

PREFACE

**Professor Ruth Duncan: A Pioneer in the Field of
Polymer Therapeutics**Ronit Satchi-Fainaro^a, María j. Vicent^b, Simon Richardson^c

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This special issue of the Journal of Drug Targeting marks the past, and the continuing contribution of Ruth Duncan to the field of drug delivery, more specifically the branch termed "Polymer Therapeutics". The three of us have witnessed, for more than 20 years, Ruth's never-ending enthusiasm and persistence in many different interdisciplinary arenas under this banner, and the immense scientific contribution to the field of drug delivery this vision (and tenacity) has generated. It has been a pleasure for us to edit this special issue, which pays tribute to her outstanding achievements within the context of the Journal of Drug Targeting- Lifetime Achievement Award for 2017.

With these few words, we wish to applaud Ruth's contribution, and briefly give some background to the seminal, interesting papers relating to polymer therapeutics and drug delivery contained herein. We would also like to send special thanks to all who have contributed, and to acknowledge that many of the authors are Ruth's collaborators (of different generations) and friends. To those new to the field of polymer therapeutics (a discipline pioneered by Ruth and her co-workers), you will read of new and exciting topics that illustrate the importance of research at the interface of polymer science, cell biology, computer modelling, metabolomics and drug delivery. These papers represent "drug targeting research" at its best, and illustrate the opportunities, ongoing debates and challenges in the field.

Contributors to this special issue include collaborators from the early work between Ruth, whilst at Keele University and **Blanka Rihova** from Prague (PK1 standing for Prague and Keele 1, denoting the collaboration) and **Paolo Ferruti** from the University of Milan. **Hiroshi Maeda**, who first described the enhanced permeability and retention (EPR) effect, a key feature of the patho-physiological rationale for the development of polymer therapeutics also contributed a review featured in this special issue. **Simon Richardson** and **Ronit Satchi-Fainaro** representing Ruth's lab students at the Center of Polymer Therapeutics in London (1994-2001), **Philipp Seib**, **María J. Vicent**, **Francesca Greco**, **Lorella Izzo** and **Elaine Ferguson** represent different generations of Ruth's period at Cardiff University (2001-2008) along with **Peter Griffiths** and **Alison Paul**, who were collaborators from Cardiff University and also have contributions herein. **Gianfranco Pasut**, who did his PhD with Ruth's long term collaborator and friend,

Francesco Veronese from Padova University, as well as **Steve Brocchini**, **Iola Duarte**, **Silvia Muro** and **Helena Florindo** representing four of the many PIs mentored and supported by Ruth during the journey towards their current well-established research positions. Many of us meet regularly every two years at the International Symposium on Polymer Therapeutics thanks to Ruth, who initiated and established this conference series.

Personal Reflections

Although we (Ronit and Simon) first came to know Ruth after she returned from industry, whilst tenured at the School of Pharmacy, University of London, or after moving to Cardiff University (María), we realized at a very early stage the special view Ruth had of the Polymer Therapeutics field, a term she coined whilst establishing one of the most successful polymeric nanomedicine laboratories in the world. Her academic background originating in cell biology and gravitated towards polymer chemistry and drug delivery, her deep understanding at the bench, and her ability to develop these ideas to a point where they are ready for trial at the bedside, complemented each very well over the last decades. This, along with her involvement with the regulatory agencies made her a researcher always seeking the patients' benefit.

Starting from the studies of Ringsdorf and also De Duve, Ruth managed not only to transfer the first polymer-drug conjugates (*N*-(2-hydroxypropylmethacrylamide) (HPMA) copolymer-doxorubicin conjugates) into the clinic, collaborating with the Institute of Macromolecular Chemistry in Prague (Jindrich and Pavla Kopecek, Karel Ulbrich and **Blanka Rihova**—see papers in this volume), but also to establish new, innovative and very diverse concepts in the field. These concepts opened up many strategies and opportunities to tackle some of the field's major challenges, including topics like gene therapy and robust nanomedicines' physico-chemical characterization, suitable for transfer to the clinic. Drawing upon Ruth's roots in cell biology, a very interesting avenue of research opened in collaboration with Paolo Ferruti in Milan using linear polyamidoamine polymers. These were used to burst specific intracellular membranes and were recognized by Ruth as a means to facilitate the intracellular delivery of proteins and nucleic acids. This research was initiated at Keele and continued in both London and Cardiff. Understanding the integral mechanisms of polyamidoamine activity also highlighted another underlying theme central to Ruth's work, correlating structure with functional activity, a theme which can be seen throughout her work with Francesco Veronese (PEG-Doxorubicin) and **Peter Griffiths** (see papers in this volume) using Small Angle Neutron Scattering (SANS) to define polymer solution properties.

In addition to the well-established and respected scientists already mentioned, special attention is owed to some of the people who joined Ruth and supported her from the beginning. Most notable are Professor Helmut Ringsdorf and Professor Tom Connors, both visiting Professors in Ruth's Lab (CPT) and frequent visitors and advisors during Ronit's and Simon's time as Ruth's PhD students. Unfortunately, Maria did not have the chance to meet Tom Connors but still benefited from the endless enthusiasm and deep knowledge of Helmut who taught us all that life and science are way too complicated to

be taken seriously. Further, we would like to highlight Ruth's continuous support for young people, not only us as part of her own CPT family, but also talented, enthusiastic young scientists now well-established in their independent careers.

Her strong support for researchers in second and third world countries, such as South Africa and Malaysia, in order to promote good science as well as present their clinical needs to the rest of the world merits great commendation. Ruth's enthusiasm and willingness to promote not only good science but a patient-centric approach to medicine has been emphasized in her thoughtful, critical, and determined approach to teaching and mentoring interdisciplinary scientists and scientific ambassadors worldwide.

We left Ruth's lab to establish our own independent careers, now in Israel, USA, UK and Spain with Ruth's unfailing support throughout, promoting our research in her invited and plenary lectures across the globe. Also, several generations of our PhD students and postdocs at Tel Aviv, Greenwich or Valencia have benefited from her continued advice and mentorship during her Visiting Professorships.

In conclusion, we cannot think of a more worthy recipient of the Journal of Drug Targeting's Lifetime Achievement Award. Over the last four decades, Prof. Ruth Duncan has, more than any other, continued to inspire and promote multidisciplinary research in drug delivery at the interface of polymer chemistry, biology, industry and the clinic. Her approach, therapeutics and pioneering strategies are well known worldwide. They also continue to be the inspiration for a large number of researchers with very different backgrounds, and focus on the same final goal of trying to benefit and fulfill patient needs.