



THE **STORIES**

04

FAIRFAX SYNDICATION



Ian Frazer

Development Of The
HPV Cervical Cancer Vaccine

Power Of Conferences

It was 1982 and clinical immunologist Ian Frazer was presenting at a conference on genital warts when a colleague, Dr Gabrielle Medley, came up to him and said “you know, you should be looking for cancers caused by these viruses as well”. Gabrielle made this suggestion because around this time Professor Harald zur Hausen in Germany had for the first time hypothesised that the human papillomavirus (HPV) might be responsible for cervical cancer.

“So that was where I got interested in the human papillomavirus and Gabrielle and I together defined that the rectal dysplasia in immune suppressed men was in fact papillomavirus related ... and it was the first major impact I had on the field.”

That same year, another significant research collaboration was initiated at a gastroenterology conference, where Ian Frazer delivered a conference paper on his work on autoimmune liver disease. Later that day, he met Hans Meyer zum Buschenfelde who was also researching liver disease; the two struck up a friendship.

Having established a common interest in their research, he visited Professor zum Buschenfelde in 1984 at the German Council Research Institute (DKFZ). It was during this visit that he was introduced to Harald zur Hausen who was at the time head of the DKFZ. It was Hausen’s early theories about the links between HPV and cancer that Gabrielle Medley had suggested he look into, so Frazer was thrilled to now speak face-to-face with the man he still refers to as “the father of research in HPV-associated cancer”.

Over afternoon tea Ian Frazer and Harald zur Hausen shared their research interests, Hausen listening intently to what Frazer had to say about his rectal dysplasia studies, and Frazer becoming excited with the work Hausen was doing in relation to cervical cancer. It was then that Frazer became excited about the links between the body’s defences against human papillomavirus and cervical cancer.

The inspiration, knowledge and motivation that came from that meeting gave both men a deeper understanding of the complexities and potential impacts of the virus, and propelled their respective areas of research

forward. They collaborated regularly from then on – almost certainly bringing Frazer years closer to development of the HPV cervical cancer vaccine for which he is now famous.

When Frazer moved to Royal Brisbane Hospital as a clinical immunologist and University of Queensland Senior Lecturer in 1985, he continued to focus on this area, looking for ways our immune system could be managed or strengthened to resist this life-threatening virus.

So, for Professor Frazer, serendipitous meetings at conferences led to “real connections” that contributed to his development of the HPV vaccine some 20 years later. It is legacies such as this which have prompted Professor Frazer, 2006 Australian of the Year and a Companion in the Order of Australia, to stress the vital role that conferences play, particularly for younger researchers who need direct access to the latest developments in their fields and who need to establish important contacts and networks.

In fact, Professor Frazer would rate the importance of conferences in helping doctoral students and post-doctoral researchers get up to speed quickly and meet the right people as “...a 10 out of 10 and a mandatory part of the process”. In terms of his own development, Frazer is convinced conferences have been integral to his career.

“I think they’ve been critically important (for me) – I mean, I would give them a 9 or 10 out of 10 for the process of getting me to where I am now.”

It seems reasonable to assume that the link between Frazer, zum Buschenfelde, zur Hausen and the vaccine emerged as a direct result of the 1982 gastroenterology conference. Had that conference not taken place, the discovery of the vaccine, which has saved millions of women from HPV-related cancer since becoming widely available, would have been significantly delayed. It is also reasonable then to include those lives and the billions of dollars in medical treatment saved as measurable outcomes of that conference.

In 1981, Frazer, a Scottish-born renal physician, moved to Australia to work at the Walter and Eliza Hall Institute of Medical Research in Melbourne. From the beginning, he attended conferences on a regular basis to make

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contacts with people who had ideas he could incorporate into his own research and who had access to technologies that might be useful to the work he was doing.

“I was always looking for new ways of doing things and by actually talking to people who were doing the new ways of doing things that you didn’t have access to then you learnt how to do them and if you didn’t, then you learnt who could do them for you.”

In the early 80s, for example, Frazer had read about ground-breaking work that was being done overseas in gene cloning, but no-one in Australia was using such technologies to work on papillomavirus. It wasn’t until he attended a papillomavirus conference in 1986 in the United States where someone presented that they had cloned a relevant human gene in an expression vector (a cell) that he realised the significant impact such technology could have upon his own work.

And whilst these new ideas, new technologies and new approaches gleaned from conference experiences have profoundly influenced the direction his career has taken, by Frazer’s own admission, it was the contacts, relationships and networks he made at those conferences that have proven the greatest legacy.

At the 1986 HPV conference in Georgetown, USA, for example, Frazer met fellow immunologist Margaret Stanley. At the time, they were the only two people in the room who seemed interested in the immunology of the virus, so whilst their interest in much of the conference content was somewhat limited, the information and knowledge they shared with each other over drinks was hugely beneficial.

“We spent a lot of time talking at the bar, as I recall, but that meeting has led to a long-standing friendship and reciprocal sabbaticals in each other’s labs ... so the connections that came through the conferences were very real ... and many of the collaborations I have in the field of immunology have arisen from people I’ve met at conferences.”

In 1989, Frazer went on sabbatical to Cambridge to try to learn more about the gene cloning technology he’d seen at the US conference three years

earlier. Whilst there, he met Dr Jian Zhou, a Chinese virologist who had similar interests in cancer research. They began working together almost immediately, and by 1991 had found a way to manufacture the harmless outside shell of the HPV, which meant they had the basis for a vaccine to prevent cervical cancer. Although Zhou sadly passed away in 1999, he has posthumously shared in many of the prestigious awards bestowed upon Frazer since discovery of the vaccine.

As Professor Frazer insists, science is a collaborative effort, and whilst individuals may be recognised, it is essentially a team effort. Gabrielle Medley first urged him to look into the HPV cancer link, zur Hausen shared his knowledge, Margaret Stanley and other friends like Paul Lambert collaborated with him over the years, and Frazer's own team of scientists, researchers and students back in his lab at the University of Queensland worked tirelessly as they inched towards the vaccine's development. Each of these key individuals have played a part in steering Ian and his team towards their discoveries – and conferences, too, have played a significant role in bringing them and their ideas into Frazer's life.

Despite reaching lofty heights – including being named a National Living Treasure by the National Trust of Australia (2012) and winning the European Inventor Award (2015) – Frazer is not standing still. For, while the HPV vaccine available today can protect those who have never been exposed to the virus, Frazer and his team are now working on ways to prevent those who've already contracted the virus from going on to develop cancers. His other important area of research is looking into squamous cell skin cancers and how papillomavirus evades the immune system in the skin. And, again, Frazer is making use of conference platforms to drive his research forward.

“I certainly think that quite a large part of the collaborations we're doing at the moment have come out of meeting people at conferences. The bigger team that we're involved with now basically involves every discipline that you can think of in biomedical research from Ecogenomics through to Bioinformatics, and yes, I meet up with these people through conferences.”

Frazer is also making use of conferences to help him find funding. Sadly, according to Frazer, governments in Australia see research in three-year

blocks, but finding cures for things like cancer takes long-term, significant funding commitments that usually only major pharmaceutical companies are willing to make. So, Frazer and his team make regular trips to overseas conferences to showcase their findings and look for organisations that are willing to back them for the long haul.

“The conferences are where we go to try and partner with [these] companies who are interested in vaccine development. We also get a chance to see what the opposition is doing.”

Some conferences are designed for partnering such as Bio and Ausbio where, “basically,” he jests, “it’s a meat market, if you like, where everybody presents their stuff to the companies. The point is if you’ve got something of interest the chances are that the people that you really want to speak to will be at the conference and you can have a quiet chat in the corner and say can we come along and pitch to your company?” Then Frazer and his team do road shows from the contacts that they’ve made at these conferences.

While Frazer acknowledges the considerable costs involved in organising and running a conference, he says that the costs of sending staff can prove an enormous burden for organisations. He believes the challenge for conference organisers is to keep the relevance there without making the costs so high that few can afford to attend.

“The first conference I went to, you found your own accommodation, there was no registration fee, you just turned up and you bought your own food and that was fine, not a problem. When I ran the International Papillomavirus workshop down in Southport in 1996 we had a registration fee which included meals and accommodation which was about \$400. Now you’re looking upwards of \$2,500 to \$3,000 for that sort of package and that makes it very difficult to send lots of students there, so I think the critical thing for getting good engagement is to be flexible about the sort of packages that are available [so more people can attend].”

The other piece of advice he gave was that conference organisers need to be clear about their purpose. He said that small, boutique conferences which are highly focused and topic-specific will attract all the major players, but

to be successful they need to be led by an expert in the field.

“Then there are the big conferences that everybody comes to, like AACR or the Australasian Society for Immunology conferences where the aim is to provide a broad education for people starting out, and the critical thing there is to have keynote speakers who will attract people to come along.”

Finally, this humble but knowledgeable man wanted to stress how important he believes it is for Australia to host big international conferences, not because it puts Australia on the map or for any short-term economic benefit from tourism, but because of the exposure, education and opportunities it gives our next generation of high achievers.

“It’s really nice to have all the talent here, and I think [it] should be remembered that if you want Australia still to be leading in a field then it’s really important that the international conferences come here, because then you bring all the people who are going through the process of becoming qualified as researchers together, and it exposes them to the people who really matter at the time and that’s critical in their development. That can’t be underestimated for value.”