

INTERNATIONAL PERSPECTIVE

The Establishment of the Nordic Cardio-Oncology Society



Agneta Månsson Broberg, MD, PhD,^a Suvi Tuohinen, MD, PhD,^b Tanja Skytta, MD, PhD,^c Jürgen Geisler, MD, PhD,^d Þórdís Jóna Hrafnkelsdóttir, MD, PhD,^e Agnes Smáradóttir,^f Kirsten Melgaard Nielsen, MD, PhD,^g Birgitte V. Offersen, MD, PhD,^h Marianne Jarfelt, MD, PhD,ⁱ Geeta Gulati, MD, PhD^{j,k}

Cardio-oncology is a relatively new, albeit quickly expanding field. The efficacy of modern cancer therapy has increased the number of long-term cancer survivors. However, the long-term survival for cancer patients may in some cases be limited by cardiovascular toxicities secondary to necessary cancer treatment. Cardiovascular mortality has been shown to surpass cancer related mortality in breast (1), hematologic (2), and childhood cancers (3). Cardiologists and oncologists have different approaches to cardio-oncology due to their

different clinical roles. A collaborative approach between the 2 fields is necessary to achieve the best possible cancer outcomes with minimal injury to the cardiovascular system.

Individually the Nordic countries have small populations ranging between 350,000 and 10 million (Table 1), and together they comprise a population of more than 27 million people (4). The backbone of the Nordic countries' general health care is a public, taxation-based system with equal access for all citizens. Although management, steering systems, and user fees differ between the countries, they all provide high-quality care. Educational systems are also similar with well-established medical universities providing a high-standard medical education and front-line research.

There is a history of collaboration between clinical and research networks with examples from shared health statistics, including the Nordic Medico-Statistical Committee (5). The Nordic Society of Pediatric Hematology and Oncology (6) also stands out for its comprehensive educational program and broadly supported clinical management guidelines, as it has inspired long-term follow-up national guidelines for childhood cancer survivors including cardiovascular surveillance. Based on these experiences and bearing in mind that knowledge grows when shared, the Nordic Cardio-Oncology Society (NCOS) was formed.

The overall goal for the NCOS is improved cardiovascular outcomes for patients treated for cancer. By creating a Nordic arena of collaboration, we hope to facilitate the implementation of practice-changing evidence for the prevention or treatment of cardiotoxicity more quickly. The first board meeting was held in the morning of November 8, 2019, at Gardermoen, Oslo, Norway, right before the first NCOS

From the ^aHeart and Vascular Theme, Karolinska University Hospital, Stockholm, Sweden; ^bHeart and Lung Center, Helsinki University Hospital, Helsinki, Finland; ^cTampere University Hospital, Department of Oncology, Tampere, Finland; ^dDepartment of Oncology, Akershus University Hospital, Lørenskog & Institute of Clinical Medicine, University of Oslo, Campus AHUS, Lørenskog, Norway; ^eDepartment of Cardiology, Landspítali University Hospital, Reykjavík, Iceland, and Faculty of Medicine, University of Iceland, Reykjavík, Iceland; ^fDepartment of Medical Oncology, Landspítali University Hospital, Reykjavík, Iceland; ^gDepartment of Cardiology, Aarhus University Hospital, Aarhus, Denmark; ^hDepartment of Experimental Clinical Oncology & Department of Oncology, Aarhus University Hospital, Aarhus Denmark; ⁱDepartment of Oncology, Sahlgrenska University Hospital and Institute of Clinical Sciences, Sahlgrenska Academy, Gothenburg, Sweden; ^jOslo University Hospital, Ullevål, Department of Cardiology, Oslo, Norway; and the ^kDepartment of Research, Akershus University Hospital, Lørenskog, and the Institute of Clinical Medicine, University of Oslo, Campus AHUS, Lørenskog, Norway. Beside the seminar fee, the Summit was mainly funded by the Research Council of Norway. Additionally, the Summit was supported and endorsed by the Norwegian Society of Cardiology, Norwegian Cancer Society, Danish Society of Cardiology, Danish Comprehensive Cancer Center and Finnish Society of Oncology. NCOS was endorsed by the Finnish Society of Cardiology and the Swedish Society of Cardiology. Dr. Gulati has received research support from Novartis; and has received personal fees from AstraZeneca.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the *JACC: CardioOncology* [author instructions page](#).

TABLE 1 Population in the Nordic Countries in Alphabetical Order

Country	Population
Denmark	5,786,703
Finland	5,538,392
Iceland	340,638
Norway	5,409,757
Sweden	10,082,066
Total	27,157,556

Summit, establishing the aims and tasks of the NCOS. The board consists of a total of 11 people, 1 from the field of cardiology and 1 from the field of oncology from Denmark, Finland, Iceland, Norway, and Sweden and going forward, the past president will be included. The board agreed that the NCOS would apply for affiliation with the International Cardio-Oncology Society (ICOS). The goals of NCOS will be published on the ICOS webpage.

In the afternoon, while the first snow fell, 58 participants from Denmark, Finland, Iceland, Norway, and Sweden gathered to learn about cardio-oncology at the first NCOS Summit. About half of the participants had a cardiology perspective and the other half had an oncology perspective. The meeting was opened by a talk titled “What is Cardio-Oncology” from one of the keynote speakers, Dr. Alexander Lyon from the Royal Brompton Hospital, London, England. Dr. Lyon is the president of the British Cardio-Oncology Society and a member of the European Society of Cardiology Cardio-Oncology Council Board. He gave a general perspective of the field of cardio-oncology and set the stage for the rest of the day. He started his talk by saying that “cancer and cardiovascular disease are two medical worlds colliding.” Hopefully, through our newly formed collaboration, we can create an aftermath of this collision that is beneficial for our patients. Dr. Lyon continued by providing an overview of the most important cardiotoxic cancer treatment regimens as anthracyclines, trastuzumab, and radiation therapy. Further, he presented data on immunotherapy showing that it has radically improved cancer survival; however, severe myocarditis can be a fatal complication. Different cancer treatments and their effects on the cardiovascular system were explored in detail by other Nordic speakers during the Summit. The second keynote speaker was Dr. Peter van der Meer from the University Medical Center Groningen in the Netherlands. Dr. van der Meer is also a board member of the European Society of Cardiology Cardio-Oncology Council Board. He gave a talk on “What do the Experts say – Position Paper in Cardio-

Oncology” and provided an overview of the evidence for cardio-protective treatment in cardio-oncology.

The patients are our central focus. To highlight the importance of balanced information to the patient about potential cardiac side effects by cancer treatment without discouraging them from accepting cancer treatment, a patient was invited to share her story. She had previously been treated for breast cancer with anthracyclines, and shared her experience in participating in a randomized, placebo-controlled clinical trial. The patient emphasized the importance of balanced information both from the oncologist and cardiologist. She also talked about the patients perspective of participating in a clinical trial, noting that participation can be reassuring as it gives a feeling of being taken better care of.

The session on “Research and Perspective for Nordic Collaboration” was opened by Professor Torbjørn Omland from Akershus University Hospital, Norway. He is the Principal Investigator of and initiated both the PRADA (Prevention of Cardiac Dysfunction During Adjuvant Breast Cancer Therapy) (7) and PRADA II trials. He gave an overview of randomized controlled trials on cardioprotective treatment during anthracycline and/or trastuzumab treatment. He, together with speakers from Denmark, Finland, and Sweden then gave an overview of cardio-oncology trials in their respective countries and the possibilities for collaboration.

Speakers from the different Nordic countries presented some of the local, regional, and national initiatives in cardio-oncology that have evolved during the past years. Multidisciplinary aspects and other collaborative activities were depicted and all spoke to the common theme of the importance of strengthening the presently fragmented cardio-oncology collaborative networks and the need of a common arena for sharing questions and knowledge.

All the Nordic countries have cardio-oncology units at some of their hospitals, but commonly these are local initiatives directed by 1 or 2 enthusiastic cardio-oncologists. However, driven by the demand from professionals and patients for evidence and information, more structured cardio-oncology activities are emerging. On a national level, Denmark has established an operative “onco-cardiology” network group within the Danish Comprehensive Cancer Center. In Sweden, a cardio-oncology initiative has been started within the heart failure working group of the Swedish Cardiology Association. Furthermore, rehabilitation after cancer is managed through a cooperation of the Swedish Regional Cancer Centers where the National Program for Long Term Follow up after Childhood Cancer also serves as a good example

of comprehensive risk assessment based screening program for all cancers, stratified by treatment. By establishing NCOS and holding summits where we can share our experiences, we can learn from each other and establish more robust cardio-oncology clinics at our hospitals.

If smaller countries can share clinical experiences, and collaborate in research projects with neighboring countries, this will hopefully result in platforms for larger randomized studies with higher clinical impact. In this way the Nordic countries are unique, as they have similar health systems and a tradition of collaboration across borders supported by similar regulatory systems. The main challenge is to establish relevant platforms for clinical and scientific encounters. We believe this summit was the beautiful start of such networking. We are in an establishment phase, perhaps the most difficult phase. Inspired by the experiences of China (8) and Israel (9), we are prepared for a long-standing development phase beginning with the formal registration of the organization. Concomitantly, the NCOS is working on a financial strategy for securing

a website where Nordic cardio-oncology clinics and research projects in cardio-oncology can register to find collaborators and others interested in the same questions.

The NCOS is working towards the goal of being the arena for Nordic educational and research networking, and aims to be acknowledged by the national cardiology and oncology societies. The NCOS' aim is to support the present cardio-oncology care providers, and we believe that supporting educational and research networks today create tomorrow's scientists and clinicians. The NCOS will encourage cardio-oncologists in the Nordic countries to take the ICOS Certification Exam.

We look forward to evaluating our progress at our next Nordic Cardio-Oncology Summit planned to be held in Finland in 2021.

ADDRESS FOR CORRESPONDENCE: Dr. Geeta Gulati, Oslo University Hospital, Postboks 4950 Nydalen, 0424 Oslo, Norway. E-mail: geetagul@medisin.uio.no. Twitter: [@Gulati_Norway](https://twitter.com/Gulati_Norway).

REFERENCES

1. Abdel-Qadir H, Austin PC, Lee DS, et al. A population-based study of cardiovascular mortality following early-stage breast cancer. *JAMA Cardiol* 2017;2:88-93.
2. Stone CR, Mickle AT, Boyne DJ, et al. Treatment for lymphoma and late cardiovascular disease risk: a systematic review and meta-analysis. *Health Sci Rep* 2019;2:e135.
3. Felicetti F, D'Ascenzo F, Moretti C, et al. Prevalence of cardiovascular risk factors in long-term survivors of childhood cancer: 16 years follow up from a prospective registry. *Eur J Prev Cardiol* 2015;22:762-70.
4. Worldometer. Available at: www.worldometers.info. Accessed April 6, 2020.
5. Nowbase. National delegations for NOMESCO. Available at: <http://www.nowbase.org/who-are-we/national-delegations-nomesco>. Accessed April 6, 2020.
6. Nordic Society of Hematology and Oncology. Available at: <https://www.nopho.org/welcome/frame.htm>. Accessed April 6, 2020.
7. Gulati G, Heck SL, Ree AH, et al. Prevention of cardiac dysfunction during adjuvant breast cancer therapy (PRADA): a 2 × 2 factorial, randomized, placebo-controlled, double-blind clinical trial of candesartan and metoprolol. *Eur Heart J* 2016;37:1671-80.
8. Zhang Y, Zhang Z, Liu Y, Zhang J. Cardio-Oncology in China. We are on the go! *J Am Coll Cardiol CardioOnc* 2020;2:139-43.
9. Lakobishvili Z, Gilon D. Cardio-Oncology in Israel. *J Am Coll Cardiol CardioOnc* 2019;1:331-3.

KEY WORDS cardio-oncology, cardiotoxicity, multidisciplinary team