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Medical physics explained in 22 tales

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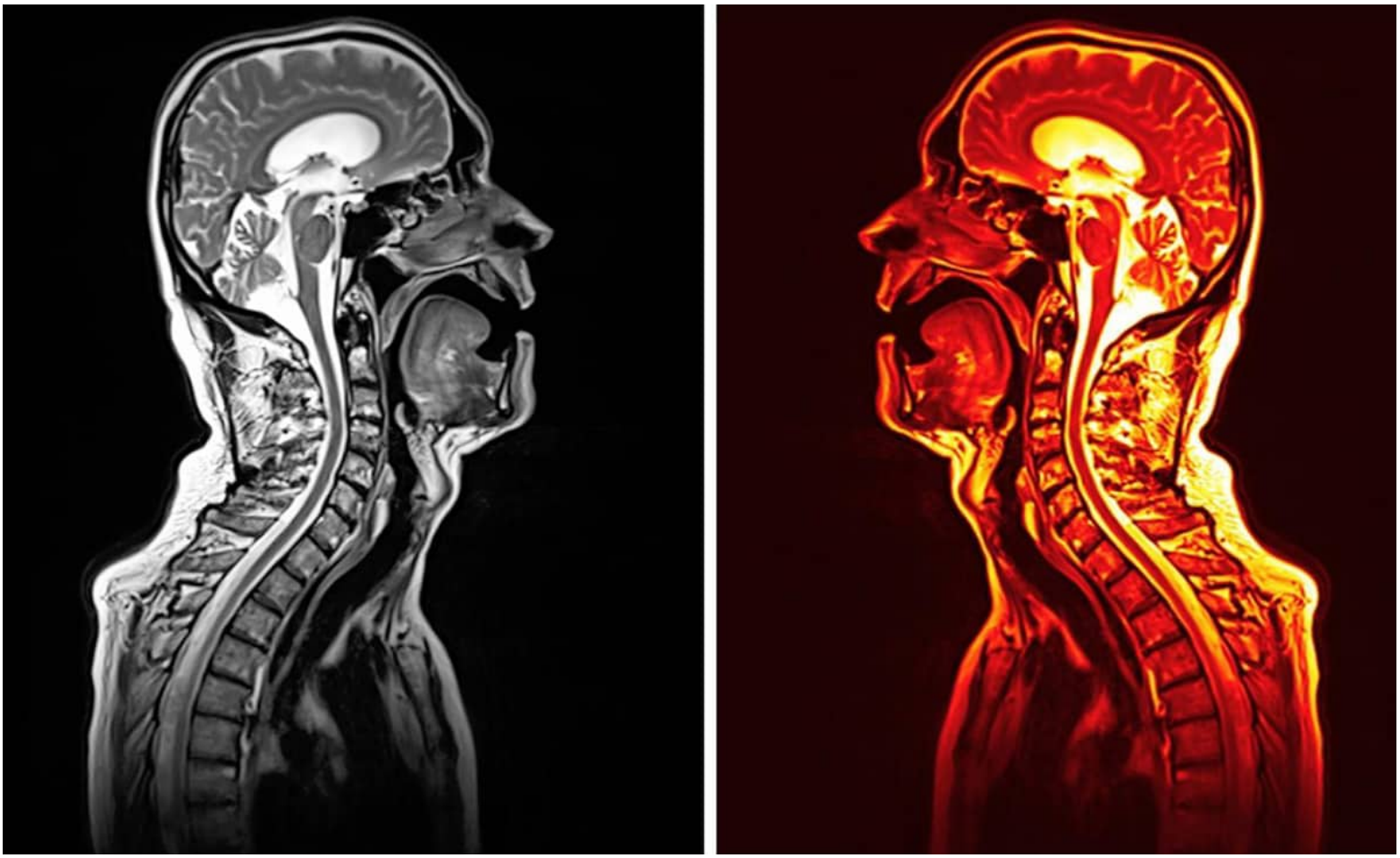
Tami Freeman reviews ***True Tales of Medical Physics: Insights into a Life-Saving Specialty*** **edited by Jacob Van Dyk**



Telling tales To create an image for the cover of the book, Jacob Van Dyk volunteered to undergo a 3T MRI scan. He notes that the two mirror images (generated using different MR settings) look like they are telling true tales to each other. (Reproduced with permission from Springer Nature, ©Jacob Van Dyk)

What is medical physics, and what exactly does a medical physicist do? Why have I never met one before? It was questions like these, endlessly repeated by the friends, families and even colleagues of medical physicists, that prompted the publication of *True Tales of Medical Physics: Insights into a Life-Saving Specialty.* Aiming to answer these questions in an easy-to-understand way, the book is a collection of real-life stories told by award-winning medical physicists. As noted by its editor, Jacob Van Dyk from Western University in Canada, "this is not a medical physics book; rather, it is a book about medical physics".

At first glance, you might feel as though reading a 600 page tome about medical physicists is a daunting task. But the good thing is, this is the perfect book to dip in and out of at will, as it is a collection of narratives. Taken as a whole, the text fulfils its remit of informing the reader exactly what is meant by medical physics. But the 22 individual "tales", each written by a high-profile medical physicist at the top of their field, also stand alone. These

personal stories from around the world, spanning different time periods and varied career pathways, were both informative and entertaining to read.

One chapter that particularly caught my eye was the "day in the life" story recounted by US physicist Arthur Boyer, which provided a glimpse into the wide breadth of roles he took on before retiring. The day in question began with Boyer planning a lecture for radiation oncology students on his drive to the San Antonio medical centre, where he worked as chief of physics, and ended with calibration checks of the centre's linear accelerator (linac).

In between, his activities included tasks such as preparing radiotherapy plans for patients; analysing radiation safety limits for a proposed new floor above a linac vault; and developing a computer program to model radiation dose distributions. Together, these activities span the three main tasks that many academic medical physicists perform, which Boyer cited as clinical service, teaching (both of new medical physicists and medical residents), and research into new instruments and software for diagnostic imaging and cancer treatment.

Many of the chapters also include a synopsis of the author's career, giving the reader a somewhat personalized overview of the history of medical physics. In telling their tales, the authors between them describe the emergence of many key technologies: the move from cobalt-60 machines to linacs for radiotherapy, for example, and the introduction of CT, MRI and ultrasonography – imaging techniques that are commonplace in hospitals today.

Their anecdotes also highlight the diverse range of ways in which the authors found their way into the field. Some were clearly always destined for a technology-based career – such as Marcel van Herk, who writes about his childhood obsession with taking apart and reassembling electronics, repairing old TVs, and designing and building devices from parts salvaged from his local flea market. By the time he finished high school, van Herk had built a working computer, and written all of the required software from scratch.

As a graduate student at the Netherlands Cancer Institute (NKI), van Herk developed the first compact electronic portal imaging device for image-guided radiotherapy (along with writing all of the accompanying software), a system that was later commercialized for clinical use. Among his other achievements, van Herk describes how he spent one Christmas holiday writing code to dramatically speed up cone-beam CT (CBCT) reconstruction. This led to the coding of a full clinical image-guidance system and positioned NKI as the first hospital to introduce CBCT-based radiotherapy guidance into the clinic.

Others followed a less obvious path, like Thomas "Rock" Mackie, who originally wanted to be a novelist. Mackie only embarked upon a degree after his father forged his signature and applied to the University of Saskatchewan for him. He took up the opportunity, drifting towards physics as a major. Mackie went on to invent helical tomotherapy, a novel radiotherapy delivery concept. He co-founded the company TomoTherapy (since acquired by Accuray) to commercialize the technique, and later established five other healthcare companies (three since his retirement in 2014).

Perhaps unsurprisingly, considering the historical nature of the book; but still rather disappointingly, only two of the 22 tales were written by women. Maryellen Giger described her role in helping to establish the fields of computer-aided detection and computer-aided diagnosis, explaining how her team launched a start-up company to commercialize the technologies.

Cari Borrás, meanwhile, recounted a rather alarming incident from 1989 when she provided medical assistance to a radiological emergency in El Salvador, which at the time was in the midst of a civil war. There had been an accident with an industrial irradiator that exposed staff to high doses of gamma rays. Her role was to ascertain the cause of the incident, establish accurate dosimetry to guide treatment of the irradiated workers, and assess the irradiator design to prevent similar accidents in future.

Reading through the various stories, I was intrigued to note how many of the tales overlapped and how so many people's paths crossed over the years. Perhaps considering the relatively small community – the International Organisation for Medical Physics currently represents more than 27,000 medical physicists worldwide – this is only to be expected.

Many of the authors described chance meetings – whether being rescued from a rainstorm by a vendor in a limousine, or running into a colleague at some unforgettable spot (Martin Yaffe cited examples ranging from the Antarctic Peninsula to the Great Wall of China to a steam-engine museum in Manchester) – that led to future collaborations and significant technology innovations.

As the titles of the book's six sections suggest, a medical physicist is perhaps more than history, more than clinical service, more than research, more than protection of the public, more than teaching and more than commercial developments. Hopefully, readers of this book will leave with a fuller grasp of what medical physics is – and perhaps even be inspired to look into it as a worthwhile career option for themselves.

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BACK TO TOP