



In memoriam – Prof. Anna Celler

Dear Colleagues,

We are very sad to inform you of the recent passing on 24 December, 2020, in Vancouver, Canada of prof. Anna Celler – a friend of Polish Nuclear Medicine, and a wonderful person and beautiful woman. Anna was generous, enthusiastic about life and science, and a loving wife, mother of two children and grandmother of five grandchildren.

Anna was very much a people person and a message to colleagues from her two children Peter and Katherine (Kasia) following her passing perhaps summarises this aspect best:

“As you probably know, people were the most important thing to Anna. I almost never heard her speak about publications or experimental results, but she frequently recounted anecdotes involving her collaborators, colleagues, and students. Anyone who worked in, or closely with, the MIRG (Medical Imaging Research Group) would know about how she insisted on hosting annual Christmas parties and summer BBQs at her home, and I know she always wanted my sister and I to attend with our children as well, so that she could introduce her group to her family, and vice versa. In fact, I believe her students were her greatest source of professional pride. Their new positions, achievements, and accolades were the first thing she would point to when asked about her career”.

Anna was a professor in the Department of Radiology at the University of British Columbia (UBC) in Vancouver, Canada. She was also the founder and Head of the Medical Imaging Research Group (MIRG), associated with the Vancouver Coastal Health Research Institute, an Adjunct Professor at the Department of Mathematics, Simon Fraser University and an Associate Member at the Department of Physics and Astronomy, UBC. Her main expertise was in nuclear and medical physics, quantitative and dynamic image reconstruction and analysis, dosimetry for radionuclide therapies, cyclotron production of medical radioisotopes and use of sophisticated mathematics in different aspects of imaging. She was the author of more than 350 peer-reviewed articles, abstracts and book chapters and served on many committees and review boards. During her career, she was awarded more than 12 million dollars in research funding as principle or co-investigator.

Anna served as a strong mentor for many students. She supervised or co-supervised 15 postdoctoral fellows, 16 PhD and 15 MSc students.

In 2018, Anna was recipient of the Canadian Organization of Medical Physicists (COMP) Gold Medal Award. It is the highest award given by COMP in recognition of an outstanding career and significant contributions to the field of medical physics in Canada. In particular, the Gold Medal recognizes leadership in medical physics, and is awarded for adding knowledge which alters the practice of medical physics and has an outstanding influence on the professional development and careers of medical physicists in Canada.

Anna’s academic career began in Warsaw, Poland. In 1974 she received her MSc in nuclear physics and in 1980 her PhD in nuclear physics from the University of Warsaw. She then spent several years in various research laboratories in Poland, Finland and France. In the summer of 1984, Anna, with her husband Zbigniew (also physicist) and son, immigrated to Vancouver. She start working at TRIUMF – Canada’s particle accelerator center with the Charge Exchange Group using high-energy spectroscopy to investigate spin and isospin excitations of the nucleus. In 1991 she entered the realm of medical physics and joined the nuclear medicine department at the Vancouver General Hospital. At the same time she founded the Medical Imaging Research Group (MIRG) – a team of physicists, mathematicians and computer scientists working in collaboration with medical personnel to provide scientific support for diagnostic nuclear medicine imaging and for radionuclide therapies.

Anna devoted most of her professional life to exploring diagnostics and internal radionuclide therapy from the physicist’s perspective. Curiosity and passion inseparably motivated her to deeply investigate various aspects of dosimetry. As new applications of medical isotopes appeared, Anna took up the challenge of understanding and describing the influence of the physical characteristic of the isotope decay emissions on the quality of SPECT or PET images and on therapy planning. None of the medical radionuclides, among them rhenium-188, gallium-67, indium-111,



Anna Celler and her first PhD student Glenn Wells – after the COMP Gold Medal Award ceremony on 14 September, 2018, Montreal

and, in recent years also yttrium-90 and lutetium-177, held any secrets from her. Of note is Anna's input into the development of technetium-99m production using a cyclotron. This was pioneer research initiated when shortages in nuclear reactor-produced molybdenum-99 forced scientists to search for alternative methods for obtaining technetium-99m. In a cyclotron, technetium-99m can be made by bombardment of molybdenum (enriched in molybdenum-100) with a proton beam, causing the transmutation of some of the molybdenum-100 nuclei into technetium-99m. Anna and her collaborators demonstrated that the yields of technetium-99m using this method are sufficient, so that even medical

cyclotrons designed to produce PET radionuclides can produce sufficient quantities of technetium-99m to meet local needs, as she described in an interview for Physics World (<https://physicsworld.com/a/cyclotrons-could-boost-technetium-supply/>). This groundbreaking work paved the way to implementation of the cyclotron production method, its radiopharmaceutical validation, and, ultimately, the approval of cyclotron-produced technetium-99m for human use.

Anna's broad interests in the field of dosimetry resulted in a number of scientific papers and practical solutions for dosimetry problems. With her vast experience she became an internationally recognized expert. Within the scope of her international activity one notable contribution is MIRD Pamphlet No. 26: Joint EANM/MIRD Guidelines for Quantitative ^{177}Lu SPECT Applied for Dosimetry of Radiopharmaceutical Therapy. This document pointed out that the accuracy of absorbed dose calculations in personalized internal radionuclide therapy is directly related to the accuracy of the activity (or activity concentration) estimates obtained at each of the imaging time points. The guidelines outline data acquisition protocols and image reconstruction techniques recommended for quantitative lutetium-177 SPECT imaging in order to reach that accuracy.

Working in close proximity and cooperation with clinical departments, she focused her efforts on making the life of nuclear medicine physicians easier. That was the stimulus and background for the development of an internal dosimetry software package which provided an assortment of tools for every step in the dose calculation process, eliminating the need for manual data transfer between various programs. The software saved time and minimized user errors, while offering a versatile method of efficiently perform patient-specific internal dose calculations in a variety of clinical situations. This software package was developed by Anna and her MIRD group at UBC, Vancouver. Not everyone knows that it



XVI Polish Society of Nuclear Medicine Symposium, Szczecin 23–26 May, 2018, Dosimetry Workshop

was then licensed by UBC to the company ABX-CRO of Germany, which turned it into the commercially-offered dosimetry tool called QDOSE. Nowadays QDOSE constitutes an important support for nuclear medicine departments in their routine dosimetry assessments, for example in patients under peptide receptor radionuclide therapy.

It was Anna's dream to share her knowledge and experience with clinical teams worldwide, particularly in Poland. She gave lectures at the biannual meetings of the Polish Society of Nuclear Medicine and was involved in several projects with the Polish Nuclear Medicine departments. The last time she visited Poland

was on the occasion of the Dosimetry Workshop organized during the XVI Polish Society of Nuclear Medicine Symposium in Szczecin.

During this workshop, she taught us the basics of dosimetry. In our discussions the need arose for deeper insight into the optimization of radiation doses delivered within the mixed lutetium-177 and yttrium-90 therapy of neuroendocrine tumors. Notably, for that purpose the QDOSE software package could be utilized. Both the vision and the appropriate tools for its fulfillment – that is the legacy that Anna has left for us. She would be happy to see that we make good use of it, with a sincere smile on her face – that is how we will remember her.

Bożena Birkenfeld
Renata Mikołajczak