

20

The research scientist— Al Rowland

Elliston Rowland wanted to be a concert pianist, but ended up as a geneticist.

Sitting at the piano at his home in Palmerston North, on New Zealand's North Island, Rowland said:

I was reasonably good on the piano, but when it came to performing before the public, I was incredibly nervous. After an early concert, I collapsed in a complete sweat. So I gave it away and focused on my other great love: science!¹

The son of a railway worker, Rowland went on to become a scientific researcher and geneticist. Known as Al rather than the formal Elliston, he studied at Victoria University in Wellington, New Zealand, for his undergraduate and doctoral studies. Together with wife Alison, Rowland then travelled to Kenya in 1977 to lecture at the University of Nairobi. After four years in Africa, they returned to New Zealand in 1982 and Rowland commenced work as a lecturer and researcher at Massey University in Palmerston North.² His field of interest soon moved to genetic research:

1 Interview with Al Rowland, Palmerston North, New Zealand, 27–28 November 2015. Unless otherwise noted, direct quotes from Rowland in this chapter come from this interview.

2 The chapter draws on information from an unpublished manuscript by Al Rowland: 'British atomic bomb testing: An unintended legacy', December 2014 (copy in author's files).

GRAPPLING WITH THE BOMB

Although my first interest was in plant genetics, I switched to human genetics early on. I had a research career looking at genetic damage, looking at any harm to the chromosomes as a consequence of exposure in the environment to various chemicals or various agents. But it was only an approach by Roy Sefton of the New Zealand Nuclear Test Veterans Association that set me on the path to look at the legacies of radiation exposure during Operation Grapple.



Al Rowland ONZM

Source: Nic Maclellan.

Having witnessed five tests as a crew member of the HMNZS *Pukaki*, Sefton joined other New Zealand Nuclear Test Veterans Association (NZNTVA) members to lobby government ministers for financial support to investigate the health problems facing the veterans.

During the term of the Bolger National Party Government, Deputy Prime Minister Winston Peters had pledged a financial grant to the veterans. However, Peters was removed from office in 1998 before the NZNTVA could access the funding, which was then refused by the new National Party Prime Minister Jenny Shipley. Before the 1999 elections, the opposition Labour Party under Helen Clark had agreed to honour the \$200,000 funding grant to the Operation Grapple veterans. However, after new elections, the incoming Labour Government was concerned that the grant might be used entirely on legal fees for a case against the UK Government.

With a further election looming, Sefton said that the veterans association tried again:

In the run up to that election, we approached every party and lobbied to have this promise that was previously made by government to be paid. It doesn't matter whether you are National, Labour or whatever, it was a political promise.

I had been for some time very interested in research because I considered that epidemiological studies are so open to misinterpretation depending on which side of the fence you're on. I remember the day when I was speaking to the chief adviser of the Minister of Veterans Affairs Mark Burton. I said, 'Look, I'm thinking about research. What say from a grant of \$200,000, we put \$100,000 into research and the rest into other areas?'

It was only a matter of an hour or so and she came back to me and said, 'Subject to a meeting with the minister, the answer is yes.'³

Together with the president and senior advisory officer of the Returned Services Association, the veterans soon met the minister and, on 27 April 2002, NZNTVA held a well-attended conference to sign an agreement on the use of the funding. Later, Minister Burton presented a cheque for \$200,000 to NZNTVA. For Roy Sefton, this opened the way to find scientific support:

3 Interview with Roy Sefton, Palmerston North, New Zealand, November 2015.

The thing is, I don't think they ever thought we would come up with someone like Al Rowland! Originally I had been looking to have the research done in the United Kingdom, on a research model that Saint Andrews University had undertaken. But I went up to Al Rowland and said, 'How much of this could you do?' I was scientifically naive at that time and wasn't sure whether it could be done here in New Zealand.⁴

Al Rowland wasn't interested in the legal aspects of the veterans' campaign, but said he was open to conducting a genetic study:

Roy Sefton had first approached Dundee University and St Andrews University in Scotland—they are among the top universities in the world looking at genetic damage in humans as a consequence of exposure to radiation. He wanted Dundee University to do a study of the New Zealand nuclear test veterans who took part in Operation Grapple. However, the British universities couldn't get ethics approval to do the study, so instead Roy approached me to ask whether I would be able to do the research.

At first, I was reluctant to do that, because the nuclear tests had taken place nearly 50 years previously. However, I talked to scientific colleagues, including Professor John Podd at Massey University who is a neuropsychologist with extensive experience in studying human populations. For basically humanitarian reasons, we decided that the alternative—to do nothing—was not good enough. So even though it was a bit like looking for a needle in a haystack, we thought that it was worth taking a look.

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The proposed New Zealand study would follow other medical research into British Christmas Island veterans, which had been underway for many years. In 1983, following numerous parliamentary questions about veterans' health, the UK Government commissioned a survey by the National Radiological Protection Board (NRPB) of 22,000 men involved in the Australian and Kiribati tests. The survey studied official documents for causes of death and detailed the incidence of cancer for the cohort, using the National Health Service Cancer Register.

4 Ibid.

The NRPB report, issued in November 1988, stated that there was no excess mortality either from all causes or from all cancers, except for a significantly higher level of deaths from leukaemia and multiple myeloma among the test participants compared to the control group. The NRPB report concluded:

There may well have been small hazards of leukaemia and multiple myeloma associated with participation in the program, but their existence is certainly not proven and further research is desirable.⁵

The NRPB carried out two more surveys in 1993⁶ and 2003,⁷ without reaching conclusions significantly different from the 1988 report (although the 1993 study reported a possible small increase in the risk of leukaemia in the first 25 years following exposure).

Based on the 1993 NRPB study, the UK Ministry of Defence (MoD) adopted a policy that pensions for War Disablement would only be granted for those veterans suffering specific leukaemia within 25 years of exposure. However, in a shameful subterfuge to avoid further liability, UK ministers have stated that the adoption of this policy ‘is not an acknowledgment that those present at the sites were exposed to harmful levels of ionising radiation. The accepted service link is purely presence at the test sites’—as if leukaemia was caused simply by visiting a Pacific atoll!⁸

5 S.C. Darby et al.: *Mortality and cancer incidence in UK participants in UK atmospheric nuclear weapon tests and experimental programmes*. NRPB-R214. (Her Majesty's Stationery Office, London, 1988). See also S.C. Darby et al.: 'A summary of mortality and incidence of cancer in men from the United Kingdom who participated in the United Kingdom's atmospheric nuclear weapon tests and experimental programmes', *British Medical Journal*, No. 296, 1988, pp. 332–338.

6 S.C. Darby et al.: *Mortality and cancer incidence 1952–1990 in UK participants in the UK atmospheric nuclear weapon tests and experimental programmes*. NRPB-R 266 (Her Majesty's Stationery Office, London, 1993); S.C. Darby et al.: 'Further follow-up of mortality and incidence of cancer in men from the United Kingdom who participated in the United Kingdom's atmospheric nuclear weapon tests and experimental programmes', *British Medical Journal*, No. 307, 1993, pp. 1530–1535.

7 C.R. Muirhead et al.: *Mortality and cancer incidence 1952–1998 in UK participants in the UK atmospheric nuclear weapons tests and experimental programmes*, NRPB-W27 (Her Majesty's Stationery Office, London, 2003); C.R. Muirhead et al.: 'Follow up of mortality and incidence of cancer 1952–1998 in men from the United Kingdom who participated in the United Kingdom's atmospheric nuclear weapon tests and experimental programmes', *Occupational and Environmental Medicine*, No. 60, 2003, pp. 165–172.

8 Parliamentary Under-Secretary of State for Defence Dr Lewis Moonie, UK House of Commons, Hansard official report, 4 December 2002, col. 264WH.

The NRPB reports have been used for nearly two decades as a shield by UK politicians, whenever challenged about health impacts.⁹ However, the methodology, data and conclusions of the NRPB reports were widely criticised by British veterans and their legal and scientific advisers. At the time the reports were published, the British Nuclear Test Veterans Association (BNTVA) was angered the NRPB only looked at deceased but not living veterans, who continue to report a range of health concerns.

The same debates occurred in Australia, where government studies were launched into radiation exposure and veterans' health following the 2002 Clarke Review into war pensions.¹⁰ These two studies—on dosimetry and on mortality and illness of veterans from Monte Bello, Emu Field and Maralinga—were also sharply challenged by Australian participants of the British atomic tests.¹¹

In 1999, a study by Sue Rabbitt Roff of Dundee University reported an excess of multiple myeloma among a group of 2,500 test veterans. With 45 reported cases of multiple myeloma (when the UK average is three per 100,000), this was twice the rate reported by the NRPB. Thirty per cent of the men in the sample had already died, and of these 'two thirds of them died from cancers that are pensionable in the United States as presumptively radiogenic among nuclear veterans'.¹²

As part of this research, retired nurse Ruth Mackenzie gathered information from 235 NZ sailors, including 97 who had died. Of 443 reported conceptions, there were 99 miscarriages, 16 stillbirths and two were aborted. Two died soon after birth because of severe deformities and 25 others in early childhood.¹³

9 See, for example, 'Christmas Island Nuclear Tests', statement by John Spellar, Secretary of State for Defence, UK House of Commons, Hansard Written Answers for 20 January 1999, col. 462.

10 Michael Carter et al.: *Australian participants in British nuclear tests in Australia*, Vol. 1: Dosimetry (Department of Veterans' Affairs, Canberra, May 2006); Richard Gun et al.: *Australian participants in British nuclear tests in Australia*, Vol. 2: Mortality and cancer incidence (Department of Veterans' Affairs, Canberra, May 2006).

11 See, for example, Jack Lonergan: *An analysis of the studies conducted to assess the impact of the British Nuclear Tests at Monte Bello, Emu Field and Maralinga on Australian participants* (copy in author's files); and John P. (Jack) Lonergan: *Submission to the Senate Standing Committee on Foreign Affairs, Defence and Trade: Inquiry into the Provisions of the Australian Participants in British Nuclear Tests (Treatment) Bill*, 27 October 2006.

12 Sue Rabbitt Roff: 'Mortality and morbidity among children and grandchildren of members of the British Nuclear Tests Veterans Association and the New Zealand Nuclear Tests Veterans Association and their children', *Medicine, Conflict and Survival*, Vol. 15, No. 3, 1999, pp. 1–51. See also 'Nuclear test veterans' survey prompts official inquiry', *The Lancet*, Vol. 353, 23 January 1998. The study was based on a self-selected cohort of 2,200 British, 238 New Zealand and 62 Fijian veterans.

13 Matthew Dearnaley: 'Nuclear veterans target Britain—claim for children's birth defects', *New Zealand Herald*, 9 April 1998.



HMNZS *Pukaki* proceeds towards the mushroom cloud after Grapple 1 test at Malden Island, May 1957

Source: Roy Sefton.

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Given the debate over evidence, causation and ‘contested illnesses’, Al Rowland and his colleagues at the Institute of Molecular Biosciences at Massey University were aware they were walking into a political, as well as medical, battlefield. They decided to proceed, however, to conduct independent research on blood samples taken from a selected group of the NZ sailors who witnessed the British tests from HMNZS *Pukaki* and *Rotoiti*:

I made it very clear to the veterans that I was separate to them, and this was a completely independent university study. I said that I may not find anything about long-term genetic damage, but they said that they just wanted the study done.

It took a year to obtain ethics approval, because in those days we had to approach six different hospital ethics committees throughout the North Island, where most of the veterans were living. We eventually obtained ethics approval and also *iwi* approval [the necessary authorisation from the indigenous Māori].

John Podd persuaded me that this must be done as a case-control study, where you have to select a matched control group. Because of his experience in this area, he agreed to select the study participants.

Given that there were only 551 NZ sailors involved in Operation Grapple, and many of them were unable to participate in the study, it was vital to establish a group of control subjects (a separate matched group of people who resemble as closely as possible the group of veterans at the heart of the study, except for one key variable—the veterans witnessed the nuclear explosions and the control group did not). Rowland said that the control group required a rigorous selection process:

John set up his research team with Judy Blakey—a Master’s graduate who played a key role in gathering information about each veteran and control volunteer. We first obtained a list of veterans’ names from the Department of Veterans Affairs in Wellington. This was a fundamentally important step—it was crucial that an authorised list of names and addresses was obtained from the department rather than rely on self-referral from the veterans themselves.

We then sent out a letter of invitation to all the nuclear test veterans from the list provided by Veterans’ Affairs, inviting them to participate in the study. After we sent out a letter of invitation to all the nuclear test veterans, Judy interviewed every one of them, but then John’s group

had to select the matched control group. Using protocols that had been established in other radiation studies overseas, we developed a very extensive questionnaire, which we presented to all prospective candidates.

John's team then proceeded to select a matched control group. They had to be matched for age, cigarette smoking, alcohol consumption and exposure to paints or solvents—all possible confounding factors that could affect the interpretation of the results, should a difference be found. We also rejected any prospective participant who had received or was receiving chemotherapy, as they could possess damaged chromosomes.

In the end, we obtained a very well matched control group, which was critical. The Returned Services Association was particularly helpful in this respect in offering to put up posters and hand our flyers in a number of clubs. Because of the healthy soldier effect, we chose ex-policemen or ex-army personnel—but not airmen or ex-naval personnel, given the controversy surrounding possible radioactive contamination of the ships.

The decision not to include former Royal New Zealand Navy (RNZN) personnel in the control group would later be questioned. The researchers would not accept former RNZN men for the control group because of the possibility of residual radiation on the Grapple frigates, which may have affected personnel who trained on or visited the Grapple ships in Auckland between nuclear tests, or later crewed the ships.

The elaborate matching of the control group with the veterans was a critical step in the process. It was also crucial for the researchers to operate without knowing whether blood samples came from one of the veterans or one of the control group. Samples taken from study participants were taken directly to Massey University's Health Clinic, and were given a new code so that the research team could not identify any participant.

The NZ Department of Veterans' Affairs was initially very helpful and even provided funding for one of the assays conducted by the university researchers (the sister chromatid exchange assay). But even with the NZ Government grant of \$100,000, some of the tests were very expensive, and the team considered dropping one of the assays in the cytogenetic analysis.

Roy Sefton said the NZNTVA would step up to make up the shortfall:

I advised Al Roland that the risk of dropping a possible ground-breaking assay could be disastrous, and NZNTVA would attempt to fundraise the amount required. The commitment of the NZNTVA members was such

that many made personal donations. Others, often old and sick, stood in the streets in winter selling raffle tickets, or were involved in other fundraising activities. We raised the \$78,000 required.

As we could not use government funding above the agreed \$100,000, NZNTVA has actually raised in excess of \$110,000 to cover additional costs to ensure the research was carried out in full.¹⁴

In consultation with experts such as Dr Peter Bryant of Saint Andrews University, the research team settled on five assays.¹⁵ Rowland explained that, using blood drawn from the veterans as well as the matched control group, his research team conducted a range of tests to look at potential damage to chromosomes:

We went on to perform a series of five or six tests looking at various aspects of the genetic machinery, because radiation can affect different things. It can affect the chromosomes themselves in terms of breakages. It can affect the DNA repair system. You can look at fractionation of DNA—so we looked at all these different aspects

There were techniques we hadn't previously used in my lab such as multicoloured fluorescence in situ hybridisation or mFISH. Peter Bryant from St Andrews University offered to train a senior technician from my laboratory, Liz Nickless, in the technique. He was very helpful, opening up his lab so she could study in Scotland. Liz brought back the technology to a lab and it was the first application of mFISH in New Zealand.

I could not have wished for a more dedicated genetics research team, including Elizabeth Nickless, Mohammed Wahab, Chad Johnson and Ruth Wrenn. Each of them was assigned a separate assay to perform and I am forever grateful to them for the contribution they made, as without their meticulous individual efforts the study could not have been done.

At a conference held in Papeete in 2006, I also had the good fortune to meet a brilliant scientist, Professor Claude Parmentier from the Institut Gustave-Roussy in Paris. He examined our findings in considerable detail and offered to calculate a dosage reconstruction from our data, ably supported by another of his colleagues, Radhia M'Kacher. This gave extra weight to our findings.

¹⁴ Interview with Roy Sefton, Palmerston North, New Zealand, November 2015.

¹⁵ For the technically minded, these included mFISH (multicolour fluorescent in situ hybridisation), G2 assay, micronucleus assay, COMET assay and sister chromatid exchange. Two of the assays, the G2 assay and the micronucleus (MN) assay, show no difference between the veterans and the matched controls, which suggests that DNA repair mechanisms in the veterans are not deficient.

When radiation hits the chromosomes inside cells, the chromosomes can break and recombine with each other—a process known as a ‘chromosome translocation’. These translocations are a well-known consequence of radiation exposure. Although Rowland’s team applied a range of tests, mFISH is the main assay used internationally for detecting damage to chromosomes caused by radiation exposure.

The mFISH technique involves ‘painting’ each chromosome a different colour, which can make breaks and rearrangements between chromosomes clearly visible. By showing whether translocations have occurred, the team could then count the number of translocations for each subject. Later, comparing the results for both the veterans and the controls allowed the team to determine whether there was any statistical difference.

After Rowland’s team had finished their study, they discovered that the mFISH assay, in particular, showed a highly significant difference. Their research paper noted:

The difference between the veterans and the matched controls with this particular assay is highly significant. The total translocation frequency is three times higher in the veterans as a group than the control group, the latter showing normal background frequencies for men of this age. This result is indicative of the veterans having incurred long-term genetic damage as a consequence of performing their duties relating to Operation Grapple.¹⁶

Rowland and his team were surprised that the mFISH tests showed such clear results:

In the end, we found an alarming result. If you are looking at a person in their 60s or 70s for genetic translocations, you would expect to find about nine or 10 translocations per 1,000 cells. This is the normal background frequency. As a group, the veterans averaged 29 translocations per 1,000 cells. To compare, that is comparable to what was discovered in workers involved in the clean-up of Chernobyl, meaning there was severe genetic damage. Scientists do not often engage in hyperbole but without exaggeration, this result is extraordinary.

16 Al Rowland: ‘British atomic bomb testing: An unintended legacy’, December 2014 (copy in author’s files).

The results are indicative of the veterans as a group having incurred long-term genetic damage as a consequence of performing their duties during Operation Grapple. In their published research study, the team reported:

A careful comparison of the veterans and the controls for possible confounding factors, together with a close analysis of the scientific literature in related studies, leads us to a probable defining cause for the chromosome anomalies observed. Ionising radiation is known to be a potent inducer of chromosome translocations. We submit the view that the cause of the elevated translocation frequencies observed in the veterans is most likely attributable to radiation exposure.

We hold the view that the genetic damage was caused by exposure to harmful radiation, probably through ingestion of ionising particles during the course of the veterans' participation in the series of bomb blasts known as Operation Grapple.¹⁷

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NZNTVA's Roy Sefton believes the results of the independent study had enormous implications beyond New Zealand:

We were mindful that genetic research identifying radiation damage in the NZ Operation Grapple veterans would make a strong case for compensation from the UK Government and also strengthen the pension claims by ex-Commonwealth nuclear test veterans and widows. Certainly the Massey University finding of genetic damage in NZ Operation Grapple veterans was a key factor in the decision of the London legal firm, Rosenblatt Solicitors, to go on with the class action for the UK, NZ, and Fijian compensation claimants against the UK Government.¹⁸

17 M.A. Wahab, F.M. Nickless, M. Najar, R. Kacher, C. Parmentier, J.V. Podd, R.E. Rowland: 'Elevated chromosome translocation frequencies in New Zealand nuclear test veterans', *Cytogenetic and Genome Research*, Vol. 12, No. 2, 2008, pp. 79–87. DOI: 10.1159/000125832.

18 Interview with Roy Sefton, Palmerston North, New Zealand, November 2015.

Public release of the results caused a firestorm in the media across Australia, New Zealand and the United Kingdom, boosting the momentum in the long-running class action before the British courts.¹⁹ One British MP told the UK House of Commons that the Massey University study ‘has opened up a hornet’s nest that cannot be denied in further research’.²⁰

NZ Prime Minister Helen Clark responded that the research was of ‘great interest’ and her government would study it further:

By today’s standards obviously it’s simply extraordinary that people were ordered to stand on the deck of a frigate and witness an atmospheric test ... We now need to consider the research and in the interim we encourage any nuclear test veteran who has a disability that they believe is attributable to or aggravated by their service to apply for a War Disablement Pension.²¹

A year later, Roy Sefton and the NZNTVA were dismayed at ongoing delays. As the research was published in a peer-reviewed journal in June 2008, Sefton told the media that the association expected the government to act now rather than wait for the outcome of the long-running court case in England (which would drag on until 2014):

When the results first became public last year, the Government promised to respond when the study had been peer-reviewed and published. Well, now they have to stop sitting on their hands and do something.²²

Even after the study was peer-reviewed, it caused ripples in the scientific community in Britain—hardly surprising, given the results reopened the debate that authorities had tried to close through repeated invocation of the NRPB studies. Rowland was well aware that research by colonials would not be warmly received by some in London:

19 See, for example, Hamish Stuart: ‘Study finds nuclear veterans suffered genetic damage’, *New Zealand Herald*, 14 May 2007; ‘Nuclear blast veterans have genetic damage—Massey study’, *Radio New Zealand*, 15 May 2007; Ean Higgins: ‘Nuclear veterans plan class action’, *The Australian*, 15 May 2007; ‘Nuke tests caused NZ genetic damage: report’, ABC News Online, 14 May 2007; ‘Boost for N-test veterans’ case’, *BBC News Online*, 15 May 2007. ‘Nuclear test veterans to push for legal action’, *ABC News Online*, 15 May 2007.

20 Dr Ian Gibson MP, UK House of Commons, Hansard official report, 22 October 2008, col. 419.

21 ‘Nuclear test study could help sailors’ lawsuit—lawyer’, *NZ Herald*, 15 May 2007.

22 Ruth Hill: ‘Study backs nuclear test veterans’ claims’, *The Dominion Post* (NZ), 16 June 2008.

When the paper was published, it wasn't welcomed with open arms by all the scientific community. Some researchers like Peter Bryant spoke glowingly, but it was too much for a handful, especially in Britain and Australia. It struck me that their disagreements were on flimsy grounds scientifically and had more to do with the organisation they worked for.

I felt secure in our findings knowing that the paper we published, in the top chromosome journal in Europe, had been scrutinised by world experts and peer-reviewed by top scientists in this field. I was particularly heartened by the comments made by Dr David Brenner, who is unquestionably one of the top scientists in this field.

Brenner, the Director of the Columbia University Center for Radiological Research and Higgins Professor of Radiation Biophysics, was called as an expert witness in the long-running court case by veterans (a legal battle described in the next chapter). Before the court, Brenner stressed that the NZ research study had provided evidence of a statistically significant difference between the veterans and the control group:

In my opinion, the Rowland mFISH study provides extremely strong evidence that the nuclear test veterans have a statistically increased burden of chromosome aberrations, compared to the controls. The measured aberration rates in the matched control group were what one would expect for individuals of their age—indicating that the methodology, precision and accuracy of the 2008 Rowland mFISH study was appropriate ...

The excess chromosome aberrations measured by Rowland and colleagues provide evidence that the individuals have, in the past, been exposed to ionising radiation, over and above natural background (in particular a median estimated dose of around 150 mSv, with the highest dose estimate being 431 mSv).²³

UK Government critics of the Rowland report acknowledge the evidence of increased chromosomal translocations, but argue that this does not necessarily mean that there will be adverse health effects as a result. In contrast, Dr Brenner's written report to the UK court highlights the increased risk to health over the life of the nuclear survivor:

There is independent evidence from large-scale epidemiological studies—in particular Japanese atomic bomb survivors, but also nuclear workers—that individuals exposed to radiation doses in this range have an increased

23 Dr David Brenner, submission to the High Court of Justice, Queen's Bench Division, London, 6 November 2008. *AB and Others versus Ministry of Defence* [2009] EWHC 1225 (QB).

lifetime risk of both cancer incidence and cancer mortality. For example, atomic bomb survivors exposed in 1945 in the dose range from 5 to 150 mSv (and followed up for many decades) show statistically-significant increased risks of both cancer incidence and cancer mortality. Atomic bomb survivors who received high doses have proportionately lifetime cancer risks.

What is well established is that for solid tumours, the latency period is long, ranging from about ten years to at least fifty years. More precisely, the increased relative risk of cancer produced by a radiation exposure is generally maintained throughout the lifetime of the exposed individual ... Thus the radiation-induced damage can remain latent in stem cells for many years until the damaged stem cell or one of its progeny starts to divide inappropriately as a result of the damage.²⁴

Al Rowland retired from Massey University in 2009. Two years later, he was invested as an Officer of the New Zealand Order of Merit (ONZM), 'for services to genetic research'.²⁵

Despite the publication of the Massey University research in a peer-reviewed journal, the NZ Government was reluctant to accept the political and financial implications. Al Rowland was soon to discover that the NZ bureaucracy would move to distort his findings:

Immediately after our paper was published, I received a phone call from the Secretary of New Zealand Veterans' Affairs to say that they did not accept any research conducted on the New Zealand nuclear test veterans that had not been previously approved by his office. I was astounded, especially seeing the funding and approval for the research had come from the New Zealand Cabinet. I could sense a 'Yes Minister' scenario working here. The powers-that-be were clearly disturbed by our findings.

In 2009, the NZ Government established an expert panel of six academics to review the research. After commissioning further reviews of the Massey University study, the initial report of the Ministerial Advisory Group on Veterans Health was forwarded to Minister of Veterans Affairs Judith Collins in December 2010, with the panel's chair confirming:

24 Ibid. For evidence of chromosomal translocations in a Japanese survivor of the Hiroshima bombing, and the onset of multiple cancers 50 years after his exposure in 1945, see Mitsuo Kodama: *Hibakusha: A-Bomb survivor* (Shift Project, Hiroshima, 2016), pp. 43–57.

25 *Queen's Birthday Honours list*, 2011, www.dpms.govt.nz/publications/queens-birthday-honours-list-2011.

The mFISH study did demonstrate an increased number of stable translocations. From these results it is reasonable to conclude that the nuclear test veterans were exposed to ionising radiation, but it is not possible to determine the exposure dose ... The Massey University mFISH study results do provide evidence that the nuclear test veterans were exposed to ionising radiation.²⁶

For Rowland, the findings of the panel were a confirmation that the NZ nuclear veterans had incurred long-term genetic damage as a consequence of performing their duties during Operation Grapple, and also that this was attributed to radiation exposure:

One could say this was a considerable achievement. One might also reasonably assume that the minister would go along with her expert panel's findings—but no. The veterans were waiting expectantly for a public acknowledgement from the government. Instead, after three years, a new document headed 'Executive Summary' was released in 2013.

This May 2013 summary document—only released to the veterans in 2017—now serves as the NZ Government's official position, even though the report is unsigned and has no public acknowledgement of the author. It argues against the core findings of the original research, concluding:

The causality for statistically significant elevated frequencies of some chromosomal anomalies in exposed veterans, which may indicate long-term damage, could not be attributed to radiation alone; the health consequence or seriousness of these chromosomal changes are not certain, and enhanced medical surveillance of veterans' children was not supported.

Even today, Rowland is angered by the process and revision of the original findings of the panel:

I find details of this 2013 document concerning our mFISH study quite staggering. It blatantly contradicts the 2010 conclusions of the Ministerial Advisory Group. To state that 'there is not enough evidence to attribute causality to radiation exposure alone' cuts right across the conclusions of international experts.

26 Letter from Professor John Campbell, Chair, Ministerial Advisory Group on Veterans Health to Minister of Veterans Affairs Judith Collins, 23 December 2010: www.veteransaffairs.mil.nz/assets/Veterans-Affairs-site-assets/Research/32.pdf.

The 2013 document is full of confusion and glaring inaccuracies. For example, the document erroneously states that the participants were self-selected, which they definitely were not. The 2013 document also questions why ex-naval personnel were not recruited for the study, ignoring the controversy over the possibility that the New Zealand boats were contaminated.

I accept that one can pick holes in any study, but the criticisms voiced in the 2013 government document fly in the face not only of international experts who are fully qualified in this area, but also their own expert panel. It illustrates what the New Zealand nuclear test veterans have had to suffer from officialdom for many years. In summary—the truth is too uncomfortable for them, yet searching for the truth is what science is all about.

The most damning comment made in the 2013 document is that the government does not support any case for the veterans' offspring to be studied. Even if the government could not bring itself to admit that the cause may be attributed to radiation exposure, they seem to accept that the veterans had incurred long-term genetic damage while performing their duties during Operation Grapple. So why not study their offspring? On scientific grounds as well as moral grounds this refusal is a miscarriage of justice.

For the veterans, this latest roadblock is extremely worrying. NZNTVA chair Roy Sefton has written in a submission to the NZ Government:

The ageing veterans have no interest in any further research on themselves. Government is aware that the prime concern is now with the genetic make-up of their off-spring and possible trans-generational damage. The veterans wish their children to be genetically researched.²⁷

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The Massey University study only involved NZ sailors, although the initial contingent of 39 Fijian naval reserves had travelled aboard the NZ frigates to Christmas Island. The Fijians served aboard British vessels off Malden Island for the first three Grapple tests. For this reason, Al Rowland's

27 New Zealand Nuclear Test Veterans Association (NZNTVA): 'An in depth report on the exposed and control groups used in the Massey University research on veterans of Operation Grapple', submission to the Minister of Veterans Affairs, April 2017.

research was still highly regarded by members of the Fiji Nuclear Veterans Association, who were concerned that the same genetic anomalies might affect their members.

Because the surviving group of Fijian veterans is so small and the men in their 80s suffer from a range of ailments, it is not possible to conduct a scientifically valid genetic study using the techniques used for the NZ sailors on *Pukaki* and *Rotoiti*. But the research provided new impetus in the veterans' legal fight for compensation, described in the next chapter.

For Al Rowland, now living in retirement, his involvement in the research study was important:

On a personal note, I find it fulfilling, albeit sad for the veterans. A reputable document is now on record which shows that the New Zealand nuclear test veterans' claims over the years that 'something' had happened to them as a result of their participation in Operation Grapple was not a figment of their imagination. They have incurred a lifetime legacy of genetic damage simply from following orders, in the name of protecting our country.

The evidence from our study points strongly in the direction that the New Zealand nuclear test veterans were exposed to radiation which resulted, as a group, in long-term genetic damage. Our conclusions were that the high frequency of chromosome translocations was caused probably through ingestion of ionising particles because all the New Zealand frigates that participated in the program sailed either through ground zero immediately after the blast or were within close proximity and thus may have encountered fallout from blowback or contaminated rain.

The NZ research sparked renewed debate in the United Kingdom, prompting a response from the newly elected Conservative government led by Prime Minister David Cameron. In 2010, in response to ongoing pressure from veterans, the UK MoD commissioned an independent expert group to conduct a health needs audit to identify the health experiences, concerns and health and social care needs of British nuclear test veterans.²⁸

28 Rebecca Miles, et al.: *British Nuclear Test Veterans Health Needs Audit Commissioned by the UK Ministry of Defence* (Miles and Green Associates, October 2011).

The report—the first research commissioned by the UK Government since the NRPB studies—found 83 per cent of veterans have developed between two and nine serious long-term illnesses since their service on Christmas Island, with some suffering more than 10 illnesses.

Another 2014 study reported there were ‘significant excess levels of miscarriages, stillbirths, infant mortality and congenital illnesses in the British veterans’ children relative both to control children and expected numbers’.²⁹

For the NZ researchers, the publication of their results would feed into ongoing legal battles. The publication of the study came in the middle of a decade-long class action brought by UK, NZ and Fijian veterans, as they fought from the lower courts to the full bench of the UK Supreme Court and the European Court of Human Rights.

29 Christopher Busby and Mireille Escande de Messieres: ‘Miscarriages and Congenital Conditions in Offspring of Veterans of the British Nuclear Atmospheric Test Programme’, *Epidemiology*, Vol. 4, No. 4, 2014. DOI: [dx.doi.org/10.4172/2161-1165.1000172](https://doi.org/10.4172/2161-1165.1000172).

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