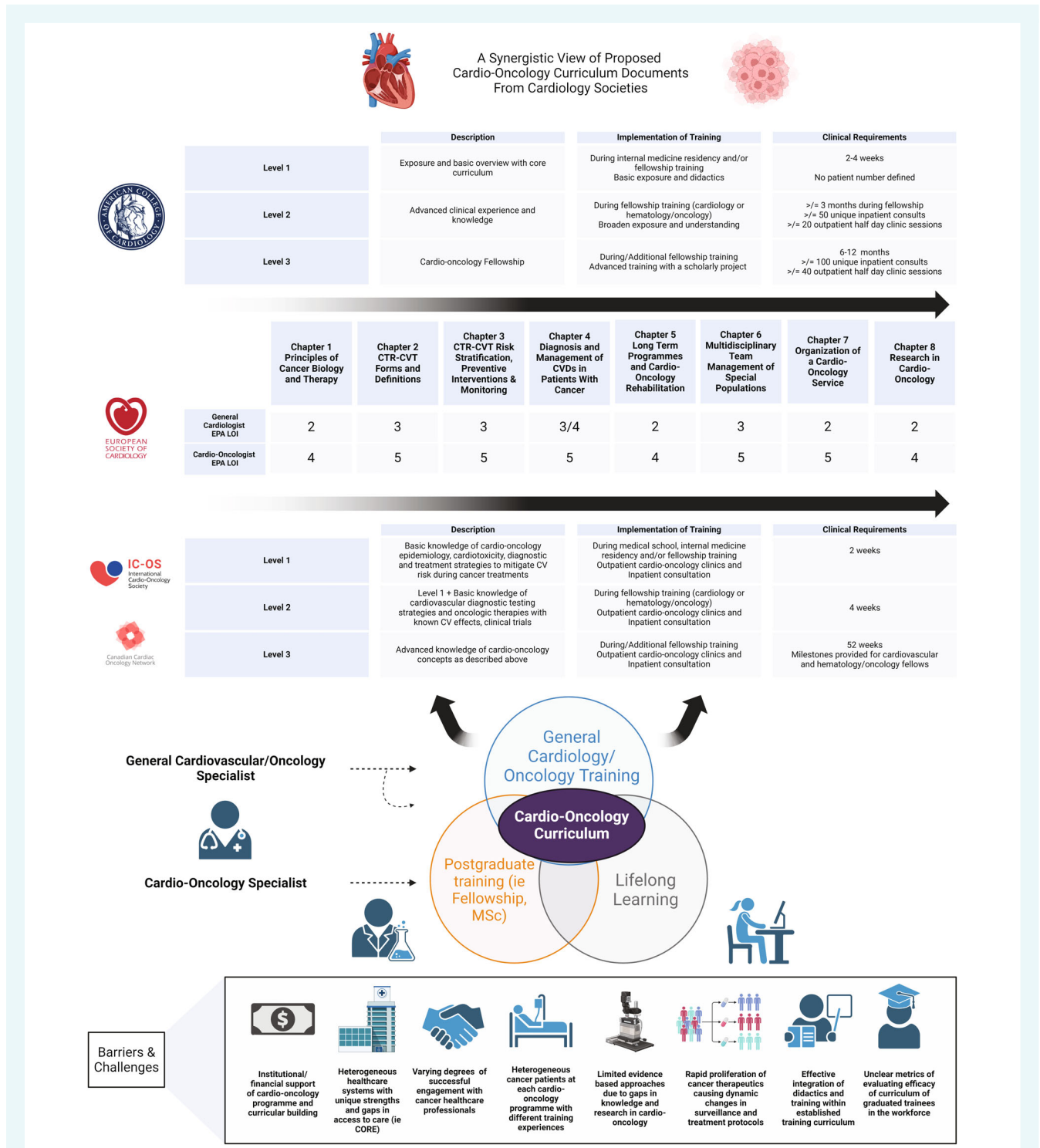
Because the field of cardio-oncology has rapidly evolved in the face of a tidal wave of novel cancer therapeutics with a myriad of cardiotoxicities, preparation and training of the workforce has been a messy and chaotic process. While this is a positive reflection of

the overwhelming global enthusiasm for the field and recognition of its importance, our ability to effectively train and educate healthcare professionals in this space has been relatively slow. Several unique challenges exist (Figure 1), including our dependence on another field (oncology) for clinical volume and collaboration, unclear milestones that determine competency in a growing list of CTR-CVTs, and varying degrees of institutional and financial support. A prior study of cardio-oncology training programmes in the US and UK demonstrated the significant heterogeneity of cancer patients that trainees are exposed to, which may lead to varying experiences making a uniform curricular design difficult, as all cancer centres globally may have significant variation in the types of patients they treat.<sup>13</sup> In addition, there remain certain services that are not uniformly available, such as cardio-oncology rehabilitation (CORE), which are mentioned in the ESC document but may not be a realistic service or competency to master for many trainees currently given lack of access.<sup>14</sup> Documents such as this ESC proposal, hopefully will bring attention and identify gaps in education for those wishing to pursue a cardio-oncology based career and engage in successful programme-building.

Crucial to increasing enthusiasm for the training of cardio-oncologists and for the dedicated time requirements for advanced training is the formal designation of cardio-oncology as a separate subspecialty, which requires recognized certification of experts in the field, similar to their other cardiology subspecialty counterparts. Thus far, the only cardio-oncology certification available is through IC-OS board certification. Although this is a promising start, such certifications may need to be from organizations providing existing certifications for other cardiac subspecialties. The ESC is working on such a cardio-oncology certification as mentioned in the curriculum document.<sup>9</sup> In the US, changes are afoot in national cardiology board certifications. Recent efforts from cardiology societies to create their own board certification separate from the American Board of Internal Medicine have created challenges of timing.<sup>15</sup> Once the outcome of this process is reached, applications for subspecialty certifications will likely follow providing an opportune time for a new cardio-oncology board certification.

In summary, the ESC Cardio-Oncology Curriculum provides the groundwork for an ESC certification programme by ensuring:

1. *Standardized education*: The curriculum sets standardized educational benchmarks, ensuring that cardio-oncologists across European countries receive consistent training.
2. *Defined core competencies*: It outlines the core competencies required for effective cardio-oncology practice.
3. *Interdisciplinary approach*: The curriculum emphasizes the interdisciplinary nature of cardio-oncology, promoting collaboration between cardiology and oncology specialists.
4. *Patient-centred care*: Competencies related to patient communication, shared decision-making, and ethical considerations are embedded in the curriculum.
5. *Global recognition*: Aligning the curriculum with ESC standards ensures that the certification programme gains global recognition. This recognition is critical for specialists seeking opportunities beyond their home countries and for promoting a unified standard of care.



**Figure 1** An overall comparison of proposed training curriculum high yield recommendations by multiple cardiology societies from the American College of Cardiology, European Society of Cardiology, International Cardio-Oncology Society, and the Canadian Cardiac Oncology Network. These documents can be synergistically used to help design training pathways and curriculum best suited for each healthcare systems' unique strengths, needs, and gaps in order to address a growing global cancer survivor population with increasing cardiovascular disease burden. Training pathways are highlighted in the Venn diagram that both general cardiovascular/oncologic and cardio-oncology specialists can potentially follow. Barriers and challenges to implement these curricular proposals are also highlighted that may vary by institution and geography. CORE, cardio-oncology rehabilitation; CTR-CVT, cancer therapy-related cardiovascular toxicity; CV, cardiovascular; CVD, cardiovascular disease; EPA, entrustable professional activity; LOI, level of independence. Adapted from<sup>9-11</sup>. Made by Biorender.com.

As the field of cardio-oncology continues to evolve, curricula such as those by the ESC, ACC and the IC-OS/CCON have provided the blueprints for the training and certification of a cadre of proficient professionals capable of navigating the nuanced challenges presented by CV issues in the context of cancer care and survivorship around the world. While there are challenges in implementing the successful training of the future cardio-oncology workforce, the gap between theory and reality continues to close. The need to advocate for effective curriculum design and training requires the support of the global community, and from both sides of the aisle of CV and cancer care teams.

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