

## **David Black**

Mobile telephones are a logical extension of the telephone, a fusion of the wired device and the radio telephone. The technology became available because of the miniaturisation of electronics and has now been in widespread use for 40 years. Mobile telephony uses electromagnetic energy, in the form of radiofrequency waves, to connect to the public telephone network, essentially harnessing the same technology which has been used for well over 100 years for communications and broadcasting. Biological effects of radiofrequencies have been studied intensively for the last 70 years with the development of standards evolving through three generations.

This evolution has been constrained by genuine concern as well as political considerations, but a great deal of scientific research has been applied, including substantial epidemiology, animal research and even limited human experiments. Mobile telephone technology has evolved steadily since the early analogue systems through five major generations so far and, in general, each generation uses the radiofrequency spectrum and energy in a more efficient manner than those which preceded it.

Concerns about unknown health effects have been associated with each revision of the technology and this has resulted in constant review by relevant and competent international authorities. This presentation describes the unexpected and unusual diversion of the career of a Auckland Medical School Graduate with prior qualifications and experience in radio technology into the review, evolution and application of mobile telephones from their first appearance in New Zealand and Australia and the United States. The work, spanning over two decades resulted in rewriting of existing local and international safety standards, although the underlying assumptions made 30 years previously were generally confirmed. This work involved collaboration with international public health and environmental regulators, as well as researchers and NGO's.

The result of these efforts of many has been the evolution of a secure and practical generation of consistent standards which have enabled the massive proliferation of this now ubiquitous technology with a high degree of certainty about safety, at least with regard to any biological effects of radiofrequency exposure. There are however persisting concerns about other safety issues associated with mobile telephones, including their role in motor vehicle accidents and that of "smart phones" as an instrument for the potentially harmful dissemination of social media.