

## **Christopher Redman, MB, BChir, FRCP, FRCOG (ad eundum)**

It is with great sadness that we learned about the passing away of a unique clinician-scientist, mentor, collaborator and friend, Chris (Christopher) Redman (31st Nov 1941-13th Aug 2024). Chris was born in South Africa, and moved to Cambridge with his family after World War 2. He studied Medicine at the University of Cambridge and undertook clinical training in Oxford as well as at Johns Hopkins University in Baltimore, Maryland. After a medical internship at the Radcliffe Infirmary in Oxford, he became a surgical intern in the Department of Pediatrics at Children's Hospital in Sheffield. In 1970, he joined Oxford's Regius Department of Medicine and subsequently moved as a University Lecturer and Consultant in Obstetric Medicine to the Nuffield Department of Obstetrics and Gynaecology in 1976. In addition to his research interests, he created the Silver Star Unit, a High Risk Pregnancy Service in the Women's Centre at the John Radcliffe Hospital in Oxford. He became the world's first holder of a Chair of Obstetric Medicine in 1992, when he was appointed as Clinical Professor at the University of Oxford.



Chris' research field was in Obstetric Medicine beginning in 1970 with a randomized clinical trial on the efficacy of methyldopa for moderate hypertension in pregnancy. He demonstrated a reduction in fetal loss in the active treatment group, which was not associated with a reduction in preeclampsia rates. Importantly, he showed that the hypotensive treatment had no effect on fetal growth in utero,<sup>1</sup> and thereby that methyldopa was safe to use for the treatment of hypertension in pregnancy in the context of close medical and obstetric supervision. He later published the highly reassuring data that the treatment had no negative effect on long-term offspring development.<sup>2,3</sup> This was the first of many research studies that gained Chris international recognition as a leader in our understanding of preeclampsia pathogenesis, detection, prevention and treatment. He pioneered the concept of the role of a systemic inflammatory response both in normal pregnancy and the clinical stages of preeclampsia. His Oxford team's identification of extracellular vesicle (EV) release by the syncytiotrophoblast (STB), their use as "liquid biopsies" of placental health in normal and preeclamptic pregnancies, and their role in linking placental and maternal cardiovascular function and health, has been the result of impressive laboratory and intellectual work.<sup>4,5</sup> Over the last decade, his novel proposal of syncytiotrophoblast stress as a convergence point for multiple pathways has also helped to link placental capacity/dysfunction to a broader spectrum of obstetric syndromes.<sup>6,7</sup> Chris Redman's pioneering research has provided many giant steps forward in understanding the spectrum of hypertensive disorders of pregnancy, including the differing pathophysiology of early-and late-onset preeclampsia.<sup>8</sup>

Chris' other main research achievement derived from his pioneering developments of computerized analyses of electronic fetal heart rate recordings. Together with the late Professor Geoffrey Dawes he developed a successful clinical system for antepartum records, that has been marketed since 1991 (Dawes-Redman system) and is the standard of care for antepartum fetal assessment in the UK and in use in 130 countries worldwide. Chris became the Clinical Director of the Oxford Centre for Fetal Monitoring Technologies, where he also worked towards developing a comparable system for use in labor, based on a unique archive

assembled by himself in Oxford since 1992. This archive provided the basis for ongoing improvements in the Dawes-Redman algorithm.

Chris received many well-deserved distinctions and recognition of his work. He received the Barnes Award of the International Society of Obstetric Medicine in 2002 and became a Fellow ad eundem of the Royal College of Obstetricians and Gynaecologists in UK. He was a recipient of the Chesley Award of the International Society for the Study of Hypertension in Pregnancy (ISSHP) in 2000 and served as President of the ISSHP from 2006 to 2008. He was also awarded a lifetime achievement award by the Preeclampsia Foundation. Chris was an important contributor to numerous IFPA meetings, where he gave superb presentations on the role of placenta in hypertensive disorders of pregnancy. He received the Senior Award from IFPA in 2013, and his Award lecture talk was published in *Placenta* in 2014.<sup>9</sup> He also contributed through collaboration and mentoring to another IFPA award presented the same year, the IFPA Award in Placentology.<sup>10</sup>

Chris' work has been summarized previously in the ISSHP Journal in 2011,<sup>11</sup> while his academic impact and achievements were more extensively presented in 2019 by the editor of the American Journal of Obstetrics and Gynecology Roberto Romero. As befits his extraordinary scientific achievements, Chris was recognized as a "Giant in Obstetrics and Gynecology" by the American Journal of Obstetrics & Gynecology "for his many contributions to the understanding of preeclampsia, placental physiology, and pathophysiology of pregnancy, and for his work in antepartum fetal heart rate monitoring".<sup>12</sup>

At the time of his death, he was still formally affiliated to the Nuffield Department of Women's and Reproductive Health, University of Oxford as an emeritus professor of Obstetric Medicine. He was also the Clinical Director of Oxford Centre for Fetal Monitoring Technologies and Honorary Research Fellow at Lady Margaret Hall. His collaborators over his years in Oxford were many. His long-lasting collaboration with Ian Sargent, which also included the collaboration with Elizabeth Linton, Dionne Tanetta, Marian Knight, Alex Smarason and Gavin Sacks, had been a pillar in his basic research work on syncytiotrophoblast vesicles and inflammation research. Manu Vatish succeeded Chris as the head of their research group, at Chris' retirement, and was essential for the continuation and further development of the research direction created by Chris.

Jim Roberts from Pittsburgh, US, was among Chris' many international collaborators, and Chris cherished highly a long-lasting friendship and scientific collaboration with him. Together with Susan Fisher from San Francisco, Jim and Chris created a highly creative and social meeting, named "Tox Talx" that was organized every second year in Mill Valley, California. Those of us who were lucky to be invited to this magnificent retreat, where all invited had to deliver a talk, saw this as our premier scientific meeting. At Tox Talx we could combine preeclampsia research discussions in friendly surroundings with lots of social activities, good food and drinks (and mountain hiking, for Chris and others).

Another important scientific and collaborative footprint left by Chris, was his co-creation of the Global Pregnancy Collaboration (CoLab) together with his good friends Jim Roberts and Les Myatt. The goals of CoLab includes improving the health of women and their infants worldwide by facilitating research addressing adverse pregnancy outcomes. Chris used a lot of his time after retirement, supported by Jim and Les and other CoLab volunteers, to build data repository systems (also linked to biological sample repositories) such as the COLLECT

database<sup>13</sup> to facilitate such collaborations and positive health developments. He contributed to numerous papers and collaborations through his engagement in CoLab.<sup>14-18</sup> The cheerful annual CoLab meetings in Oxford are still ongoing, providing a collaborative research hub that benefited many established as well as less established researchers in the preeclampsia and the reproductive pathophysiology research field. Chris was known to bike through Oxford to the CoLab meeting at a college location he had selected, efficiently transporting several boxes of good wine from his favorite wine store. We all loved the good conversations after the formal sessions, in a meeting room known as the “Box”.

Chris Redman’s achievements were not restricted to academic and clinical impact. His heart was very much with his patients and their families, and his work was dedicated to making a difference in the survival and wellbeing of preeclampsia sufferers. In 1991, together with the preeclampsia survivor and patient advocate Isabel Walker, he co-founded the very successful UK patient advocacy organization, Action on Pre-Eclampsia (APEC). He made numerous layman presentations and together with Isabel Walker published comprehensive patient guides, both in 1992 (Pre-eclampsia, the facts) and in 2017 (Understanding Pre-Eclampsia). His patient advocacy efforts were not restricted to the UK. His support of the American Preeclampsia Foundation and other international preeclampsia organizations (like the Indonesian ISSHP) are acknowledged world-wide. Chris became a role model on how to synergize patient and medical knowledge to optimize health outcomes, long before patient perspectives were considered in medicine.

For the many of us who had the privilege of being his collaborators and friends during his long career, the loss of Chris extends beyond his academic achievements. The numerous and spontaneous responses to the news of his sudden death portrays the person that Chris was in life: gracious, humorous, adventurous, and not least a unique mentor. He had an open mind that cherished new research ideas and new mindsets, and he met new people at research settings across the world with utmost respect, whatever education, profession, cultural background, religion, age, gender or ethnicity. Despite his linguistic superiority in choosing correct words and developing text and academic papers, he was never arrogant. In contrast, he often emphasized that he only knew one language (English), in contrast to most of the people he met in research. Those of us who have had the great opportunity and fortune of being mentored by Chris and also collaborating with him on developing papers, are forever grateful for his never-ending efforts in discussing and improving research ideas and research texts. He was an informal mentor for many young researchers across the globe, and we are now all the poorer for having lost his willingness to listen and discuss new ideas on how to improve our understanding of major obstetric syndromes that affect women and their families world-wide. In addition, he was a good friend to many of us, with many pleasant discussions far outside research topics. His interest in reading and culture provided inspiration. Chris also loved good food and drink, not being afraid of trying new food on his many travels abroad. His adventurous side included proposing and agreeing to any mountain, forest or seaside hike across the world that could in some way be used as a pre-meeting opportunity for a research congress. Over the last two decades this included several US walks (Yosemite, Death Valley, Bryce Canyon, Zion National Park, Yellowstone, Smoky Mountains National Park, Muir Woods National Park), but also hikes in Chile (Patagonia), Australia (Stradbroke Island), Reunion (sunrise at 4 am at 3,500 meters above sea level is an impressive achievement for any person in their mid 70-ies) and Norway. Chris had been an eager long-distance runner in his younger years, and had participated in many marathons. This investment in his own health

likely contributed to him being able to participate in and enjoy strenuous hikes later in life. He remained hiking active even in his late 70ies, together with his Norwegian collaboration team at Oslo University Hospital, who also shared his passion for combining adventurous travels, discussions, research meetings and hikes. Chris' formal and informal supervision roles benefited several PhD and post doc projects in our Oslo University research group in obstetrics, and we are forever grateful for his generous willingness to share his time and ideas with us.

In Oxford, Chris was well known and recognized for his contributions to clinical care and research. In his retirement, he continued to be fiercely interested in research and became the paragon of mentorship, choosing to join lab meetings and presentations where his unerring knowledge of preeclampsia at both clinical and scientific levels allowed him to be a valuable resource for students and colleagues alike. He found the use of online digital meeting platforms during COVID very useful and indeed commented frequently that he saw more of the team using this platform than cycling into the laboratory. He particularly liked "dropping in" to meetings where he would offer sage advice – his most common online phrase being "Are you free? I have had an idea". He was patient, self-effacing, and scrupulous about the way publications were written, and talks presented. He would often recount how the first paper he had written had been returned to him with a comment from the editor that it was the worst written paper he had read. Chris had clearly resolved that no further papers would ever suffer this ignominy, and he would be ruthless with his red pen, often re-writing large sections of papers into a format he saw as being clearer and more informative. Similarly, talks would be honed and improved, and he would not care how much time he spent doing this. As a researcher, working with Chris and Ian Sargent was an amazing environment; rigorous science, good humor and openness to new concepts and ideas were the bywords by which the group ran. In the last few years, he became involved in a Dawes-Redman education platform and would regularly join training sessions where clinical staff would be delighted to speak to the inventor of the system. The privilege of working with him has made a huge impact on Chris' research team in Oxford and his approach to research defines the ongoing work that continues to expand Chris' discoveries. His presence will be highly missed.

Chris Redman's greatest pride in life was without doubt his own large family. He was so proud of his 5 children and the many grandchildren he had together with his much loved and supportive wife, Corinna. He had invented a special game of cards, which none of us outside the family ever got to master, nor really comprehend, at any sufficient level. This was a very rapid card game that was fiercely played at the many family gatherings of Chris' large family, and that demanded extreme passion and a smart brain. For many years Chris and Corinna organized an annual retreat with their five children and 13 grandchildren to spend a summer week together in England, most recently in Shropshire. Chris' tales about large family dinners and these friendly, but tough card games and sport activities, illustrated how much his family meant to him. He said that settling down and staying in Oxford to stabilize the family life had been an important career choice for him and Corinna. Our deepest condolences go to Corinna and the extended family, for the loss of a unique and much-loved person.

We outside the family are all very grateful for having had the opportunity to share some of Chris' time and for having him at some time point in our lives. We will all deeply miss his unique and bright mind and his role as a motivator, mentor, collaborator, scientist, and not least a great friend.

Annetine (Anne Cathrine) Staff: MD, PhD, Professor in Obstetrics and Medicine, Head of Research, University of Oslo and Oslo University Hospital, Norway.

Manu Vatish: MD, DPhil, FRCOG, Professor of Obstetrics and Consultant Obstetrician, University of Oxford and the John Radcliffe Hospital Oxford, UK.

Jim Roberts, MD, Professor, University of Pittsburgh and Magee Women's Research Institute and Foundation, USA.

Leslie Myatt, PhD; FRCOG, Professor of Obstetrics and Gynecology, Oregon Health & Science University, USA.

### Reference List

1. Redman CW. Fetal outcome in trial of antihypertensive treatment in pregnancy. *Lancet* 1976; **2**(7989): 753-6.
2. Ounsted MK, Moar VA, Good FJ, Redman CW. Hypertension during pregnancy with and without specific treatment; the development of the children at the age of four years. *Br J Obstet Gynaecol* 1980; **87**(1): 19-24.
3. Ounsted M, Moar V, Redman CW. Infant growth and development following treatment of maternal hypertension. *Lancet* 1980; **1**(8170): 705.
4. Tannetta D, Collett G, Vatish M, Redman C, Sargent I. Syncytiotrophoblast extracellular vesicles - Circulating biopsies reflecting placental health. *Placenta* 2017; **52**: 134-8.
5. Tannetta D, Masliukaite I, Vatish M, Redman C, Sargent I. Update of syncytiotrophoblast derived extracellular vesicles in normal pregnancy and preeclampsia. *J Reprod Immunol* 2017; **119**: 98-106.
6. Redman CWG, Staff AC, Roberts JM. Syncytiotrophoblast stress in preeclampsia: the convergence point for multiple pathways. *Am J Obstet Gynecol* 2022; **226**(2s): S907-s27.
7. Redman CW, Staff AC. Preeclampsia, biomarkers, syncytiotrophoblast stress, and placental capacity. *Am J Obstet Gynecol* 2015; **213**(4 Suppl): S9-4.
8. Staff AC, Redman C. The Differences Between Early- and Late-Onset Preeclampsia. In: Saito S, ed. *Preeclampsia*. Singapore: Springer; 2018: 157-72.
9. Redman CW, Sargent IL, Staff AC. IFPA Senior Award Lecture: Making sense of pre-eclampsia - Two placental causes of preeclampsia? *Placenta* 2014; **35 Suppl**: S20-S5.
10. Staff AC, Redman CW. IFPA Award in Placentology Lecture: preeclampsia, the decidual battleground and future maternal cardiovascular disease. *Placenta* 2014; **35 Suppl**: S26-S31.
11. Lyall F, Sargent I. Editorial. *Pregnancy Hypertens* 2011; **1**(1): 1.
12. Romero R. Giants in Obstetrics and Gynecology Series: a profile of Christopher Redman, MB, BChir, MRCP, FRCP. *Am J Obstet Gynecol* 2019; **220**(5): 420-7.e1.
13. Myatt L, Roberts JM, Redman CWG. Availability of COLLECT, a database for pregnancy and placental research studies worldwide. *Placenta* 2017; **57**: 223-4.
14. Burton GJ, Sebire NJ, Myatt L, et al. Optimising sample collection for placental research. *Placenta* 2014; **35**(1): 9-22.
15. Myatt L, Redman CW, Staff AC, et al. Strategy for standardization of preeclampsia research study design. *Hypertension* 2014; **63**(6): 1293-301.
16. Burke O, Benton S, Szafranski P, et al. Extending the scope of pooled analyses of individual patient biomarker data from heterogeneous laboratory platforms and cohorts using merging algorithms. *Pregnancy Hypertens* 2016; **6**(1): 53-9.

17. Roberts JM, Mascalzoni D, Ness RB, Poston L. Collaboration to Understand Complex Diseases: Preeclampsia and Adverse Pregnancy Outcomes. *Hypertension* 2016; **67**(4): 681-7.
18. Staff AC, Redman CW, Williams D, et al. Pregnancy and Long-Term Maternal Cardiovascular Health: Progress Through Harmonization of Research Cohorts and Biobanks. *Hypertension* 2016; **67**(2): 251-60.