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PERSONAL STORIES FROM EMINENT PHYSICIAN SCIENTISTS

We are currently at the most exciting time ever in medical research and we are fortunate to have some of the leading medical scientists in the world working in our region. Their stories, encompassing some of the things that prompted them to a life of discovery, are inspirational. The Journal will publish an occasional series of invited articles in this area in the hope that it will stimulate some of our younger colleagues to outstanding research achievements.

E. Byrne

One journey, many pathways

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BIOGRAPHICAL NOTE

Professor Fiona Stanley

Professor Stanley qualified in Medicine at the University of Western Australia and then completed further training in epidemiology and biostatistics and public health. She is the founding director of the Telethon Institute for Child Health Research (ICHR) and Variety Club Professor of the Department of Pediatrics at the University of Western Australia. The ICHR is multidisciplinary, and research is focused on prevention of major childhood illnesses. Professor Stanley has made a number of major contributions to the field, including the introduction of folate for the prevention of spina bifida and important contributions in preventative medicine in the maternal and child health areas in Aboriginal communities. Current major research interests include understanding the causes and achieving prevention of birth defects and major neurological disorders (including cerebral palsies) and developing strategies to enhance health and well-being in populations. Professor Stanley was made a Companion of the Order of Australia in 1996.

I had the very good fortune that, from an early age, I was exposed to science and shown how it could be used to improve health in populations. My father, Neville Stanley, was a virologist who worked closely with Albert Sabin and Jonas Salk in the quest to find a vaccine for polio. Like all children of the 1940s and 1950s, I grew up in the shadow of the polio epidemics, terrified of contracting the disease. Imagine how inspiring it was to be surrounded by great minds and champions of one of the world's most successful campaigns against disease.

At the age of eight I dreamt of saving the world! In my dreams I would sail out to all the undiscovered islands (we had a wooden boat moored in Sydney Harbour) and inoculate the inhabitants in a whirlwind race to conquer disease and pestilence. I was Marie Curie and Albert Schweitzer rolled into one. Buoyed by the successes of these people, it seemed there was no disease or condition beyond the reach of modern science. I was convinced throughout my teens that the intelligent application of scientific discoveries held the answer to all the world's ills.

A few years later, these dreams and illusions came crashing down around me. In 1969 I completed my medical degree and became involved in an Aboriginal clinic run from Perth's Children's Hospital. I was horrified and frustrated by the way Aboriginal children were brought into hospital suffering devastating health problems and then sent back to live in the very same conditions that had caused the health problems in the first place. We would bring these very sick Aboriginal children into hospital, perform expensive medical 'miracles' (often represented as such in the media) and then dump them back into the environment that had caused their problems.

The case of one little boy stands out in particular. He was admitted several times to Princess Margaret Hospital for Children in Perth – always extremely sick, dehydrated and thin from a combination of gastroenteritis and pneumonia. Each time, we would perform medical 'miracles' on him. He would be discharged back to his Western Desert camp, only to come in again. On his last admission he died. I thought to myself that there had to be a better way to practise medicine by finding out the causes of diseases and trying to prevent them.

I could not deny the realization that clinical medicine was failing most children. It was not providing answers to the problems experienced by the children and families I treated, and for all I knew may have done harm in the long term. This was a very low point in my life. I had no idea what I could do to reverse any of the adverse trends I had observed. I didn't know what my contribution was going to be in terms of medicine. I became quite depressed.

In 1972 I decided it was time for a complete break and I went overseas for an extended backpacking trek through much of the Northern Hemisphere. My life was changed by a chance sighting of an advertisement in a scientific journal, seeking people interested in a career in social medicine. The advertisement leapt off the page and seized my imagination. I knew this was the path I had been seeking. I literally fell into this incredible environment seething with ideas, innovation and inspiration. The Social Medicine Unit at the London School of Hygiene and Tropical Medicine, run by Jerry Morris, was the world's foremost centre for epidemiology. Jerry Morris was the father of modern epidemiology and social medicine (prevention) in the UK. He was a most outstanding intellect, who gathered around him a group of giants in the field – many of whom are now 'household' names. They taught us epidemiology, biostatistics, health economics and a host of other exciting disciplines of the new era. I will never be able adequately to express the extent to which the colleagues and close friends I encountered there – Geoffrey Rose, Peter Armitage, David Clayton, Eva Alberman and Iain Chalmers – helped me to forge a hopeful and realistic holistic vision of social medicine and its potential to improve health and prevent disease.

These invaluable experiences and training were consolidated by a year in the USA at the National Institute for Health (NIH) in 1976, which offered further opportunities to explore the exciting 'new world' of epidemiology. At NIH I received absolutely first-class training and was privileged to be exposed to the best minds in the business. I worked with great epidemiological thinkers such as Mervyn Susser, Zena Stein, Newton Morton, Milton Terris, Sam Shapiro, Jerry Stammler, Henry Blackburn, Janet Hardy and Karin Nelson.

When I returned to Perth in 1977, I was able to apply this first-class training in epidemiology and tackle children's health problems in Western Australia. My experience overseas gave me the theoretical and practical tools to pursue my deep commitment to improving outcomes in maternal and child health in both national and international contexts. I realized that improved outcomes could only be achieved and measured through effective collection and use of population health data. I decided to focus on investigating the causes of low birthweight, birth defects, neurological disorders and to improve Aboriginal maternal and child health. We established population databases to find out how preterm births, birth defects and social factors were related to the patterns of disease occurrence.

That year – with the help of brilliant co-workers, such as Carol Bower, and a wonderfully enthusiastic team – I established the Maternal and Child Health Research population database (MCHDB), with the aim of studying the causes of birth defects, neurological disorders and low birthweight, and investigating how easily environment could influence later childhood problems. This unique, cutting-edge database is only one of very few in the world. It enabled us to contribute to the important discovery – the connection between folic acid and spina bifida – by collecting data on all cases and controls in Western Australia.

In 1994, following international results, we set up the folic acid programme in Western Australia. Women were urged to eat a diet rich in folic acid, and breakfast cereals were supplemented with this vitamin. By 1997, just 3 years after the programme was set up in Western Australia, the rate of spina bifida had fallen by one-third. More recently, as a result of this research, most breakfast cereals in Australia have been supplemented with this vitamin as part of a federal government initiative. The consequences of these interventions have been terrific and have been achieved within a relatively short time frame – from knowing nothing about the causes of a major birth defect to reducing its incidence, all within less than 2 decades. Apart from the physical and emotional distress for families, the actual economic costs saved have been enormous – to the order of $A1 million health dollars per child saved by avoiding spina bifida.

Using our population databases and registers, we identified preterm birth and low birthweight, perinatal brain damage and birth defects as the major burdens in maternal and child health in the early 1980s. They were of such obvious importance that they guided our aetiological research over the next 10 years.

We were able to make exciting contributions to the international body of knowledge surrounding the causes and prevention of cerebral palsy. Cerebral palsy is the most common childhood disability and affects approximately 2.5 in every thousand babies

born each year in Australia. Conventional thinking had ascribed the disorder to lack of oxygen to the baby's brain during labour, but our team found that the proportion of babies suffering the disorder had remained unchanged, despite advances in obstetric care. Although asphyxiation during labour accounts for some cases (probably less than 5%), our team's research opened up new areas of investigation by suggesting that events early in pregnancy (such as infections, placental problems or blood incompatibilities) disrupt the normal development of the brain.

Ever since my initial experiences running the Aboriginal Children's Clinic I have always maintained a very deep commitment to improving the maternal and child health of Western Australia's Aboriginal population. In 1992 I had the privilege of launching the Ngunytju Tjitji Pirni, a pilot research project providing enhanced care for Aboriginal women and their children in the Eastern Goldfields of Western Australia. This project employs Aboriginal health workers to provide care and collect data on the social and medical conditions of the women and children. The initiative was the first of its kind in Australia. It has been successful and is now embedded in public health policy and practice in Western Australia. It joins other exciting ventures – such as the Strong Women, Strong Babies Strong Culture Project in the Northern Territory, which has recently been implemented and evaluated positively. Now, 10 years down the track, we have a wealth of cutting-edge indigenous maternal and child health research being undertaken at the Institute for Child Health Research (ICHR) under the auspices of the Kulunga Network – an initiative set up to ensure that the ICHR's research activities in this area are of high quality and are culturally appropriate. There is still a huge amount to do.

After these initial successes I still found myself frustrated with the inability of population science to deal effectively with childhood diseases on its own. There was something that the population and medical sciences were missing. To me there was something inherently paradoxical in the way science pursued miracle high-tech cures for complex diseases while often neglecting a broader description of the problem (which could open up more, and possibly better, cheaper ways of preventing or coping with the problem).

For me the answer lay in elucidating causal pathways and identifying points of early intervention, and using this to inform effective preventative approaches. Thinking in pathways opens up the complex and numerous causal possibilities and identifies earlier (distal) rather than later (proximal) risk factors which may result in more effective and cheaper preventive strategies. The closer you are to the outcome, the less likely are you to be able to successfully prevent the problem because you are more likely to already have it!

Thus, by the middle of the 1980s, I had become increasingly dissatisfied, this time with epidemiology. My sense was then that epidemiology was unable by itself to solve the true causal pathways to the complex diseases that challenged us in health and medical research. The complex interactions of genetic risk, the intrauterine environment and the external environment with physical, biological and social factors demanded more sophisticated research thinking and a more multidisciplinary research environment. The risk-factor paradigm did not seem the best approach, particularly in seeking information to underpin population interventions to improve child health. It was out of this sense of complexity that the idea of the ICHR was born. The ICHR was established to be a place where molecular biologists, cell biologists, clinical scientists, psychosocial researchers, epidemiologists and biostatisticians would all work together to:

1 Describe the burden of disease.
2 Elucidate true complex causal pathways.
3 Use data and research to encourage and evaluate evidence-based public health and clinical practice.

The ultimate aim of the ICHR was to make a difference – to influence the public health and to translate research into action.

Since its inception, the ICHR has gone from strength to strength. It combines the three major disciplines of medical research: (i) basic laboratory science, (ii) clinical science and (iii) epidemiology. We have been very fortunate to attract world leaders in such fields as: (i) asthma and allergy, (ii) infectious disease, (iii) birth defects, (iv) childhood death and disability, (v) Aboriginal maternal and child health, (vi) leukaemia and other cancers and (vii) adolescent mental health. In 2000, the move to our new purpose-built building symbolized our 'coming of age' as an institute of national and international standing. In 2001, our 5-year International Scientific Review confirmed that our efforts to firmly place child health as a priority on the national agenda and to translate research into action have been judged as successful.

Where to from here? . . . Future success will come from the bringing together of social, environmental and genetic epidemiologists with molecular and developmental biologists – a new era of health and medical research indeed.