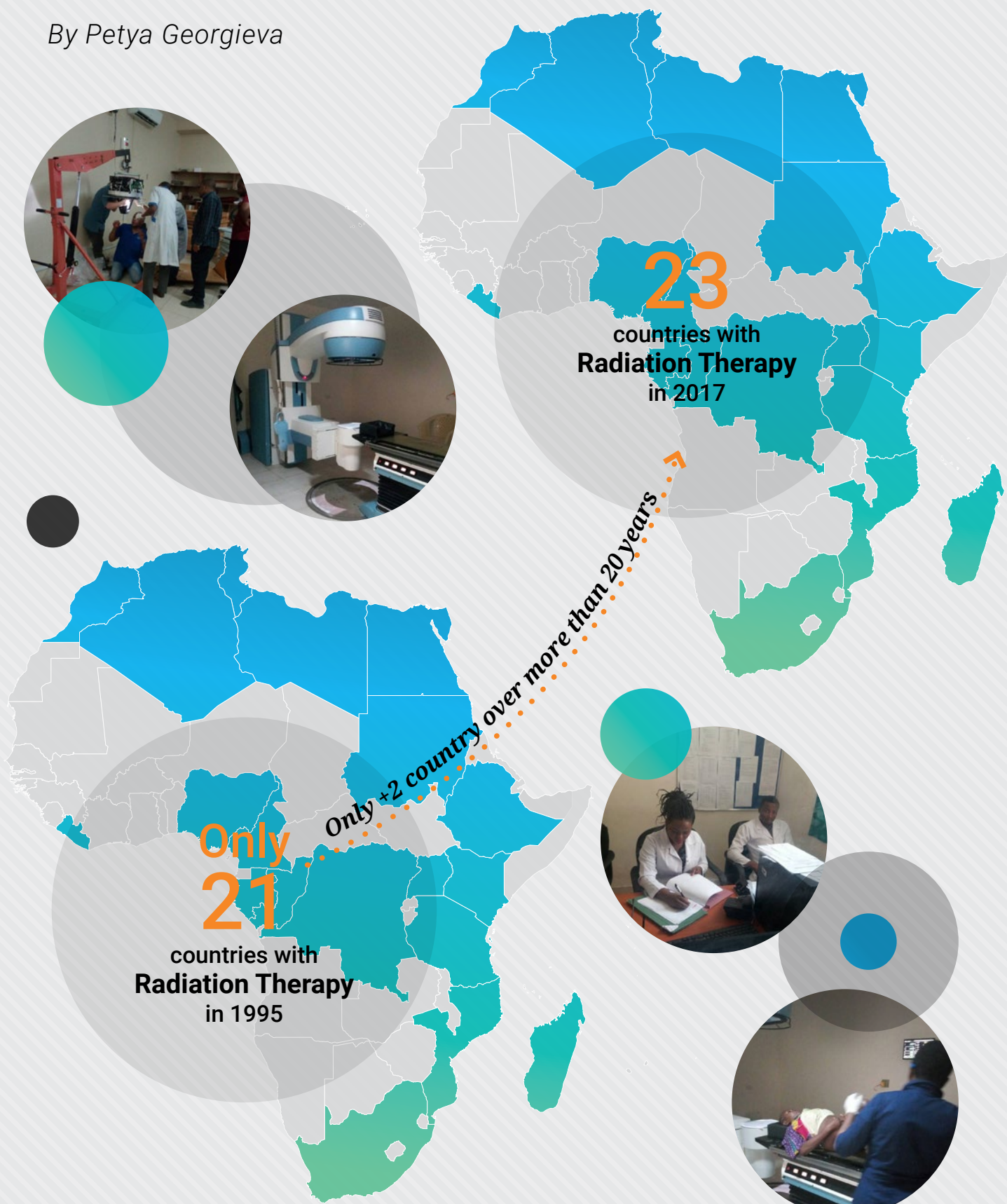


DEVELOPING MEDICAL LINACs FOR CHALLENGING ENVIRONMENTS

By Petya Georgieva





Participants to the Workshop on Innovative, Robust and Affordable Medical Linear Accelerators for Challenging Environments held at CERN, 25-27 October 2017

About 50 experts in accelerator technologies, medical physics and oncology from Botswana, Ghana, Jordan, Nigeria, Tanzania, ICEC, the UK and CERN met at CERN in October 2017 to discuss the goal of developing innovative, robust and affordable medical linear accelerators for challenging environments. This was the follow-up of a first workshop, hosted by CERN in November 2016 and co-organised with the International Cancer Experts Corps (ICEC). Last year's workshop resulted in the creation of three task forces by: 1. Technical, 2. Education, mentoring and training and 3. Global Connectivity and development) to address the treatment of cancer in challenging environments and to explore new possible emerging directions in the radiotherapy treatment of cancer.

At the follow up workshop, entitled "Innovative, robust and affordable medical linear accelerators for challenging environments", the participants, which included representatives from the Official Development Assistance (ODA) countries on the Development Assistance Committee (DAC) list, shared their grass-roots perspectives and the needs and struggles in order to build a strategy for increasing access to radiotherapy to a larger number of patients. The event¹ was organised in collaboration between CERN, ICEC and the Science and Technology Facilities Council (STFC).

Funded through the UK's Global Challenges Research Fund, the workshop became a constructive dialogue among experts in accelerator technologies, medical physics and oncology who pledged to identify resources and practices to enhance the effectiveness of the machines to be deployed. There was significant interest in this brainstorming event and presentations from Botswana and Ghana were given using video conference platform. The extreme difficulty in establishing these connections once again illustrated how challenging are these environments.

In terms of time and priorities, all the participants agreed that improving and enhancing the operating machines is needed urgently as the current ones are technically complex and require frequent and expert maintenance. As a second step, in the next 3 to 7 years, we have to find solutions for a better linac and associated instrumentation which is adapted for such challenges. An important aspect that was strongly stressed throughout the open discussions was to make the linac components and system as a whole more robust and easily

maintainable in regions where experienced technical staff are limited.

Simplicity of operation is another significant factor in using linacs in clinical settings. On one hand, the radiation technologist should be able to do the setups under the direction of the radiation oncologist and follow the treatment plan. And on the other hand, maintenance should also be as easy as possible – from remote upgrades and monitoring to anticipating failure of components. These centres and their machines should be able to provide treatment on a 24/7 basis, as needed, and, at the same time, deliver exclusive first-class treatment comparable with the state of the art in developed countries.

A frequent challenge for reliable radiotherapy delivery is the environment in which the advanced linacs must function continuously. Harsh factors such as high temperatures, inadequate cooling, extensive dust and the high humidity in developing countries are only few of the factors that can impact both the robustness of the machines and the general infrastructure.

This workshop, as outlined above, established many of the challenges for the future of this joint collaboration for delivering radiotherapy for difficult environments. The immediate objective is to develop 4-5 projects in collaboration with participants from ODA countries that will address the points raised in the technical sessions, which will be presented in the next workshop in March 2018.

The eventual goal is to embed the individual projects and develop an umbrella proposal in collaboration with ODA countries, CERN, ICEC, STFC institutes which is going to address the needs and develop the medical linac for treating cancer. STFC will lead the proposal to the Global Challenges Research Fund Foundation Awards 2018. ■



Animated discussion during one of the presentations.

¹For more information, please visit <http://indico.cern.ch/event/661597/overview>