To House of Commons select committee on Science and Technology 1999

Memorandum submitted by Mr Stewart Anthony Fist

(see near end also, yellow highlighted)

INTRODUCTION

I write a weekly column on the social, economic, political and medical issues of telecommunications and technology for *The Australian (News Ltd)* newspaper in which I regularly raise cellphone health issues. I believe I am the only columnist to do this regularly in a mainstream newspaper in the world.

I also write a regular monthly column specifically on cellphone health research in an Australian electronics trade-hobby magazine, *Electronics Australia*. Again, I believe this to be the only column of its type in the world.

I am an independent investigative/technical journalist and a regular columnist for a number of Australian newspapers and magazines, with a background in television current affairs. My initial profession was optometry, and I have also been involved for many years in meta-research into environmental and health issues.

I was employed at one time by public relations firm Hill & Knowlton as a specialist consultant in these areas, and later established a company (Imform) which conducted scientific and environmental meta-research—preparing reports which culled and consolidated the evidence produced by scientific research into various subjects.

My company, Special Projects Pty Ltd, (trading as Imform Information Brokers) was contracted to Australian companies and government agencies in the mid-1980s, both directly and through local public relations companies. We used the first-generation of time-share on-line information retrieval systems (before PCs) which linked us to the giant US databases Dialog and Orbit via Pacific phone and X.25 connections.

Our expertise was in gathering and examining the evidence for and against such health and environmental problems as: cigarettes and tobacco; asbestos-fibre exposure; DDT; PCBs exposure and disposal;245-T/Agent Orange (and dioxins); food colourings, additives and preservatives; and various similar health concerns. Mostly we were advising the companies and agencies concerned with the manufacture and/or sale of these products.

I now regret much of my involvement here, because most of this research was used to cover-up serious health problems. I no longer have any association with public relations or in meta-research for any company. However I do have an insight into how these companies and industry sectors organise their anti-environmental or anti-consumer efforts; how they dilute and counter any adverse scientific findings; and how they lobby governments and regulators.

I have taken an active interest in exposing these activities now for a number of years, and have also been actively following (and writing about) the potential long-term adverse health effects of cellphones since 1992.

To get just a brief idea of the scale of the research that has been done—and the sheer number of research reports that either show, or indicate that adverse health effects are possible from cellphones, I urge you all to look at the US government's NASA (Commission K) web site which has a partial listing (Before 1992) of research into potential adverse effects (and some positive and therapeutic effects) of EMG.

It gives you an idea of the complexity of this research also, and you will begin to see why it is difficult often to get replication or confirmation of an important study. See:

<http://ndadsb.gsfc.nasa.gov/anon_dir/multidis/URSI/URSI_K/K_REF.TXT>

Note that almost none of this research was directed at cellphones, since they weren't considered much of a problem until 1993. However a very large number of the scientists listed here have found adverse effects since, and are active still in this field of research—and probably three-quarters would agree with the statement "that there are long-term potential health risks associated with cellphone use".

My site at <http://www.electric-words.com> has a listing of the more important studies done until 1994 (still very little on cellphones). Since then the research funding has been variable, and a lot of the findings aren't published, so I don't think anyone has been keeping score.

Actually, this is a very important job that needs to be done, and it should be one of this committee's recommendations. Someone needs to build up an accessible library of relevant research—even if only in abstract form.

SUMMARY

To over-simplify my view of a complicated issue I would state that:

Potential—but not proved: The potential for serious health issues to arise from long-term cellphone handset use is highly significant. In my view the evidence produced by the good research (and only some of it is "good") is now highly significant, and needs to be treated as very serious. However, in no way does it approach "certainty". The evidence that suggests radio transmissions of this kind have no effect is also substantial, but in no way does this constitute certainty of "safety". When so many variables are in play in such a complex area of research, it is almost certain that there will always be conflicting findings and numerous unexplained zero effects.

Handsets rather than towers: The possibility that low-level, but significant health issues can arise (mainly in children) through long-term, insidious, 24-hour exposures to low background levels of radio pollution from cellphone towers, TV transmitters, etc certainly exists, but at a lower level of significance. The evidence is vague and much less convincing than that associated with handset exposure levels. If adverse consequences of tower-exposures are ever established, I believe they will probably be of minor communal importance when compared to the high radiation levels experienced by handset users, and possibly of less significance to those of other environmental pollutants such as lead in petrol, nitrous oxides, particulate pollution, etc.

Crisis-mongering vs chronic long-term problems: Public fears about the relative dangers of handsets and towers are almost totally misdirected. They centre on towers and on young children's low-levels of general-body exposure as if this were a critical issue, whereas the real problem will most likely come from handset use by young adults, chronically exposed to localised high-levels of R/F through their lifetimes.

Susceptibility and genetic predisposition: The evidence points towards biological effects of a number of different kinds, but they generally tend to indicate that only a few people will be randomly or genetically susceptible (DNA breaks, tumour promotion rather than cause, etc). This means that the likely incidence of any adverse effects in the population will probably be low and difficult to identify with the cause—but with 300 million users worldwide, even a 1 per cent incidence means three million potential victims.

Cellphone industry has become the tobacco industry of the 1990s: I have no doubt whatsoever that the cellphone industry (often in collaboration with the regulators and some governments) have engaged in a massive cover-up of the potential that exists for these problems. The industry has also been totally

cavalier in its attitude; it conducted no research into biological effects, and set standards based primarily on electrical interference to electronic circuits.

They have employed all the modern tactics of polluting business sectors—like those of the tobacco industry and the pesticide manufacturers. They have responded to questions of safety with:

- highly aggressive and co-ordinated public relations campaigns worldwide;
- well-funded political lobbying;
- the creation of fake "grassroots" organisations;
- innuendo, slander and defamation of certain scientists;
- threats of advertising revenue withdrawal for editors and publishers;
- junkets for journalists;
- scientific fraud and manipulation of results;
- blocking publication of scientific findings; and
- scientific funding used as bribes.

Simple problems are largely solved: Now we are dealing with extraordinarily complex scientific issues at a molecular biological level. I also believe that the complexity of the problem is beyond the understanding of most of the normal medical "experts" in this field (unfortunately, many of whom provide advice to governments on health issues). In fact the problems are usually so far beyond the "complexity horizon" of both the public and politicians, that it is easy for the cellphone industry to sow confusion, pretending that "experts disagree".

A lot of the work being done on electrical and magnetic influences on cell-membranes and DNA involves a move from basic Newtonian physics to quantum mechanics and interactions. Cell membranes, for instance, are sometimes only two molecules thick, and so a voltage differential of 0.1V (the norm) represents a voltage gradient of 100,000 Volts/cm, which is equal to a car spark-plug. This is a new form of electro-magnetic-mechanics, because these voltages block access to messenger chemicals and viruses, etc.

Most experts with bio-electromagnetic research backgrounds would agree that there is a potential cellphone-health problem—but they'd disagree about the nature of the problem. They each see it from their own side of the speciality—and this discipline has many sides.

This allows the industry to claim legitimately that there is a lack of consensus on many issues, and it also helps create the impression that any claim of the need for research is a form of crisis-mongering.

The media also project many anti-cellphone activists as if they are nothing more than self-serving NIMBY Luddites (which tower activists often are—but who'd want a tower in their back yard); that they exaggerate the claims of danger (which they often do) and therefore the issue can be safely ignored (which it can't be, and mustn't be). Very often the activists are their own worst enemy here: they overstate the case and distort the evidence as much as the industry does.

SUBMISSION

1. ***DUBIOUS ADVICE TO GOVERNMENTS***

The scientific and medical advice often being given to governments about the safety of cellular phone handsets (as distinct from towers) is grossly distorted. A majority of the so-called "experts" advising government have no expertise of any significance in biological research and often have a confused and biased view about these matters. Once committed to a viewpoint, many of them will never change.

Unfortunately, nature abhors a vacuum, and in the absence of real evidence and expertise, the "advice vacuum" has been filled by people who don't often know the full extent of their own ignorance. Radiation scientists and those whose expertise is in radio systems, generally believe that non-ionising radiation, by definition, can't be dangerous—because it is impossible for it to effect biological tissues unless actual tissue-heating results.

This belief is still being taught in universities; however, it is demonstrably wrong. If this claim were true, it would be impossible for humans to see (non-ionising radiation called "light" causes chemical changes in the retina).

Most scientists in the field, even those still promoting the "Proven safe" industry line, will now agree that it is likely that many non-thermal effects exist. They will argue, however, that the harmful nature of these has not been proved. This "sea-change" in certainty, has only recently been widely accepted, but it is now accepted by virtually all bio-medical researchers. Unfortunately, it has not yet filtered through to radiation physicists and electrical engineers who often advise governments.

2. INDUSTRY AND REGULATORS IGNORED THE POTENTIAL FOR PROBLEMS, AND DID LITTLE OR NO RESEARCH

The Industry has done nothing of any significance to ensure that cellphones are safe. I have conducted two interviews over the years with early technologists in Europe who discovered (and reported to superiors) that time-division technologies they were developing for GSM were environmentally polluting. They were both told to ignore these problems, and keep to the job in hand—yet both technologists recognised that any device which disturbs nearby electronics to this degree (GSM is notorious) must also have some health implications needing study.

I also have a copy of a UK Radio Technology Laboratory project report (1989) and a short Department of Trade and Industry (DTI 1990) summary, which shows that the UK government and industry both knew about these interference problems 10 years ago (See Appendix A/1 and A/2)[31] and did nothing about it.

These were faxed to me from an unknown source in Phillips in Holland, and they show that the European cellphone organisations also knew there was a potential for GSM cellphones to cause serious interference problems (hearing aids was then the major issue).

At this time the GSM phone was then in its early design stages and preliminary research had established that they generated massive amounts of electrical interference which could disrupt bio-medical devices and essential electronic systems. It was also noted by the engineers that these devices probably had the potential to cause health problems.

According to a phone interview I had with a spokeswoman from the UK DTI, the European cellphone industry was well apprised of these facts via reports sent to ETSI, and they deliberately chose to ignore the evidence. See also the statement of Dr Mikitalo (Appendix A/3)[32].

I also interviewed two telecommunications researchers, one of whom worked in Germany with Siemens, and the other in the UK. Both tell the same story; that the radio-interference effects of the technology were well known, but deliberately hushed up.

The American cellphone industry also chose to deny the facts, even after the evidence of cellphone interference with hearing aids and pacemakers had been demonstrated in Australia (initially in 1994) and then in the UK. Only in the last three years have the Americans officially accepted this as fact—even though thousands of medical device wearers have reported time-division (GSM and US IS-54) cellphones were causing substantial problems.

Appendix B[33] shows that the interference with pacemakers was widely known for many years, although only revealed in public when I wrote a story about this in early 1993 (following the fuss over hearing aids, which was another story that I broke around the world).

You will note that the letter in Appendix B/1[34] is from the major Australian manufacturer of pacemakers. They consistently lied to me in 1992 after I had received reports of pacemaker problems and they continued with this line for many years. Evidence now shows that they had major problems.

Appendix B/2[35] is a mid-1993 exchange of letters with Austel, the Australian regulator of cellphones at the time. They had consistently denied in public there was any problem with GSM and hearing aids or pacemakers—but were hypocritical enough to discuss the reality with me in confidence—not for attribution of any kind.

On this occasion, Grant Symons, the second-in-charge of the cellphone division was stupid enough to speak in public about the matter (to an audience of cellphone industry executives) at a time when I had my tape recorder running and wasn't bound by a confidentiality agreement—and so the information was on the record.

I then spoke about Austel's awareness of the problems at a conference in New Zealand, and Austel were greatly embarrassed. They tried to pretend that I had lied and stated in public that they had no such information.

If you take the trouble to read the exchange of letters, you can see what happened—and how industry regulators very often protect the interests of their industry rather than that of the public. It took them only 24 hours to back down when I offered to publish the tape transcripts in my newspaper column.

This type of regulator-protective action is not an exception in this area in my experience. Rex Christensen was actually a very good technocrat/bureaucrat, and generally he did a good job. However, he was obviously being leaned on from above, or by the cellphone industry, to deny they had any pacemaker problems.

3. **EVIDENCE OF ADVERSE EFFECTS HAS BEEN DISTORTED, OVERRIDDEN AND IGNORED**

The history of this research is replete with dozens of cases where important research findings have been:

— Covered up and not released by government instrumentalities (mainly defence establishments who did a lot of the early work on radar and microwaves)
— Delayed in release until public counter-measures can be put in place and promoted. See the Royal Adelaide Hospital case study (Appendix Z)[36].
— Distorted in the public expression of findings; very often the public reports are at odds with the scientific reports. This form of distortion is very common, and is done in various ways and for different reasons:

(a) as part of the contractual obligations for research funding. The distortion is usually throughPR (spin-doctor) management and the purchase of press-agency distribution of industry-favourable PR releases as if they were impartial news stories (especially Reuters) (see Appendix Z);

(b) by the scientists themselves, presumably in order to maintain future funding for themselves—and also for their departments and universities (they are often subject to peer pressure and administrative direction). (Also Appendix Z);

(c) by scientists themselves fearing the consequence of "going against the tide" of perceived scientific opinion—especially the fear of their work receiving "junk science" labels;

(d) by the media itself, putting its own spin on stories for various reasons—including the need to support advertisers, and also because reporters want to appear "scientifically credible" by supporting the "perceived wisdom" of the conventional "experts". (See Appendix X)[37];

(e) by governments and government authorities, for many various reasons, including supporting local industries, employment, etc. Also because the most wealthy industry sectors are also the major political donors and have the most lobbying power. (See pacemaker material in Appendix B/2);

(f) by government funded scientific bureaus and regulators whose members usually come out of the industry concerned, and who share a common culture.

3.3 The question of exposure standards

These standards are, in most countries, "voluntary" or "guidelines" set by committees comprising mostly engineers and industry representatives. In the past they were set on the basis of electromagnetic compatibility (EMC), which means not interfering with other nearby electronics.

When mass-production equipment is found to interfere seriously, as it was with GSM digital mobile phones, the cry then goes up to:

(a) raise the EMC standard so as not to inhibit the sale of the equipment.
(b) force newer and higher levels of immunity (EMI) on the other equipment (such as hearing aids and pacemakers) by redesigning them and shielding them from the interference.

In other words, when the smoke-stack pollutes, they raise the level of quality needed by gas masks. This is why the world is now called by EMF environmental activists "The Blue World" and radio pollution is called "Blue Smog". We now all live in an unavoidable soup of electro-magnetic radiation—and it is extremely hard to now determine what is "normal" and what is not.

This is one reason why epidemiology finds it increasingly difficult to produce reliable results. The ELF and R/F effects may appear to cause low-level incidences of diseases like brain cancer, Altzheimers, and childhood leukemia—but if these effects only occur in those people more susceptible than others, and if the whole society is bathed in this form of pollution—it is an almost impossible task to identify any cause-effect relationship.

Standards setting, therefore, doesn't rest on any real science. See Appendix C/1[38] for an admission of this fact by the US Environmental Protection Agency.

What has happened around the world is that the various "standards bodies" have added to their "non-interference" EMC standards for electrical equipment, a claim that such standards are adequate to protect the human body from harm "unless the temperature of local tissue rises 1 degree Celsius". This is based on body-temperature rises in rats which clearly show the animal is distressed.

Later, when scientists began to discover biological actions and potential health effects at exposure levels far below any which might cause body tissue temperature rises, most of the standards bodies have had to take these "non-thermal" effects into account.

They have generally done this simply by adding a statement that "In setting these standards we have taken `non-thermal' evidence into account" while not actually changing any of the standards.

In this current phase of standards setting around the world, attempts are being made to "harmonise" all national standards, to bring them in line with each other, so that the manufacturers can confidently export to a global market.

In Australia and New Zealand a co-ordinated standards committee was formed in 1991—headed by Dr Michael Repacholi. Prior to the combined committee, the New Zealand standards committee had voted to reduce their emission standards.

The aim of some of the NZ members was to move to the "precautionary principle" which suggests keeping cellphone and other similar causes of radio pollution as low in emissions as possible ("ALARA—As Low As Reasonably Attainable) and warning people to restrict usage or keep the instruments away from the head.

However, at the first combined meeting, the Australian industry representatives and Dr Repacholi ignored the New Zealand vote, and instead voted to raise one section of the Australian standards, with the aim of bringing it into line with the international ICNRP standard. (Dr Repacholi was the chairman of this committee also).

Consequently Dr Neil Pearce felt compelled to resign in protest. (Appendix C/2)[39]. Since that time the Australian/NZ committee has been in constant turmoil, dividing into two factions, with industry and government on one side, and the consumer representatives and biomedical researchers on the other. The industry objects to "precautionary principles" being added to the standards because they say it may open them to later litigation and additional costs in advising people that cellphones may be a health hazard.

The consumer/biomedical group has said it will accept the ICNRP standard as an interim measure, in the absence of anything better, but only if it is accompanied by a definite statement that this has been set on a "thermal" basis, and does not take into account "non-thermal" research findings—and should therefore not be treated as a level of proven safety, but simply as a guide.

This requirement has proven to be unacceptable to the industry and government representatives, and so they have spat-the-dummy and refused to ratify the ICNRP standards with this additional clause. Currently Australia has no valid standard for radio emissions of this kind. (The old ones had a sunset-clause, precisely for this reason, to ensure that they were reviewed in the light of new knowledge).

Appendix C/3[40] is just a letter from the lecturers and professors at the Department of Physics, Monash University (top uni in Melbourne, Victoria) strongly opposing any attempt to raise levels. I include it just because it is extremely unusual for physicists to be worried about such things.

3.4 Industry spin-doctoring and distortions of the truth

Appendix D is a collection of documents put out by the cellphone industry. They have a world-wide distribution system for fire-fighting the occasional adverse health effect finding, and they are often not shrewd enough to post-date their distributed material so as not to provide evidence of prior knowledge. This Adelaide Hospital R/F report was supposedly kept secret—but the CTIA had a preview copy.

In fact the CTIA publication (Appendix D/1)[41] "Australian Tumour Promotion Study" was in circulation around the world before the release of any information in Australia. The official release of information occurred at a press conference in Adelaide on the morning of Tuesday 29 April 1997. This would still be 28 April in the USA, and the release is dated 27 April (Note: a Sunday).

This document was, in fact, circulating in Australia earlier than this— probably on the Friday. It provided the first information that many of us had about what was found by the Royal Adelaide Hospital R/F research.

Appendix D/2[42] is just a collection of propaganda, mainly material which is distributed around the world by the CTIA in Washington, and republished in Australia by the AMTA.

The first page lists the key animal studies that the industry constantly claims proves that cellphones are safe. The local head of the AMTA waved this document in a very recent TV interview with the local Nine Network's reporter Paul Ransley, and at the top of the list was research by Dr Ross Adey—one of the oldest and most respected of researchers.

I wrote to Adey asking why the industry was able to use just this one of his numerous research reports to make claims of safety on a television program, and this is his reply to Ramsey (available for public distribution):

Date: Thursday 22 April 1999 13:52:12-0700
To: pransley@http:

From: Ross Adey <RossAdey@citrus.ucr.edu>

Cc: fist@ozemail.com.au

Mr Paul Ransley
National Nine Networks, "Business Sunday"

Sydney, Australia

Dear Mr Ransley:

It has come to my notice that the Australian cellphone industry has singled out one of our studies to support their claim that cellphones are safe.

Nothing could be farther from the truth. My research team has published hundreds of papers on his subject over the past 35 years, many with disturbing findings.

From this pioneering research, it is my considered view that there is unequivocal laboratory and epidemiological evidence pointing to potentially adverse health effects of radiofrequency and microwave radiation. Nothing in our research findings can be construed as supporting the view that use of a cellphone is free from health risks.

To the contrary, our research in animal models exposed to digital cellphone fields has revealed the occurrence of effects on regulation of cell growth related to tumour formation. Extreme caution is necessary before directly extrapolating these findings to human health risks. Reduced tumour numbers in exposed animals seen in one of our experiments, as opposed to an increase, is of vastly less significance in a medical context than the finding that there was a field effect on cell growth regulation. It will be some months before these findings finally appear in an international peer-reviewed journal.

But with a feckless irresponsibility so characteristic of their venal vested interests, industry organizations have hastily concluded that our findings support their endless chant, indeed their mantra, that use of these phones carries no risk. And from the biomedical research of which they have been virtually the sole sponsors worldwide, they openly state that the only answer that they wish to hear is one unequivocally supporting corporate positions and policies, totally unfettered by health concerns.

Please be advised that these issues are currently the subject of close scrutiny from an international perspective by the BBC Panorama group for a programme to air in mid-May.

Thank you for your consideration.

W Ross Adey, MD
Professor of Biochemistry

University of California at Riverside

Distinguished Professor of Physiology

Loma Linda University School of Medicine

Fellow, Institute of Electrical and Electronics Engineers

The other studies credited here with proving safety are also interesting. The one numbered No 2 by Prof B Veyret of the University de Bordeau, I haven't read, but Veyret's 1991 paper "Antibody responses of mice exposed to low-power microwaves under combined, pulse and amplitude modulation," Bioelectromagnetics 12: P 47-56." is generally listed as one of the key studies that prove cellphones are likely to be dangerous.

Similarly the third on this list is one of Dr Salford's 1993 papers where he found no evidence of brain tumour promotion, but his published paper was a landmark study, not on brain tumours but on brain permeability: "Permeability of the blood brain barrier induced by 915 MHz electromagnetic radiation; continuous wave and modulated at 8, 16, 50 and 200 Hz. Bioelectrochem Bioenerg 1993;30:293-301."

This is one of a number in recent years which shows that the protective mechanisms of the brain can be breached by cellphone type radiation exposure. Salford and Lin are the two recognised experts in this area, and they both worry about the long-term effects of such biological actions.

Blood-brain barriers are important to block unwanted cells from invading brain tissue.

At the 1997 Bologna conference Salford presented another paper "Blood brain barrier permeability in rats exposed to electromagnetic fields from a GSM wireless communication transmitter," which is considered yet another landmark animal study in proving potential dangers—because this deals specifically with GSM cellphones.

The second document (a widely distributed press release) Appendix D/2, is another excellent example of industry distortion in its claims of "proven safety". It is blatantly labelled "Further evidence that mobile phones are safe". It supposedly reports on the Bologna conference in June 1997 where the vast majority of reports were discussing the mechanisms by which R/F effects cells, and other evidence pointing to problems.

Report No. 1. I have no knowledge of this, but I would comment that I've never heard any suspicion that rat livers are likely to develop cancer from cellphones. So these researchers could equally as well examined whether the rats developed a cancer of the tail, or nose, or whatever, and written a zero paper on that. You can always produce zero results, if you misunderstand the nature of the problem or design research to fail.

Report No. 2. I've dealt with this at length elsewhere. It was a total PR fiction. The release of theFinnish information was engineered by Nokia to counter the release of the Royal Adelaide Hospital finding of 2.4-times the number of lymphomas in exposed mice.

Briefly, the Finnish EEG study showed nothing of interest whatsoever, and is now completely and justifiably ignored (it took only a few hours to set up and complete with a few university students)—and

the mouse study was then only in its early stages, and they had no autopsy results. See Appendix F[43]—letters from the two scientists who got caught up in this fiasco).

Report No. 3. Is the Ross Adey study mentioned above. It was just one of about a hundred that Adey had done on cell mechanisms, where he was trying to find out what frequencies had the greatest and least effect on the expression of certain hormones and cell repair mechanisms. He found that some frequencies enhanced the ability of the cells to block proliferation—while other frequencies worked the other way (this is called a "window" effect). The CTIA and AMTA just chose the one that showed a reduction in tumour promotion—but, of course, if cellphones can't affect human tissue then it should have shown NO effect!

Report No. 4. This refers to the Roti Roti study which, after receiving $US 5.4 million from Motorola, failed to replicate the Lai-Singh study. Note the use of the term "similar" to: (they used a quite different assay technique which was known not to give the same results).

Unfortunately for the industry, while it was loudly celebrating this "proof that Lai-Singh was wrong about radio signals causing DNA breaks", Roti-Roti joined in the publication of another study which seems to demonstrate cancer-promotion effects, which almost certainly came from DNA strand breaks—just asLai-Singh had demonstrated.

Report No. 5. This refers to some study that found no "chronobiological" changes. Translated that just means effects-over-time!

There are about a dozen well-recognised studies that show melatonin modification effects after cellphone exposures; in fact, this is one of the few hormonal changes which seems to be accepted by everyone. This study seems to have tested some subject for levels of a hormone after "GSM telephone use"—which could mean anything. I couldn't find any reference to it in the published literature, but I don't have the full Bologna transcripts.

Note also the claim (point 6) that there have been "40 years of substantiated *(sic)* scientific findings that the RF energy from mobile phones pose no health risk" when cellphones have been around for less than17 years and widely used for only about eight years. GSM phones, where most of the suspicion lies, have only been around for eight years—and most forms of adult cancer take a minimum of 10 years to develop, and problems like Altzheimers take even longer.

I guess the term "substantiated" implies "replicated"—but since they can't even quote one research report that proves safety, it is difficult to see how it can be replicated. You can't ever prove "safety" here—at best, you can only show a zero outcome—and that depends on what you expected to find.

The next industry advisory page in Appendix D deals with the Mild study into headaches from mobile phone use. This was actually a replication of a study done in Australia by Dr Bruce Hocking, ex-Chief Medical Officer of Telstra. He also found unexplained high levels of headaches reported by some GSM cellphone users while he was employed by Telstra, and later after he was "made redundant" (and compensated handsomely, on condition he did not report on his research at Telstra) he conducted another study and published the same results. Mild was trying to find out whether these widely-reported headaches were related only to GSM or also to NMT analog phones (used only in Scandinavia).

The AMTA advisory then builds up a straw-man, to knock down. It says: "In fact, nothing in the survey suggests that wireless users have a greater incidence of headaches than the general population." Later it explains why: "There was no non-mobile phone control group".

Why would there be: Mild was comparing analog to digital phone users.

The last page in Appendix D/2 illustrates how they deal with the public and politicians. The last paragraph makes the claim that "The Australian Standard is one of the most stringent in the Western World". In fact it is slightly less stringent than most other countries who have standards, and considerably less stringent than many.

Remember this claim when you read the section dealing with Australian standards.

Appendix D/3[44] is just a note which shows that research funded by the CTIA's WTR operation (Professor Om Gandhi at University of Utah) which was widely trumpeted around the world as proving cellphones to be safe (when it didn't anyway) was later found to be faulty. He corrected it.

Gandhi's most recent paper (1999) showed that many cellphones exceed the 1.6 W/kg per gm tissue SAR limit that has long been claimed as the upper-limit for healthy standards. This has been kept fairly quiet so far, but it is hard to see how the industry is going to continue their claim that their phones are within the IEEE exposure guidelines when the Gandhi measurement shows that they are being exceeded regularly.

Professor Gandhi was co-chairman of the IEEE committee (the industry body) which developed the 1991 exposure standard still in use.

3.5 Over-promotion of the "scientific" line—the need for replication

One favourite ploy of scientists, administrators and regulators when they want to play down a disturbing scientific finding, is to announce that it is only an "isolated example", and can therefore safely be ignored.

The fact is that every research report is "an isolated example" unless it is a direct replication of some work done previously. Given the fact that there are supposedly (according to industry sources) "20,000 research reports which prove cellphones to be safe" then it would be perfectly obvious to the village idiot that one proving otherwise is an "isolated example".

However, this labelling is used indiscriminately in cellphone research—and almost only ever when adverse findings are made. No one in the establishment ever comments or complains that any of these 20,000 reports are "isolated examples".

On the side of the evidence that shows disturbing health implications there must be at least 600 to 1,000 of these "isolated examples" which collectively support each other and paint a very disturbing picture.

Mouse studies

Another ploy is to loudly proclaim that this research was conducted only on mice, and that it is not possible to relate such evidence to potential human health problems—which must come as a surprise to the thousands of medical researchers around the world who conduct mice studies every day.

Mice are used because humans aren't always available to be exposed, killed and dissected.

Mice also have a life-span of only two years, and their metabolism takes them through the cell-lifetime stages of a human in roughly this time.

Mice studies have been shown to be very relevant to humans—especially when dealing with cells at the molecular level where DNA is DNA—and it appears to act and be effected almost exactly the same way in mice and humans.

Transgenic mice

These are used because the scientists want animals which are more sensitive to changes in environmental conditions, within the normal 18 month span of experiments. The results are always taken from the ratio of controls to exposed animals—and it is this ratio which is important, not any absolute numbers.

There's a full explanation of this at my site <http://www.electric-words.com> if anyone is really interested.

Replication

The main problems with replication of adverse research findings are these:

(a) These days most research is funded by the cellphone industry either directly (pretty well limited to Motorola in the USA, and Nokia in Finland), or indirectly through organisations like Wireless Technology Research (WTR) which sees its job as much as public-relations and industry-lobbyist, as it does funding and controlling legitimate research. WTR has the reputation of conducting some genuine, and some "tobacco science"—and certainly of slanting its funding choices to individuals and organisations likely to turn up zero findings.
(b) Industry sources are not likely to fund replications of independent research which shows adverse findings—like the various studies by Sakar, Lai-Singh, and Versheave which all found DNA breaks after brief exposure, or those of Adey and Philips who found much the same. (These are all labelled "isolated examples" incidentally!)
(c) For-profit research organisations are unlikely to get funding for such research from anyone—unless the work is covered by a contract which specifies that the results can't be published without the funder's permission. We know that some replication work has been done this way, but it is hard to prove. No one will talk about this.
(d) Independent universities in the USA will also conduct research under contracts which allow the funders to block the publication of results. Motorola, for instance, now only funds research in US organisations which will allow these contracts.
(e) Government funded universities and research institutions in the USA, and in most other countries, must not sign contracts which can block publication. They therefore get virtually no cellphone funding now in the USA.
These universities do have their own funding, but inevitably these funds are directed towards original research—stuff that will enhance the reputation of the university and its scientists. Replication has none of these advantages.

As a consequence, virtually no one replicates important studies in these important areas—yet the mantra is constantly chanted, *ad nauseum,* that adverse studies should be ignored until replicated.

There are some cases of replication (or near replication) which are either dismissed or discounted. For instance:

1. Professor Steven Cleary of Virginia Commonwealth University, USA, in 1990 published a paper on human glioma cells (brain tumour cells in culture) which showed that such microwave radiation could enhance the proliferation of human brain tumour cells. ("Effects of RF power absorption in mammalian cells").

He found a proliferation of the glioma cells after a two hour exposure to 2.45GHz (microwave) at 5W/kg (moderately-high dose for human tissue). His findings were consistent with the early changes seen in cells involved in tumour formation.

The disturbing finding here was that while the cell cultures were exposed for only two hours, the effects were being detected up to five days later. This means that each subsequent daily dose of radio exposure would reinforce the last—and the effects would be cumulative. He also changed the dosage in a parallel study, and reported a dose-related response.

Dr Ewa Czerska of the US Food and Drug Administration (FDA) also found similar changes in brain tumour cells. She reported these findings during a workshop in Washington, DC in February 1997. Czerska used 827 MHz radiation signals designed to mimic the emissions from a digital cellular phone (Cleary used a higher frequency) and she announced that she had at least partial confirmed Cleary's results—observing greater proliferation at specific absorption rates of 1.6 W/Kg and 4.8 W/Kg. "The increase also appeared to be dose-dependent", she said.

Czerska noted that this could not have been due solely to a thermal response, since conventional heating did not stimulate a similar level of proliferation. But this work was never published. It is widely reported in scientific circles that she was warned off the subject by both the FDA and Motorola, and given a desk job.

2. The surprise of the Repacholi Adelaide Hospital R/F study was the reporting of B-cell (basal cell) lymphomas involvement, when only T-cell (thymus) were expected. Basal cell lymphomas are closely related to cancer formation.

While this study hasn't been replicated, Uckan, Kurosaki, Jin, *et al* (at University of Minnesota-1995) have also found "that exposure of B-lineage lymphoid cells to low energy EMF stimulates" [special proteins] and possibly upset the "delicate growth regulatory balance" in cells. B-Lymphoma cells are known to be more sensitive to radiation exposures than T-Cells, and B-Cells are produced into myeloid tissue within the bone of the cranium. This gives this form of Lymphoma special significance for cellphone research.

3. The famous series of Lai-Singh studies showing single and double-strand breaks have supposedly failed the replication test. Professor J Roti-Roti received $US5.4 million (probably the most money ever given as a grant in this line of research) from Motorola to set up a special "comet assay" laboratory (this is an extraordinarily complex technique of detecting DNA strand breaks).

He failed to replicate the Lai-Singh work, partly because he used a different form of comet assay after being told that it would not work by Dr Narendra Singh, who is certainly the world expert on these techniques.

Similar research has produced almost identical results to Lai-Singh; and some of the cell-culture research also produces virtually identical increases in the DNA strand breaks with low levels of cellphone-type R/F exposure. Philips, J and Adey, R have both done cell-culture work that produces DNA strand breaks of this kind, and Sakar and Vercheave have both done live-animal exposures like Lai-Singh, and also shown DNA destruction.

What's more, Professor Roti-Roti has subsequently put his name to some similar research (See the March 1999 issue (page 300) of Radiation Research) which has reporting cell phone RF-signals caused a two-fold activation of the c-fos gene in fibroblasts. (The study was supported by Motorola).

This c-fos is a proto-oncogene which could be related to cancer development. On the other hand, DNA strand breaks are known to activate this gene. So it is very likely that they observed a DNA damage-induced activation of c-fos gene, which provides a link between DNA damage reported by Sarkar, Phillips, Verscheave and Lai-Singh, and cancer promotion reported by Repacholi, Guy and others.

In conclusion

While replication is important (and should obviously be done if any part of the cellphone industry will ever fund it), very often parallel findings make such replication largely irrelevant because essentially the same or supporting findings come from different techniques.

The industry, however, continues to chant "Not Replicated" to discount even the strongest of adverse findings—in a way that suggest daleks are on the loose ("Exterminate . . . Exterminate").

*4. **CASE STUDIES***

I've included some simple case studies and explanatory notes showing how the evidence has been presented and distorted, and the way the media is manipulated in particular.

4.1 Appendix Z-Royal Adelaide Hospital research

The Royal Adelaide Hospital in South Australia (which has a top-class animal house for research), conducted two parallel studies on EMF exposure between 1993 and 1995. The research design was checked by a committee of the National Health and Medical Research Council (NHMRC) of Australia (the supreme medical research authority) and the hospital had a special committee supposedly oversighting the day to day activities.

The promoter of these two research projects, Dr Michael Repacholi (now in charge of WHO's EMF project in Geneva) sold the idea to the electricity supply organisation and cellphone industry as a way to solve their problems once and for all.

Repacholi is not so much a scientist (he has no research credentials before this), but is well-known as a spokesman and science administrator. He has long been one of the world's best known and most vocal "No Possible Effects" promoters for both low-frequency mains power and cellphones and therefore had the confidence of both the ESAA and Telstra.

The main research project was funded to the tune of $A1 million by the Electricity Supply Association of Australia (ESAA) to look at possible adverse health effects of mains-power exposure, and the second side of the project (run in parallel) was funded (probably $250,000) by Telstra (Australia's dominant carrier) to look specifically at possible effects of GSM digital cellphone exposures.

These studies were conducted in parallel during the 19 month period from August 1993 to Feb 1995.

The studies both had control groups of 100 animals, which were treated identically (down to the use of "sham" exposures), and both were double-blind trials where no one knew which autopsied mice had been exposed and which had not until after the diagnosis of cancer had been determined.

4.2 The GSM R/F study:

Six months into the formal phase of the study using GSM radio-frequency exposures of one-hour a day (probably in January and February 1994) the NHMRC's statistician Val Gebski noted a sudden and obvious rise in lymphomas in the exposed mice. Autopsies by Alan Harris at the Walter and Eliza Institute began to show an unexpected increase in B-cell lymphomas—and since this was unknown, and totally unexpected, the slides were sent off to a US research institution in Marylands for confirmation.

From this point on the scientists had no doubt that this was to be an important, and highly significant piece of research.

The exposed mice were showing:

— lymphomas at an earlier stage. The exposed mice had higher rates early (at about nine months), but the rate continued to rise throughout the 18 month study period;
— initially three to four times the lymphoma rate of the unexposed (later this rate dropped slightly to 2.4 times after some suspect ones were removed);
— the B-cell lymphomas linked to cancer, rather than the expected T-cell type found in the unexposed.

Note that this became evident to all researchers (including Michael Repacholi) in this early part of 1994.

The results for both studies were due to be published in March or April 1995 (See Appendix Z/2). However the GSM radio exposure study was released on 29 April 1997 after a never-satisfactorily-explained two-year delay. It took another year for the ESAA's electricity power study to be released.

The researchers claim that a year of the GSM-report time was occupied by checking the B-cell cancer question (they say the Marylands institute took a long while to do the work), and that another year was lost because the first three major publications (Nature, Science and one other) passed it for peer-review—but then decided not to publish "for political reasons" (the quote of one scientist) and because it was too hot to handle (according to one of the others).

Michael Repacholi also told me at the London conference in November 1996 that the study had passed peer review a couple of times, but hadn't been accepted for publication. This was the only bit of information that turned out to be true. Three publications rejected it before Radiation Research published the report—and according to one of my sources, only one of the publications had any significant comments about the quality of the paper, but they all rejected it on (admitted) "political" grounds as being too hot to handle.

Telstra maintains that it played no part in the official press conference at Adelaide on 29 April. However, Telstra was the major funder of the study and is also Australia's provider of video conferencing services. Telstra was known to have had the main results of the study at least a year beforehand, although this is denied by Dr Hugh Bradlow (See Appendix X/5). The Adelaide Hospital study scientists also claim that the confidentiality clause was insisted on by Telstra, not by the scientists (see Bradlow letter also).

It is important to realise that media control is a well developed art in Australia. Holding an important Australian medical/technical press conference in Adelaide is a bit like holding a similar, rather esoteric British press conference in Kiev—it's about the same distance from the media centres and the journalistic expertise. This ensured that the major press wouldn't be able to cover it. They will try to pick the key parts of the story up from Reuters, or perhaps send an Adelaide-based cadet journalist out to cover it. "The Australian" did neither.

Also, via a satellite video conference hook-up, Dr Michael Repacholi was brought into Australia from Geneva (he had headed off there to his new job with the WHO EMF Project before the study really got underway). Telstra maintains that the hospital paid for this extraordinary cost—but if so, it is the first time that any Australian hospital has ever had this sort of money to throw around (it would have cost $5,000 at least).

What's more, this claim that the hospital was paying for it allowed Telstra to block expert journalists like myself from participating in the video conference. Normally with a satellite link of this kind, Sydney and Melbourne technical journalists would have been invited to participate via Telstra's Sydney and Melbourne video conferencing rooms (they have a number, and one is always available).

I tried to get access to Telstra's facilities in Sydney, but was not permitted. In fact, although I write more about this subject than all other Australian journalists combined, I wasn't invited to Adelaide either, or advised by anyone officially that it was taking place!

The day before the 29 April announcement, Australia also celebrated the first anniversary of the infamous Port Arthur massacre in Tasmania where over 20 people died at the hands of a deranged gunman. This had triggered a nation-wide determination to recall and destroy all unnecessary weapons, which resulted in a fierce battle between pro-gun and anti-gun lobbies.

Consequently it was well-known beforehand that all Australian newspapers had plans to devote large sections of their news pages to multiple images of the formal ceremony (attended by political leaders and families of the victims) and discussion on gun control. Television coverage of the ceremonies and discussions on gun control filled all news and current affairs programs also. Radio had gun control on its mind, totally.

There would not have been a better day in the last few years in which to release a scientific story that the carriers and their spin-doctors wanted to cover up and keep quiet. This absolutely ensured that the official press-conference on April 29 was submerged in news coverage by the Port Arthur material.

After three years in almost total security, the story of the research finding was also leaked on the Sunday to the Hobart Mercury—in a way that has never been explained—meaning that "the scoop" was buried in a small provincial Tasmanian newspaper at a time of state and national mourning.

I had a contact in Adelaide who kept me informed, and I wrote the story for the national broadsheet, *The Australian*—thinking it could perhaps get front page coverage on the day after—but the news editor did not publish it at all, for reasons, she said, "of space", and later because she claimed it to be "old news" since it had been previously published in Hobart.

The story would not have got out to the wider world if I hadn't subsequently written full details in my columns on May 6 and May 15 (See both Appendix Z/3 and Z/4) explaining the significance, and I also circulated this material and some other notes to journalists around the world via e-mail and Internet forums.

The Adelaide Hospital study is now seen as probably the most significant research finding ever released which directly implicates radio frequency exposure as a potential cancer-promoter. It proves, almost beyond doubt, that radio exposures can have serious adverse effects on biological tissue—something long denied by the industry.

It does not link mice cancers to humans—but nor does any animal research. The importance also lies in the fact that findings were statistically highly significant (OR=0.999) and the research controls and protocols were excellent. What's more, neither the scientists or the funders could remotely have been said to have wanted these results to emerge.

In my opinion, they did everything they could (legally) to stop them being heard or understood. See the Government's response in Appendix Z/1.

4.3 ESAA mains-power study

This side of the study used 625 mice overall, with 97 being "sentinel wild mice" (just to check for random diseases).

The 528 transgenic mice were divided into five groups (111, 105, 103, 105, 104) and the first became the unexposed control (actually "sham-exposed" or pretend-exposed) group. The others were exposed to constantly levels of 1, 100 and 1,000 microTeslas of magnetic field which was carefully filtered to remove the normal "transients"—leaving just pure 50Hz waves.

Why this was done has never been explained—although it is probably understandable if the ESAA had feared that random radio frequency transients may have been causing or promoting cancer. It created results which could not really then relate to normal human exposure.

One other 1,000 microTesla group received exposure on a 15 minute on, 15 minute off cycle.

What they actually found (I have the full study report) is a substantial rise in lymphoma in the most exposed groups above that expected (15 per cent was expected, but the highest found was 30.5 per cent). However they also found a very substantial rise in the rate in the control group (15 per cent expected, and 28.8 per cent found). This was further confused by an unexpected form of kidney disease which also hit the exposed group harder than the unexposed, and so made the interpretation of any clear-cut results virtually impossible.

These are the facts:

— There were substantially higher levels of lymphoma in the exposed mice;
— There were higher levels of lymphoma in the unexposed mice;
— However the difference between the two was not significant in statistical terms:

— the highest exposed group had 32 cases or 30.5 per cent;

— the second highest having 35 cases or 33.6 per cent;

— the third highest having 27 cases or 26.2 per cent;

— the fourth highest having 31 cases or 29.5 per cent;

— the unexposed group having 32 cases or 28.8 per cent.

— The expected level of lymphomas in these mice (from historical records) was only 15 per cent—so even the unexposed mice were nearly double what had been expected. No one can explain this.
— There was also a high level of kidney disease with:

— the highest exposed group having 20 cases or 19.2 per cent

— the second highest having 16 cases or 15.2 per cent

— the third highest having 12 cases of 11.6 per cent

— the fourth highest having 9 cases or 8.5 per cent

— the unexposed group having 10 cases or 9 per cent.

One would normally assume the significance of this is fairly substantial. There is a clear fall-off in incidence between exposed and unexposed—regularly progressing downwards as exposure is reduced. In fact the report admits this is statistically significant.

However this was outside the parameters of the research design (to look at cancer-rate incidence) and appears just to have been ignored.

One valid assumption here, could be that the EMF exposure was effecting the immune response in general, which explains the slightly higher lymphoma rate and the much higher kidney disease rate in the exposed animals. Such a proposition was never considered, apparently.

— In terms of surviving the full 18 months of the research program:

— the highest exposed group had the least survivors—40 per cent

— the second highest group had 42 per cent survive

— the third highest had 50 per cent survive

— the fourth highest had 46 per cent survive

— the unexposed group had 45 per cent survive.

In other words, taken overall, less of the exposed mice survived—and the exposed mice clearly were more susceptible to kidney disease. The results therefore suggested that there could be health problems with high levels of 50Hz mains power. But fairly obviously these are not statistically significant findings taken overall, and you can't come to any conclusions without understanding what caused the kidney disease.

The only conclusion that anyone can make here with any certainty is that this research is worrying, and it certainly needs to be repeated urgently.

THERE IS NO WAY THIS RESEARCH CAN BE CONSIDERED AS PROVING THAT MAINS POWER EXPOSURE IS S AFE

Especially since so many epidemiological studies also point to low level increased incidences of childhood leukaemia. (See other material.)

4.4 How the release of information was handled in both cases

WHY DID THEY TAKE SO LONG?

The R/F cellphone study

The GSM cellphone study was published in the May 1997 edition of *Radiation Research* as "Lymphomas in Emu-Pim 1 Transgenic Mice Exposed to Pulsed 900 MHz Electromagnetic Field", by Michael H Repacholi, Antony Basten, Val Gebski, Denise Noonan, John Finnie and Alan W Harris. (See abstract Appendix Z/1.)

The claim is made that a two year delay resulted from:

— the need to confirm the finding of B-cell lymphomas

— the fact that three of the most prestigious peer-review publications refused to handle it because they didn't want to get involved in promoting this sort of controversy—despite the fact that the paper passed through peer-review with two publications easily and quickly.

I accept both of these arguments, having constantly experienced much the same resistance by editors to enter controversial fields, myself. My guess is that this explains half of the two-year delay, and a desire to let interest cool down explains the other year.

The ELF mains-power study

The second part of the Adelaide Hospital study was released nearly a year after the first (2 March 1998)—which was a full three years after the end of the mouse-exposure phase, and nearly three years after the analysis was first promised.

There is absolutely no excuse for this delay. The R/F study did present some problems, but not the ESAA according to the researchers themselves. They refuse to say why it took so long. But there were no B-cell implications that needed to be checked in Marylands—and the paper was published without the problems associated with the R/F study, so it could have been done in a few months.

This was clearly an attempt to let the publicity surrounding the R/F study blow over. No one wanted the claimed findings of safety to be examined too carefully. In July to December 1997 also, there was a very strong and very vocal reaction to the *New England Journal of Medicine's* Editorial (July 1997—See Appendix E/2)[45] calling for all funding of mains-power research to be curtailed. The UK *New Scientist* magazine also took this line in a story and an editorial. (See Appendix E/5.)[46]

This was followed, for many months after, by a spate of scientific letters and reports to editors of trade and scientific magazines pointing out that the "definitive" research (the NCI—Linet study) on which the *Journal* and *New Scientist* had based their claims, was incorrectly interpreted. However, I don't recall anyone ever printing a retraction.

In fact the NCI-Linet study confirmed numerous previous studies that showed a slight link between high mains-power exposure and childhood leukaemia. It is now used by everyone as one of the more definitive studies linking mains-power to ALL in children. (There are about 10 others with similar findings—mainly US and Swedish) and a few which are inconclusive.

HOW DID THEY RELEASE THE INFORMATION TO THE PUBLIC?

Cellphone

Through leaking it to a provincial newspaper in a day when Australia's interests were elsewhere, then holding the press conference in a remote part of the country and refusing to use a video-conference link already set up and paid for.

Mains Power

A Sydney press conference with all the trappings; press releases issued under the University of Sydney banner; one-to-one interviews for television news.

WHAT DID THE SCIENTISTS SAY THEY FOUND?

Cellphones

The theme of the press conference was to play down the significance and emphasise that this only applied to mice—not humans. The principal scientists who had done the work were not made available and they stopped questions very quickly after the key announcement and speech from Geneva by Repacholi.

The discussion section of the report leads off with a typical weazle-word statement that "this single study" (suggesting that the evidence is unique and isolated, when it is not) "cannot be applied directly to assessment of human cancer risk." (Has any animal research ever been directly applicable to human risk?)

This paragraph and the study itself is most notable for its complete lack of discussion about the meaning and implications of the positive effects—and for presenting as many reasons as they can think of for discounting the finding—and for suggesting that this could somehow be viewed as a trial on the usefulness of transgenic mice in radiation studies.

THE FACT IS THAT IT ESTABLISHED CLEARLY AND WITH LITTLE ROOM FOR DOUBT THAT THE INDUSTRY CLAIMTHAT "CELLPHONE RADIATION CANNOT POSSIBLY AFFECT BIOLOGICAL TISSUE AT NON-THERMAL EXPOSURELEVELS," IS A COMPLETE LIE

And this finding is only one of hundreds which have consistently shown this, with varying degrees of validity and credibility over many years. It fits almost perfectly into the overall "assemblage" of evidence accumulated by many different independent biomedical researchers from many varied studies on animals and cell-cultures.

Mains Power

The findings were finally made public at a Sydney press conference, complete with press releases from Sydney University's Centenary Institute headed "No Evidence for Cancer Link with Powerlines". The report was published also in *Radiation Research* journal.

Professor Basten sought out the ABC and commercial television stations and did one-to-one interviews with each, where he was quite adamant that this research now proved almost beyond doubt that power-lines did not cause cancer. I recorded three TV news programs that night, and each led with this statement, and each later included a Basten interview stating that power-lines now had the all clear.

The ESAA also issued a press release headed "Australian study reveals no evidence for EMF cancer link" which says:

> "The result is reassuring because the mice used in the study were particularly sensitive to showing subtle changes of any magnetic field effects [A total distortion—there is no known link between magnetic fields and lymphoma] and the magnetic field levels used in the laboratory were much greater than those experienced by people in daily life." [Actually some of them were at about normal exposure levels, and some were higher.]

WHAT WAS ACTUALLY FOUND (AS SHOWN IN THE REPORTS)?

Cellphones

- Highly significant increases in lymphoma in the exposed group compared to the unexposed.
- A different type of lymphoma in the exposed.
- A much more dangerous type of lymphoma in the exposed.
- Earlier onset of lymphoma in the exposed.

Mains Power

The result is confused by the kidney disease, and no real conclusions can be drawn. However, there were noted increases in both lymphoma (very small) and kidney disease (highly significant) in the exposed groups, and this needs urgent research to clarify.

WHAT CONCLUSIONS CAN BE DRAWN?

Cellphones

The claim that it is not possible for radio signals to affect biological tissue is resoundingly defeated. The indications are that cellphone type and level of radiation can act as a cancer promoter—and this needs urgent further work, and justifies the call for the application of the prudence principles.

Mains power

More and urgent research needs to be done (NO ONE IS DOING IT). This study has proved nothing—but suggests that compromise of the immune system might be the mechanism.

4.5 Manipulation of the media

What interests me here is the way in which the release of the information was manipulated—by the scientists, by the hospital, and by the ESAA and Telstra (it is often not clear which)—and sometimes by all of them together.

Remember, two and a half years after the completion of the study, not one word of results had leaked out. In the interim, Dr Repacholi had attended dozens of conferences and given dozens of interviews, and still vocally maintained his stance that there was no evidence connecting cellphone exposures to adverse health consequences—knowing all the time that his mice had shown a major, highly significant, increase in basal-cell lymphomas.

Yet Michael Repacholi told me off-the-record at a London Conference on 15 November 1997 (it is recorded in my journalist's notebook) that the research had turned up "nothing of any significance". He also revealed that the group had problems finding a publisher. I already knew this from another source in the research team. (See Appendix Z/12 e-mail from Repacholi also).

At the same London conference, he was very vocal in supporting industry claims that there were no studies linking cellphones to adverse health effects and strongly criticised a few scientists who had turned up positive results. There were dozens of people at the conference who can attest to this.

At this time Dr Repacholi was the head of WHO's EMF Project and probably the second most powerful cell-research-funding bureaucrat in the world (Dr George Carlo was the most powerful)—yet he was publicly denying and discounting his own unpublished research.

At that time Repacholi had known for over two years that the Adelaide Hospital research finding was the most significant link yet discovered. It had a "highly significant" p-value, and an Odds Ratio (OR) of 0.999—meaning that this doubling of leukemia in the exposed mice could only have arisen by chance once in a thousand experiments. This is 10 times more significant than the normal 1 per cent "high-significance" level in a very well-conducted live animal trial.

Even more significance lies on the difference between the exposed and unexposed groups—and in the fact that normal GSM cellphone handset exposure levels produced this cancer-promotion (not initiation) result with one hour of daily exposure over nine to 18 months.

So Repacholi's claim to me that the findings were "not significant", and also the fact that he continued to maintain at scientific conferences that there was no evidence that cellphones can be harmful, was not the truth. A number of scientists have also complained bitterly about this sort of conduct by Dr Repacholi, on this and other related matters—but this was my first and only experience.

HOW WAS THE STUDY CONCLUDED?

A point not made elsewhere in the literature is that, at the conclusion of the 18 month period of the study, the remaining live mice were killed—BUT NOT AUTOPSIED.

Since the level of lymphomas in the cellphone study had been rising steadily from six to 18 months, it would have been reasonable to assume that even more significant figures would have been found if the last live animals had been autopsied. This was not done—and I find this fact very disturbing.

HOW DID THE SCIENCE MAGAZINES HANDLE THE CELLPHONE STORY?

I couldn't get any of the electronics magazines interested, or the science magazines I sometimes write for, so finally I wrote a few columns (See Appendix Z) and followed up a year later with a couple showing how the industry was manipulating both the cellphone health issue and the electricity mains-power results (also included here).

I also wrote and circulated a couple of long pieces on the cellphone research to other journalists via the Internet. *New Scientist* then approached me to write 750 words on the subject.

This is a very short story for such a complex subject. They then rejected it and asked me to write a longer explanatory piece—which I did—and which they then cut to about 500 words, dumping all the explanatory material, and filling the page with public-relations rubbish from the US Cellular Telecommunications Industry Association saying why the study wasn't of much importance (See Appendix Z/10).

They published this under my name after very strong objections from me—and then refused to publish a letter where I disowned the second part of the story as it appeared. I now refuse to write for this publication, or their sister publication *Electronics Weekly.*

5. THE INDUSTRY REACTION—THE FINNISH STUDIES

A few weeks after the news of the Adelaide Hospital research spread around the world, Nokia and the European manufacturers mounted a tactical response. They dragged out two studies that they had funded to prove that cellphones were safe.

They hurriedly put together a Helsinki press-conference (May 22 1997), based on the work of Maila Heitanen (completely unknown in the R/F research field), who had subjected 19 University students to an electro-encephalogram and switched a GSM phone on in the room, while watching the brain waves.

She concluded that there was no change in the brain waves.

To build up some credibility, they also had a progress-report by Jukka Juutilainen (a highly respected researcher in this field) who was part-way through a mouse study (which appears never to have been published).

They then had Reuters issue a press release which went around the world, and was widely quoted as:

MOBILES SAFE, STUDY FINDS, BUT THEY DO HEAT BRAIN or FINNISH STUDY FINDS NO HEALTH HAZARDS IN MOBILES

An amazing number of newspapers and magazines around the world carried this as a lead story, because if followed the "scare story" of the Adelaide mice by only a few weeks—and it kept advertisers happy—and it arrived as part of Reuter's regular news feed.

The full details are in Appendix F, including my e-mail correspondence with the two scientists, asking how they got caught up in this sham.

You will find this most instructive.

It is not unusual. In fact, I would say this sort of "good-news" publication is the dominant form of cellphone-and-health news circulated by the major press agencies.

See how they handled the UK Preece study.

6. THE CTIA, WTR, DR GEORGE CARLO AND THE US RESEARCH EFFORT

The research effort supposedly mounted by the Cellular Telephone Industry Association (CTIA) in the USA is pretty much a sham from start to finish. More money has been spent on junkets, conferences for scientists who are willing to play along and on research intended to find nothing, than on legitimate research.

I think there has only been a couple of legitimate research fundings although $27 million has supposedly been spent in the last few years.

The CTIA chose Dr Carlo to run the WTR, not because of his scientific research expertise—he has none—but because he is a well-known scientific "fire-fighter" who can organise sham science when industries are subject to attack.

His biography is up at my site lebelled "Dr George Carlo—This is your life." <http://electric-words.com/radiation/carlo.html>

All the information here can easily be checked on-line.

My first experience of Carlo was when he arrived in Australia in 1990 as an "independent dioxin expert" hired to check Melbourne's water supply after a spill of the herbicide 245-T by a company called NuFarm.

His report abstract is in Appendix G/1.

He gave the water supply a clean bill of health, and this was accepted by authorities.

At that time I was involved in dioxin research. What we didn't know was that:

— Dr Carlo was a paid consultant in the USA to the Chorine Institute which lobbies on behalf of dioxin-producing companies.
— He was (or became) the technical director for drug companies Pharma and Pharma Pacific—which, like NuFarm—was a subsidiary of the New Zealand chemical company Fernz.
— Carlo has no biomedical qualifications. He is a statistician/epidemiologist with a law degree. He wouldn't know how to test for low levels of dioxin in a fit.
— His associate "scientists" on this paper (Sund and Baller) have even less qualifications than Carlo. One appears to be his secretary, and the other is a contract lawyer in Washington.

I only found out about this when I began to look into the background of the key scientist that the cellphone industry had decided would control the initial $1 million token research effort. Later the US Senate made them put up $25 million.

There is a lot of material here, which just serve to show that the US choice of "chief scientist" is a total sham. Carlo is a lobbyist and science-for-sale entrepeneur with a dozen different companies, and financial interests in drug companies pushing immunisation products, and he employs a large number of people doing research who have little or no experience, and often little or no qualifications.

As the WTR money is running out, he is now shifting his attention from cellphones to breast implants, and runs the "Breast Implant Public Health Project: A Public Health Alternative" for Dow Corning.

The material here (Appendix G)[47] and at my site will tell you more in 10 minutes of reading about this man, and the genuineness of the CTIA's research efforts, than anything I can write here today.

THIS IS IMPORTANT:

Firstly

It is important to separate the cellphone handset exposure problems from the tower problems and the so-called Blue-World or Blue-Smog fears.

Secondly

However, don't necessarily separate the radio-frequency (including microwave) problems from the powerline. There are pulses in cellphones which give them frequencies close to those of power-lines, and there are "transients" in power-lines which are almost identical to radio transmissions.

Thirdly

Recognise that this area of research involves a wide range of disciplines than almost any other—and this complicates the matter. It requires highly skilled, dedicated researchers who understand dosimetrics (how exposure measures can be compromised or incorrect) and who have a deep understanding of molecular cell biology. An enormous amount of expensive research is being done by people who only understand about 10 per cent of what they should know—I find this every second time I talk to someone doing this research. Their ignorance of some basics is often extraordinary—on both sides of the divide.

Fourthly

Be aware that there are strong prevailing prejudices and knowledge-fashions in some of these disciplines which makes them "certain" when they should be curious. Often their claims of "expertise" are dubious because they are so narrow and focused in their knowledge.

Here are some of the fashions of thinking:

(a) ***Ionising radiation physics and physiology***

> These experts know, without the need for any further investigation, that it is impossible for non-ionising radiation to have sufficient energy in the photons to disrupt hydrogen co-valent bonds in biological materials and chemicals. Only X-rays and above can do that.

Therefore, in their view, it is not possible for R/F to create adverse health effects at levels below those which cause a temperature rise of at least 1 degree Celsius.

The only problem with this theory is that it is wrong, and is known to be wrong by anyone who has studied a range of bio-medical subjects. For instance, a dark-adapted eye can see a distant star when only one photon could possibly have triggered the chemical-based retinal cell response. This is non-ionising radiation triggering a series of chemical-based cell-responses at energy levels which can only be minute fractions of a per cent of the thermal threshold.

There are a couple of reasons why this is possible. Bonds don't necessarily need to be broken to have a biological effect. Often they flip in a left-versus-rights way; and stochastic resonance can use the inherent "noise" in biological systems to super-sensitise the cell actions.

(b) ***Radio engineers***

These people look on the body as nothing more than a complex electrical circuit, and want to treat it as if it were some homogeneous electrical or magnetic mass—like a dipole antenna. They involve themselves in endless discussions about resonant frequencies of the head, and the coupling effect of the handset with head-tissues, and try to derive judgements of likely biological mechanisms from their

understanding of copper+transistor electrical circuits. They see DNA as a crystal-set coil, and tissue layers as condenser plates.

They have been taught from early university days that radio frequencies can't harm people below the thermal limit, and since they rise to prominence through electronic engineering associations and cellphone companies and now occupy the key positions in each national standards committee, these views hold enormous sway in setting exposure standards.

Generally these standards were devised in order to prevent intentional or unintentional radio transmitters from interfering with other electronic circuits nearby. Health concerns were tacked on to these pre-defined standards for occupational reasons (mainly after war-time experience with radar and ship-transmitter inadvertent exposures), usually by the rather arbitrary inclusion of the 1 degree Celsius "thermal safety limit".

Later, when the possibility of non-thermal effects began to be discussed in the community, it was these people (now running the national and international standards committees) who have been charged with deciding what is a safe exposure level and what is not.

Quite apart from their obviously partisan position as company and industry representatives, they are of the old-time "practical engineering" school, who rather despise environmental and health activists—especially if they seem to have a lot of ridiculous fears (which they inevitably do).

THE PROBLEM IS THIS

Nothing has been "proved" in the scientific sense about the dangers of cellphones—and most of the public fears are misdirected at cellphone towers, whereas virtually all the scientists see the handsets as the problem.

They see this as a long-term potential problem rather than anything critical—and most believe that the problem could be alleviated by a bit of phone design to get the antenna away from the head (perhaps putting it at the other end, below the microphone).

There are now strong indications that there will be a significant health problem in 10 years or so. This, I feel is now reasonably well established, but it is difficult to say what form this might take. This is not apparently a problem that has one-to-one links, like asbestos and mesothelioma—or cigarettes and lung-cancer. The range of effects appears to be quite wide, probably involving growth, ageing and immune responses. This itself creates a problem.

As a society we are use to dealing with environmental-diseases where the effects have a strong link with one cause. Tobacco and lung-cancer, for instance, was recognised long before tobacco was linked to heart problems and breast-cancer, because these have alternate causal links. Asbestos only became widely recognised as a cause of cancer when it showed a near perfect link with mesothelioma (and no other cause for mesothelioma was known). Prior to that it had an indefinite link with smoking and lung-cancer.

When clear-cut one-to-one links like that between mesothelioma and asbestos are lacking, the disciplines of medical science and statistical analysis have a very difficult job in establishing cause-effects links.

The reason why it is becoming more difficult to establish links like these could well be that the easy work has already been done. Now medical science is being asked to deal with:

1. those which have shot-gun effects over a wide-range of health conditions (attacks on immune system, promotion rather than "cause" of cancers and those involving hormonal or cell-messenger responses).
2. those which create conditions indistinguishable from ageing (Alzheimers and Parkinsons; memory loss).
3. those which may appear to be psychologically based, rather than biologically (above, plus chronic fatigue, sleep problems, electro-sensitivity, tension and headaches, etc).
4. those which have a long-term, rather than any critical relationship between cellphone use and the health problems.
5. those which have an inverse exposure response (light exposure may cause DNA disruptions and mutations; heavy exposure may kill the cells):

(a) R/F might be varied in its effect.

Brain cancers and Alzheimers are the two most publicised likely effects, but the evidence is more that these are just the two associated with the exposed area of the body. Many scientists believe the effects are more broad-spectrum in nature, involving immune system responses, or blocking normal apoptosis (programmed cell-death) processes and leading to cancer and similar conditions. But there are also signs of neurological (perhaps psychological) conditions such as headaches, memory changes, etc. This is not likely to be a causal connection which has direct and clear-cut relationships.

(b) R/F is certainly insidious in effect.

There is not likely to be any critical or dramatic symptoms from most of the conditions. Therefore it is unlikely that any causal connection will be obvious to users—apart, perhaps, from headaches and so-called "electro-sensitivity" (if this proves to be real).

(c) R/F exposure effects are likely to be very long-term in nature.

No one expects cellphone users to be dropping dead in the streets while using a cellphone. The nature of the problem is much more likely to surface after 10 or 20 years of use.

(d) R/F effects are likely to be low-level in terms of incidence, but still a massive public health problem.

It is likely that these problems may only affect a few per cent of the user population. The unlucky ones could either be:

(i) genetically predisposed;

(ii) super-sensitive by reason of previous exposures to other cancer-causing agents;

(iii) high-users;

(iv) subject to cumulative effects associated with mains-power, and/or other radio emitters (VDUs, etc).

11 June 1999