

AUDIENCE AND CONSUMER AFFAIRS

INVESTIGATION REPORT

Catalyst *Wi-Fried?*

Broadcast 16 February 2016

Introduction

The Catalyst program *Wi-Fried?* investigates whether wireless devices and Wi-Fi could be harmful to our health. The website description states:

You cannot see it or hear it but Wi-Fi blankets our homes, our schools and our cities. Australia's safety agency says there's no evidence of harm, but that's not the same as saying it's safe. A growing number of scientists are concerned that the widespread use of Wi-Fi and Wi-Fi-enabled devices could be slowly making us sick. In this Catalyst investigation, Dr Maryanne Demasi explores whether our wireless devices could be putting our health at risk.

The program has further explained to Audience and Consumer Affairs:

The report ... set out to investigate the legitimate and ongoing debate between radiofrequency microwave radiation and health effects like cancer. The program and its producers recognise there is a debate, understand that the science is not settled and that it is an issue of public concern. Catalyst spoke to those who consider the increased risk to be significant and concerning, and to others who do not consider it to be significant, including a spokesman for ARPANSA (Australian Radiation Protection and Nuclear Safety Agency) and the industry body AMTA (Australian Mobile Telecommunications Association).

The complaints we are considering, including a detailed complaint from AMTA, the peak body for the mobile telecommunications industry in Australia, allege a number of inaccuracies and a lack of impartiality. Many of the complaints claim that the program failed to present the weight of scientific evidence on the topic, and that credible peer reviewed science was ignored in favour of the unorthodox and unsubstantiated view that wireless devices and Wi-Fi pose a significant health risk.

Catalyst's published response to criticism of the program is available on its website - <http://www.abc.net.au/catalyst/stories/4408824.htm>.

ACCURACY

The ABC has a statutory duty to ensure that the information presented in programs, such as Catalyst, is accurate according to the recognised standards of objective journalism. The credibility of the ABC depends heavily on maintaining factual accuracy.

The ABC's Editorial Policies require that reasonable efforts must be made by program makers to ensure accuracy which is gauged by reference to:

- the type, subject and nature of the content;
- the likely audience expectations of the content;

- the likely impact of reliance by the audience on the accuracy of the content; and
- the circumstances in which the content was made and presented.

Having considered these factors, we regard the following as particularly relevant:

- Catalyst is a highly regarded science program which reaches a wide audience. Over a long period, it has developed a reputation for communicating complex scientific ideas in a straightforward, easy to understand manner. It describes itself as the ABC's flagship television science program.

- The subject matter of the program was a matter of public importance, considering the prevalence of mobile phones and Wi-Fi.

It is our view that given the reputation of the program and the importance of the subject matter, audiences were likely to expect a high degree of accuracy; and that this edition of Catalyst was obliged to observe high standards of accuracy.

Relevant editorial standards for accuracy:

2.1 Make reasonable efforts to ensure that material facts are accurate and presented in context.

2.2 Do not present factual content in a way that will materially mislead the audience. In some cases, this may require appropriate labels or other explanatory information.

Complaint: Catalyst failed to explain Group 2B Carcinogen classification and conflated the established concerns about mobile phones with the use of Wi-Fi

C7354-16

"The WHO Class 2B carcinogen classification which was repeatedly referred to - relates to exposure from hand held devices - and not to environmental exposures to radio frequency including wifi, TV and radio broadcasts and mobile networks. (Holding a mobile phone, or a radio transmitter - right next to the head is relatively new - and exposes the user to about 500,000 more radio frequency than ambient, environmental exposure from signals present in the environment - including your broadcast signals - which are not new and have been present for decades.)

This was never explained at all - and in general the story terribly conflated the science relating to mobile device exposures to the head and ambient exposure to radio signals - leading everyone to believe that wifi and wireless networks generally may cause brain cancer."

C6944-16

"...mobile phones may cause certain cancers but no link regarding wifi causing cancer was provided."

"They did not present any evidence to support the claim that wifi explicitly causes cancer despite the provocative program title – mobile phones may cause certain cancers but no link regarding wifi causing cancer was provided." "...because they couldn't test it [wifi in school] – they inferred it was unsafe."

C10019-16

“Also with regard to Standard 2.2, there are repeated references (implicitly and explicitly) to WiFi’s ‘association’ with cancer. Again, the episode plays on the logical fallacy that confuses correlation with causation. This fallacy is repeated many times throughout the episode in a manner likely to ‘materially mislead’ the audience.”

Transcript:

Dr Maryanne Demasi: Professor Bruce Armstrong was part of an expert panel on radiation which gathered for the International Agency for Research on Cancer, or IARC. The panel was tasked with analysing whether radiofrequency radiation could cause cancer.

Professor Bruce Armstrong: Its decision was, essentially, that it possibly causes cancer.

Dr Maryanne Demasi: That means radiofrequency radiation is now classified as a Class 2B possible human carcinogen.

[...]

Dr Maryanne Demasi: One study involving 14 countries is currently assessing whether use of mobile phones at an early age increases the rates of early on-set brain tumours in 1,000 young people. The results will be released this year. Unlike mobile phones which can be switched off, Wi-Fi exposure is constant.

Kevin Rudd: This is the toolbox of the 21st century, OK?

Dr Maryanne Demasi: The 2008 education revolution under the Rudd Government led to the roll-out of Wi-Fi routers in public schools across the country, but some parents are concerned about their children's exposure to Wi-Fi in the classroom.

Libby Laura: Basically when a child starts high school, they're at school from anywhere from four to six years, and they're sitting in radiofrequency microwave radiation, the 2B possible carcinogen, and the routers are pulsing all day, every day. On top of that, you've got mobile telephones, you've got their laptops, so you've got this whole layering of radiofrequency microwave radiation that we've never been exposed to before in the past. With regards to that layering effect, who's to say what the consequences of that will be for that child's long-term future?

Dr Maryanne Demasi: Unfortunately, we weren't granted access to measure the levels of Wi-Fi radiation in this school. The Department of Education didn't respond directly to our question about the risks of exposing children to Wi-Fi, but they did state the Australian Government is supporting research into the effects of electromagnetic energy on people's health.

Catalyst Response

“The 2B possible human carcinogen was given to ALL RF-EME [radiofrequency electromagnetic energy], not based solely on mobile phones.

Again, any expert familiar with the IARC ruling in 2011 would know this and we question the veracity of these complaints.

The IARC classification refers to the “**RF**” part of the electromagnetic spectrum, not just the few specific frequencies used for mobile/wireless/cordless phones.

According to ARPANSA, RF electromagnetic radiation sources are:

“Radio and television broadcasting, mobile phones, pagers, cordless phones, police and fire department radios, point-to-point links and satellite communications all produce RF EMR. Other sources of RF fields include microwave ovens, radar, industrial heaters and sealers, and various medical applications. <http://www.arpansa.gov.au/radiationprotection/basics/rf.cfm>”

*Also, the **attached** IARC notification - <http://about.abc.net.au/wp-content/uploads/2016/07/IARC-notification-31-May-2011.pdf> - explicitly states they evaluated the scientific literature in a range of RF-EMR exposure studies (epidemiologic, animal and cell culture studies) **beyond** wireless phones...*

Assessment

The IARC, International Agency for Research on Cancer, is the specialized cancer agency of the World Health Organisation (WHO). The IARC formed a working group of 31 scientists from 14 countries to assess the potential carcinogenic hazards from exposure to radiofrequency electromagnetic fields. The working group looked at available literature in the following exposure categories involving radiofrequency electromagnetic fields:

- occupational exposure to radar and to microwaves;
- environmental exposures associated with transmission of radio signals for radio, television and wireless telecommunication; and
- personal exposure associated with the use of wireless telephones.

Although the working group considered a number of different exposure categories, it was clear in both the IARC Monographs Volume 102 Non-Ionizing Radiation, Part 2: Radiofrequency Electromagnetic Fields report and the 31 May 2011 IARC Press Release, that the IARC “*has classified radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group 2B), based on an increased risk for glioma, a malignant type of brain cancer, associated with wireless phone use.*”

The IARC working group found there to be limited evidence in humans for the carcinogenicity of radiofrequency radiation and that positive associations were only observed between exposure to radiofrequency from wireless phones and glioma or acoustic neuroma (a benign, slow-growing tumour originating in the ear canal). Working group Chairman Dr Jonathan Samet was clear that the classification of Group 2B indicated “that there could be some risk, and therefore we need to keep a close watch for a link between cell phones and cancer risk.”

The IARC classification of radiofrequency electromagnetic fields as possibly carcinogenic to humans does apply to the spectrum of radiofrequency electromagnetic fields as Catalyst state. However, it is clear that the IARC working group determined this classification based on the positive association between mobile phones and glioma.

Audience and Consumer Affairs are satisfied that Dr Maryanne Demasi and Professor Bruce Armstrong's statements ("that means radiofrequency radiation is now classified as a Class 2B possible human carcinogen" and "Its decision was, essentially, that it possibly causes cancer") were sufficiently contextualised within the discussion about the potential risks posed by mobile phones. In making this finding we have taken into account the video overlay which accompanied discussion of IARC's task, which included an image of a scientific report titled 'Are Cell Phones a Possible Carcinogen? An Update on the IARC Report'. We also note that at the conclusion of the excerpt with Professor Armstrong, Dr Demasi's narration refers to *"heavy users ... who talk on a mobile 30 minutes a day for longer than 10 years"*.

Later in the program concerns specifically about Wi-Fi are considered. Parent Libby Laura is introduced and she references the scientific findings of the IARC classification and makes claims about the *"layering effect"* of radiofrequency microwave radiation in today's schools. Arguably, because Ms Laura is not a scientist, the audience expectations that her comments be scientifically accurate are lower than the expectations of comments by Dr Demasi or Professor Armstrong.

However, credence is given to Ms Laura's claims by subsequent comments from Dr Davis, Frank Clegg and Dr Demasi. In the context of the discussion about Wi-Fi use in schools Mr Clegg asserts that *"industry is on a campaign to bury the science and confuse the message on the harmful effects of wireless devices...one of the best analogies I've heard in this scenario is using the tobacco model where we know the first science came out showing smoking cigarettes caused harm back in the 1960s, and the tobacco industry was able to delay legislation, delay the message to the public for decades."*

In Audience and Consumer Affairs view, insufficient context was provided for the extrapolation of the positive association found in some studies between heavy mobile phone use and glioma and the possible health impacts of Wi-Fi. The program offered no explanation why Wi-Fi should be considered equivalent to mobile phone use with regard to possible carcinogenic effects other than the broad Group 2B classification. As discussed above, although the Group 2B classification applies to all radiofrequency electromagnetic fields, the IARC's determination was made on the basis of studies of wireless phones *only*, which found a positive association between heavy use and glioma, and not Wi-Fi or Wi-Fi routers.

The program initially considers mobile phones and the possible carcinogenic risk posed by heavy use. In considering the relationship between Wi-Fi and mobile phones, Dr Demasi states *"Unlike mobile phones which can be switched off, Wi-Fi exposure is constant"*. No further context is provided to explain why Wi-Fi is being considered other than its classification within the broad radiofrequency electromagnetic field spectrum.

While it is legitimate for Catalyst to consider the potential health effects of Wi-Fi in light of the IARC finding, the concerns raised by Ms Laura, Mr Clegg and Dr Davis required further context. No specific scientific studies are discussed or provided to illustrate the potential health effects of Wi-Fi and only mobile phone research was relied upon to establish a concern with Wi-Fi, based on the IARC's classification of radiofrequency electromagnetic fields.

Crucially, it was not made clear in the program that the 2B classification, though applicable to all radiofrequency electromagnetic fields (any frequency in the range of 30MHz to 300GHz), was determined *specifically* on studies about wireless phones.

Without sufficient context, Audience & Consumer Affairs believe that the audience was likely to be materially misled about the connection between the health risks that some studies have observed

from heavy mobile phone use and the potential risks of Wi-Fi. Further, it had the effect of materially overstating the potential health concerns associated with Wi-Fi use.

Finding: Breach of 2.2

Complaint: This episode of Catalyst is underpinned by the Bioinitiative Report which has been discredited

C7354-16

“By contrast, the Bioinitiative Report, which has been widely criticised in scientific circles, was highlighted by Catalyst as evidence of doubt and reason for concern. The visual treatment of this report – with the stream of doctors names rolling down the screen was highly suggestive. We did not see this visual treatment for the 1300 papers included in the ARPANSA standard review...By highlighting a document of dubious scientific merit, and by failing to disclose that it has already been given whatever due it deserved from ARPANSA, Catalyst has again scared and misled its audience.”

C11765-16

“In fact, the program did the opposite and referenced a self-published report by a group of scientists, the Bioinitiative Report, which came to a different conclusion and has been widely criticised by independent health authorities. Catalyst provided a link to this report at the end of the program’s transcript but no links to any of the other significant scientific reviews, giving the Bioinitiative Report undue significance while excluding the weight of views of the scientific mainstream.”

Transcript:

Dr Maryanne Demasi: Mr Clegg points out that the safety standard only protects people from thermal damage that can occur through overheating. But scientists have demonstrated that radiation emitting devices can cause DNA damage without heating tissue. These are non-thermal effects.

Frank Clegg: Unfortunately, the safety standard in North American and Australia are based on this theory that’s many decades old that if tissue doesn’t get heated, then it can’t cause harm. That’s just out of date, and what biologists tell us and have shown in many experiments, and again, peer-reviewed published papers, that there is damage done at the DNA level, and from a biological standpoint, non-thermal radiation can and does cause harm to humans.

Dr Maryanne Demasi: For example, there is strong evidence to suggest that mobile phones can damage sperm, as might occur when a male keeps his smart phone in his pocket.

Dr Devra Davis: If you take sperm from a healthy man and you put sperm in one test tube which gets no exposure with a mobile phone and the other gets exposure, the mobile phone exposed sperm die faster, have more damage to their mitochondrial DNA which is the engine that makes the cell run, and studies around the world consistently find the heaviest cell phone users have the lowest sperm count. Those studies have not been considered recently in reviews and there are new data emerging all the time.

Dr Maryanne Demasi: This BioInitiative Report sets out hundreds of peer reviewed papers confirming the biological changes caused by wireless transmitting devices which can occur thousands of times below the safety threshold. It's been formulated by independent doctors and scientists from over ten different countries, but ARPANSA has a different view.

Dr Ken Karipidis: There's certainly some studies that have shown effects on sperm, but there's many other studies that haven't. There is no consistent evidence that there's established biological effects other than rising temperature. The evidence is really inconsistent, and not good enough at the moment to say that mobile phones do affect sperm.

Catalyst Response:

"The Bioinitiative Report is not peer-reviewed itself BUT it is a report containing a review of thousands of peer-reviewed papers...To raise doubt about the quality or validity of the peer-reviewed research papers listed in the Bioinitiative Report is both spurious and misleading...

The peer-reviewed papers which feature in the Bioinitiative report provide strong support for the statement made by Frank Clegg...

...a case can be made that even though official bodies like ARPANSA disagree with the Bioinitiative Report, they may actually be viewed as the dissenting voice in this debate given so many other countries around the world, disagree with them."

Assessment:

The Bioinitiative Report¹ was initially published online in 2007 and updated in 2012; the report was not peer-reviewed or published in a reputable science journal. According to the ARPANSA review of the Bioinitiative Report, the 2012 report consists of *"a collection of separate chapters written by individual authors, rather than a consensus view of an expert panel. The various chapters do not have a standardized format and only one chapter mentions any criteria used to select the studies on which it is based. The report discusses selected research results indicating the possibility of harmful effects beyond those considered established by the mainstream scientific community."*²

When initially released, the Bioinitiative Report was widely criticised for lacking in balance and cherry-picking the reports analysed in order to show that radiofrequency electromagnetic radiation has a biological effect, including by:

- Australian Centre for Radiofrequency Bioeffects Research (ACRBR)

"Overall we think that the BioInitiative Report does not progress science, and would agree with the Health Council of the Netherlands, that the BioInitiative Report is 'not an objective and balanced reflection of the current state of scientific knowledge'. As it stands it merely provides a set of views that are not consistent with the consensus of science, and it does not provide an analysis that is rigorous enough to raise doubts about the scientific consensus."

<http://about.abc.net.au/wp-content/uploads/2016/07/ACRBR-Bioinitiative-Report-18-DEc-2008.pdf>

¹ <http://www.bioinitiative.org/>

² <http://www.arpansa.gov.au/radiationprotection/emr/literature/january13.cfm>

- The European Union's European Commission EMF-NET Review:

"There is a lack of balance in the report; no mention is made in fact of reports that do not concur with the authors' statements and conclusions. The results and conclusions are very different from those of recent national and international reviews on this topic."

<http://about.abc.net.au/wp-content/uploads/2016/07/EMF-NET-Comments-on-the-Bioinitiative-Report-Oct-2007.pdf>

The Bioinitiative Report was also criticised by: the Health Council of the Netherlands, the Institute of Electrical and Electronics Engineers, the German Federal Office for Radiation Protection, the French Agency for Environmental and Occupational Health Safety and the Indian Council of Medical Research.

Although the program did acknowledge that "ARPANSA has a different view" to that expressed in the Bioinitiative Report, the program did not acknowledge the significant scientific criticisms and shortfalls of the Bioinitiative Report itself.

Without addressing the criticism of the Bioinitiative Report as selectively choosing papers which all support the thesis that radiofrequency electromagnetic fields cause biological changes without overheating, sufficient context was not provided in the program and was likely to materially mislead viewers.

Although the Bioinitiative Report was directly referenced during the discussion about the potential impact on sperm, the Bioinitiative Report was cited in the program as "*confirm[ation that] biological changes caused by wireless transmitting devices...can occur thousands of times below the safety threshold.*" The Bioinitiative Report underpins the argument put forth in the program that non-thermal effects can cause biological changes including, but not limited to, declines in fertility and increases in brain tumours.

While it is clearly at Catalyst's discretion which research is referenced in the program, that research must be presented in context. In this instance the lack of information provided to the audience had the effect of materially overstating the credibility and independence of the Bioinitiative Report.

Finding: Breach of 2.2

Complaint: Catalyst erroneously claimed that mobile phones destroy sperm

C11765-16

"We [AMTA] also provided Catalyst with SCENIHR's conclusion on fertility, but only Dr Davis's views were represented, in which she highlighted studies which were part of the SCENIHR's review. The SCENIHR Opinion concluded: "*The previous SCENIHR Opinion concluded that there were no adverse effects on reproduction and development from RF fields at non-thermal exposure levels. The inclusion of more recent human and animal data does not change this assessment.*"

Transcript

Dr Maryanne Demasi: Mr Clegg points out that the safety standard only protects people from thermal damage that can occur through overheating. But scientists have demonstrated that

radiation emitting devices can cause DNA damage without heating tissue. These are non-thermal effects.

Frank Clegg: Unfortunately, the safety standards in North America and Australia are based on this theory that's many decades old that if tissue doesn't get heated, then it can't cause harm. That's just out of date, and what the biologists tell us and have shown in many experiments, and again, peer-reviewed published papers, that there is damage done at the DNA level, and from a biological standpoint, non-thermal radiation can cause and does cause harm to humans.

Dr Maryanne Demasi: For example, there is strong evidence to suggest that mobile phones can damage sperm, as might occur when a male keeps his smart phone in his pocket.

Dr Devra Davis: If you take sperm from a healthy man and you put sperm in one test tube which gets no exposure with a mobile phone and the other gets exposure, the mobile phone exposed sperm dies faster, have more damage to their mitochondrial DNA which is the ending that makes the cell run, and studies around the world consistently find the heaviest cell phone users have the lowest sperm count. These studies have not been considered recently in reviews and there are new data emerging all the time.

Dr Maryanne Demasi: This Bioinitiative Report sets out hundreds of peer reviewed papers confirming the biological changes caused by wireless transmitting devices which can occur thousands of times below the safety threshold. It's been formulated by independent doctors and scientists from over ten countries, but ARPANSA has a different view.

Dr Ken Karipidis: There's certainly some studies that have shown effects on sperm, but there's many other studies that haven't. There is no consistent evidence that there's established biological effects other than rising temperature. The evidence is really inconsistent, and it's not good enough at the moment to say that mobile phones do affect sperm.

Catalyst Response

"Mobile phone exposure is associated with less motility, vitality and more damage to mitochondrial DNA and it has been demonstrated to occur in a dose response manner.

[...]

Aitken et al 2009 – Abstract and Figure 1 on Page 3 show exposure to RF-EMR decreased

- VITALITY (sperm vitality was significantly reduced from the control value of 82% to 29% for the exposed cells (**p,0.001))
- MOTILITY (sperm motility was also significantly reduced from the control value of 82% to 28% (**p,0.01))
- DAMAGE increased via reactive oxygen species (ROS) (ROS production was increased after RF-EMR exposure such that 28% of the cells were producing ROS, while only 7% of the controls contributed to ROS production (**p,0.001))

Mostafa et al 2015 – mobile phone radiation caused genotoxic damage to DNA state in abstract and results page 132. It states:

"There was a significant decrease in sperm motility, sperm linear velocity, sperm linearity index, and sperm acrosin activity, whereas there was a significant increase in sperm DNA fragmentation

percent, CLU gene expression and CLU protein levels in the exposed semen samples to RF-EMF compared with non-exposed samples”

Argarwal et al 2009 – mobile phone radiation decreased sperm motility and viability as state in abstract and results on page 1321.

[...]

[Catalyst response regarding Dr Davis’ claim that “studies around the world consistently find the heaviest cell phone users have the lowest sperm count”]

Adams et al 2014 – a meta-analysis of TEN studies, including 1492 samples showed exposure to mobile phones was associated with reduced sperm **motility** (mean difference -8.1% (95%CI -13.1, -3.2)) and **viability** (mean difference -9.1% (95% CI -18.4, 0.2)), but the effects on concentration were more equivocal. We conclude that pooled results from in vitro (**IN TEST TUBE**) and in vivo (**IN HUMAN STUDIES**) studies suggest that mobile phone exposure negatively effect sperm quality.

Agarwal et al 2008 – cell phone use affect sperm quality as stated in **abstract** (and in conclusions on page 126)

“Use of cell phones decrease the semen quality in men by decreasing sperm count, motility, viability, and normal morphology”

La Vignera et al 2012 – a mini-review of studies showing the effect of exposure to mobile phones and male reproduction. Summary in abstract page 1 shows that: The result showed that human spermatozoa exposed to RF-EMR have decreased motility, morphometric abnormalities, and increased oxidative stress, whereas men using mobile phones have decreased sperm concentration, decreased motility (particularly rapid progressive motility), normal morphology, and decreased viability. These abnormalities seem to be directed related to the duration of mobile phone use. “

Assessment:

In Audience and Consumer Affairs view, and as highlighted by AMTA, the program may have benefited from inclusion of the SCENIHR (The Scientific Committee on Emerging and Newly Identified Health Risks) Opinion stating that in the 2015 review, recent animal and human data does not change the assessment that there were no adverse effect on reproduction and development from RF fields at non-thermal exposure levels. AMTA drew this information to Catalyst’s attention prior to the broadcast.

The comments by Dr Karipidis do illustrate that there is not sufficient scientific evidence currently to say that mobile phones affect sperm. However, Dr Karipidis’ comments were preceded by Dr Demasi’s statements that *“there is strong evidence to suggest that mobile phones can damage sperm”* and *“this Bioinitiative Report sets out hundreds of peer reviewed papers confirming the biological changes caused by wireless transmitting devices”*. Dr Demasi’s comments served to throw some doubt on the veracity of ARPANSA’s response.

However, because Dr Karipidis was afforded the opportunity to challenge Dr Davis and Mr Clegg’s assertions, on balance Audience and Consumer Affairs are satisfied that in this instance despite the shortfalls discussed above, sufficient context was provided to viewers about the lack of scientific consensus regarding the impact of mobile phones on sperm.

Finding: No breach of 2.1

Complaint: Data and studies referred to by Dr Devra Davis in the program were cherry-picked and misinterpreted

A number of complainants took issue with the amount of time afforded to Dr Davis in the program, and to the information she provided. Audience and Consumer Affairs have assessed some of the material factual statements made by Dr Davis against the accuracy standards.

C6966-16

“I am not going to rebut the episode here but I will mention one thing in the episode completely overlooked. Why was the difference between ionising and non ionising radiation not further investigated? ... Why was Dr Devra Davis’ studies that had been not only cherry picked (briefly mentioned in the show) but had hugely misinterpreted results not shown in the program. This might as well have been a paid promotion for Davis.”

C8720-16

“...none of Devra Davis’ factual claims were subjected to any degree of scrutiny, such as would quickly reveal the erroneous nature of the statement like ‘when the bombs fell at the end of WWII on Japan, we followed every person who survived. 40 years is how long it took for brain cancer to develop after exposure’.

C6944-16

“The program also made reference to nuclear bomb causing cancer 40 years later; which is caused by ionising radiation, while wifi is non ionising radiation. This link does not have any scientific basis and is sensational.”

C7079-16

“A quote from her piece was especially baffling: ‘every single well-designed study ever conducted finds an increased risk of brain cancer with the heaviest users, and the range of the risk is between 50 percent to eightfold. That’s a fact.’ IT IS NOT A FACT. It is the EXACT OPPOSITE of a fact, it is COMPLETELY INCORRECT and this is a DISGUSTING example of what ‘science journalism’ means on the ABC these days.”

C7309-16

“...you drew a distinction between ‘ionising radiation like X-rays’ and ‘non-ionising radiation like microwaves’. Whilst this is entirely correct, this is misleading to the public, many of whom might incorrectly conflate it with ionising radiation (not least due to the colloquial reference to ‘nuking’ food in the microwave, or the incorrect but widely held belief that microwaving food makes it radioactive).”

Transcript:

Dr Maryanne Demasi: Since IARC's decision in 2011, more evidence has emerged which adds strength to the findings. The CERENAT study and Hardell's study both found a link between heavy

mobile phone use and rare head tumours.

Professor Bruce Armstrong: Those studies do suggest rather more strongly than the body of evidence available to IARC at the time that there is an association between heavy mobile phone use and brain tumours.

Dr Maryanne Demasi: These studies have sparked calls for the classification to be upgraded from 2B to 2A.

Dr Devra Davis: My colleagues and I since then, some of whom have worked at the World Health Organisation with me in the past, have just published an article saying **mobile phone radiation is a probable human carcinogen with newer studies showing that people who begin to use cell phones regularly and heavily as teenagers have four to eight times more malignant glioma, that's a brain tumour, ten years later.**

Catalyst Response:

"In the attached paper by Hardell 2009 - <http://about.abc.net.au/wp-content/uploads/2016/07/Hardell-Carlberg-Wireless-phones-2009.pdf> – **Table 1 page 7**...the study reports on the ipsilateral use (i.e. tumors on the same side of the head as the mobile phone was used) for astrocytoma (which belong to a group of tumours called gliomas).

For those whose phone use began as a teenager or younger (i.e <20 years), the risk of brain cancer was statistically significant **7.9-fold after greater than [sic] 1 year**; highlighted in Table 1. Some of the people in that group may have been exposed to a mobile phone for >10 years.

For those who first began between ages 20-49 was a statistically significant 2.1-fold risk; also highlighted in Table 1.

On page 8, table 2, the study reports 4.7 times risk of other types of malignant brain tumours in the class of gliomas (medulloblastoma & ependymoma) >10 years latency.

The authors discussed the results on page 15 and highlighted "*For astrocytoma we found an increased risk for tumour in front, parietal and temporal lobe. The risk increased for both tumour types with time since first use and was highest in the group with >10 year latency. This is what one would expect from a carcinogenic effect from radiofrequency fields emitted from wireless phones. The brain is a near-field organ for such exposure, thus all use in a car with external antenna or a hands free was disregarded.*"

"Especially worrying is the finding of highest risk in person with first use at age <20 years. This was found both for astrocytoma...This result is of biological significance since a developing organ is more sensitive for carcinogenic agents and the brain is continuing to develop until ~20 years of age [includes teenagers]."

Also attached is Hardell & Carlberg 2014 - <http://about.abc.net.au/wp-content/uploads/2016/07/Hardell-Carlberg-2014.pdf>. In the abstract it states:

"Mobile phone use increased the risk of glioma...increasing to OR = 3.0, 95% CI = 1.7-5.2 in the >25 year latency group."

The authors also demonstrated in this Table 2, page 4 and highlighted where risk of glioma increases at >25 yrs later.

Again, it was confirmed in an analysis by Hardell and Carlberg, 2015 attached - <http://about.abc.net.au/wp-content/uploads/2016/07/Hardell-Carlberg-Pathophysiology-2015.pdf> - page 1 abstract that:

“First use of mobile or cordless phone before the age of 20 gave higher OR for glioma than in later age groups.”

Yes, correct, Hardell “does not look at teenagers” in his study, he looks at the incidence of brain tumours after >1 yr in people who were exposed to mobile phones as teenagers (<20 yrs of age). Studies in young people have been noticeably absent and we say this in the story.

Finally, a book chapter [‘Mobile phone use and brain tumour risk: early warnings, early action?’], attached - <http://about.abc.net.au/wp-content/uploads/2016/07/Hardell-et-al-Late-Lessons-II-chapter-21.pdf> - sums up the extensive literature on Hardell’s studies and highlights the latency of solid brain tumours like glioma. Page 545 highlighted, it says:

*Both use of mobile and cordless phones gave an increased risk overall for **glioma**, highest in the latency group >10 years, increasing further for ipsilateral use; mobile phones OR [odds ratio] of 2.9 (95% CI = 1.8-4.7) and cordless phone OR of 3.8 (95% CI = 1.8-8.7). Highest OR was found in the >10 year latency group for total wireless phone use as well...*

Yes, there is no study which found any positive correlation between “regular use” and glioma. We never stated this in the story either. We only ever mentioned that there was a link between “**heavy** mobile phone use” and glioma.

Assessment

Within the program Dr Davis is clearly established as a highly credentialed leading authority: it is explained that Dr Davis is a US cancer epidemiologist who has worked at the Cancer Institute, was a Professor of Epidemiology at the University of Pittsburgh, was President Clinton’s appointee to the Chemical Safety and Hazard Investigation Board and is internationally recognised for her work on environmental health and disease prevention. The prominence given to Dr Davis in the program together with her extensive scientific credits would encourage the audience to have high expectations that Dr Davis’ comments on the science she is presenting on the ABC’s flagship science program would be accurate.

Dr Davis’ statement - “.... mobile phone radiation is a probable human carcinogen with newer studies showing that people who begin to use cell phones regularly and heavily as teenagers have four to eight times more malignant glioma ...” - is a material, factual statement which can reasonably be understood to assert that both regular and heavy use of mobile phones as teenagers result in a four to eight fold increased incidence of malignant glioma ten years later.

As noted in the response from Catalyst – “*there is no study which found a positive correlation between ‘regular use’ and glioma*”. Therefore, to the extent that Dr Davis’ statement refers to an increased risk for or incidence of glioma amongst teenagers who “regularly” use cell phones it is incorrect.

To the extent that Dr Davis’ statement relates to studies examining malignant glioma in people who started using cell phones heavily as teenagers, the claim is that malignant glioma is observed four to eight times more in this group after 10 years compared to non-users and/or the general population. In support of this statement, Catalyst initially pointed to studies showing an increased risk for certain types of tumours based on, inter alia, the age of first use. All of these initial studies were authored, or co-authored, by Dr Lennart Hardell (who was also a contributor to the Bioinitiative Report).

The “8 fold” risk comes from the 2009 Hardell & Carlberg paper “Mobile phones, cordless phones and the risk for brain tumours”. In the paper Hardell & Carlberg find an increased odds ratio of 7.8 for people who were under 20 at the age of first use of a mobile phone with a >1 year latency. However, the sample size used to derive this figure is extremely small (exposed cases = 8, control cases = 5) and only refers to a specific type of glioma (astrocytoma) occurring ipsilaterally (on the same side of the head as the reported phone use).

It is important to note that in subsequent Hardell studies the odds ratios were considerably smaller than the finding of 7.8. Most significantly the 2015 Hardell & Carlberg paper “Mobile phone and cordless phone use and the risk of glioma – Analysis of pooled case-control studies in Sweden, 1997-2003 and 2007-2009”, found the odds ratio for the risk of ipsilateral glioma for first use before the age of 20 to be slightly over two-fold (OR=2.3).

The only instance where Audience and Consumer Affairs were able to identify an odds ratio of 4 (four times greater risk) in the information provided by Catalyst was in the 2009 Hardell & Carlberg paper where there was an odds ratio of 4.1 with a >10 year latency for use of a mobile phone associated with ‘other malignant’ tumours. These ‘other malignant’ tumours included tumours which were not glioma and did not account for the age of first use.

In addition to the Hardell studies, Catalyst subsequently provided Audience and Consumer Affairs with two additional studies to corroborate Dr Davis’ claim, both of which were published after the 2011 IARC classification. The paper provided to Audience and Consumer Affairs regarding the CEFALO study was not one of the original peer-reviewed papers published in association with the CEFALO study but was a review undertaken by Dr Davis’ organisation, Environmental Health Trust. We have considered both the review paper and the original CEFALO study.

The Environmental Health Trust review provided by Catalyst, ‘The JNCI Study by Aydin et al on Risk of Childhood Brain Cancer from Cellphone Use Reveals Serious Health Problems’, states that the actual findings of the CEFALO study directly contradict the results as expressed in the abstract. The review states that “*Table 4 found a statistically significant greater than doubled risk of brain cancer, 2.8 years after the first subscription for a cellphone began (OR= 2.15, 95% CI=1.07-4.29)... Table 5 showed that when the duration of cellphone subscription was more than 4 years (the highest exposure) from ipsilateral use greater than a 3-fold risk of brain cancer (OR=3.74, 95% CI=1.19 to 6.71), and close to a 3-fold risk when the number of cellphone calls was greater than 2,638, the highest exposure (OR=2.91, 95% CI=1.09 to 7.76).*”

The ‘JNCI Study’ referred to in the review is ‘Mobile Phone Use and Brain Tumours in Children and Adolescents: A Multicentre Case-Control Study’ by Aydin et al. The CEFALO study, like the Hardell

studies and INTERPHONE, was a case-control study where interviews were conducted with participants. Where available, these interviews were supplemented by operator recorded data (this data was only available for 35% of patients and 34% of control subjects).

The findings referred to by the Environmental Health Trust are discussed in the Aydin et al paper: *“For this subset of subjects, we found a statistically significantly increased risk among users with the longest period since first subscription (OR = 2.15 [95% CI = 1.07 to 4.29] among 24 case patients and 25 control subjects who had subscriptions for more than 2.8 years, Ptrend < .001; Table 4). We also tabulated records for cumulative duration of subscription, cumulative hours of use, and cumulative number of calls. For each of these categories, exposure–response trends were not statistically significant.”* The paper concluded: *“Our primary analysis does not point to a statistically significantly increased risk for brain tumors in children that is associated with the use of mobile phones. There was no consistent exposure–response relationship either in terms of the amount of mobile phone use or by the location of the tumor. In a small subset of study participants with operator recorded data (n = 163), however, time since the start of a mobile phone subscription was statistically significantly related to brain tumor risk... [W]e did observe a statistically significant trend of increasing risk with increasing time since first subscription when we used the data recorded by the network operators (Table 4). There was no consistent trend with cumulative duration or number of calls ... Because we did not find a clear exposure-response relationship in most of these analyses, the available evidence does not support a causal association between the use of mobile phone and brain tumors.”*

The findings in the paper published in association with the CEFALO study did not find an increased risk for brain tumours based on heavy or regular mobile phone use, but rather what was identified was a statistically significant association between duration of mobile phone subscriptions and brain tumours. No similar statistically significant association was identified between brain tumours and cumulative use of mobile phones.

One of the statistically significant increases noted in the CEFALO study in relation to length of mobile phone subscriptions approaches the lower end of the 4 to 8 times figure stated by Dr Davis in the program (OR=2.15 2.8 years after the first subscription began and OR=3.74 for cumulative duration of subscriptions greater than 4 years).

Catalyst also cited the CERENAT study to support Dr Davis’ claims. The CERENAT study did find a statistically significant association between the heaviest users and brain tumours, (OR=2.89; 95% CI 1.41 to 5.93 for glioma with life-long cumulative call duration and OR=2.10, 95% CI 1.03 to 4.31 for glioma with the greatest number of calls made). However, again no association was found with regular use, the increased risk was not as high as Dr Davis states in the program and the participants in the CERENAT study were not teenagers nor did it consider at what age participants began using mobile phones (note: the mean age was 56.4 for glioma patients and 60.4 for meningioma patients).

We note that despite the program makers providing Audience and Consumer Affairs with various studies, and Dr Davis referring to “newer studies”, only the 2009 Hardell & Carlberg paper finds increased odds ratios of between 4 to 8, all the other papers cited by Catalyst either find an odds ratio below 4 or do not discuss a specific factor by which risk is increased. While the CEFALO study finds an odds ratio approaching 4 in one sub-group, this risk was not associated with actual use of a mobile phone.

Dr Davis' comment about 'newer studies' came in a discussion about whether the IARC classification should be upgraded from a Group 2B to a Group 2A Probable Human Carcinogen. Dr Demasi noted that "since IARC's decision in 2011, more evidence has emerged which adds strength to the findings". However, as discussed above, the 2011 IARC decision considered the Hardell studies extensively, including the 2009 Hardell & Carlberg study Dr Davis relied upon to establish a 4-8 fold increase in risk of glioma. The study used by Dr Davis to illustrate that the 2011 IARC finding was insufficient in light of new findings was in fact considered by IARC when classifying radiofrequency electromagnetic fields as a Group 2B possible human carcinogen.

Without acknowledging that Dr Davis' figures are derived from a study already considered by IARC, there is a possibility that the audience may understand that the findings referred to by Dr Davis are new and therefore the IARC findings are out of date. Further, Dr Davis states that there are newer "studies" supporting the figure of "four to eight times more malignant glioma" for regular and heavy cellphone use: we have been able to only identify one study amongst those Catalyst provided and no studies establish more malignant glioma for regular users as suggested.

The statement – "*newer studies showing that people who begin to use cell phones regularly and heavily as teenagers have four to eight times more malignant glioma, that's a brain tumour, ten years later*" – is in the view of Audience & Consumer Affairs materially misleading; it has the effect of significantly overstating the risks identified in the 2009 Hardell & Carlberg study and because of insufficient context, it strongly implies that this study was not considered by IARC.

Finding: Breach of 2.1 and 2.2

Transcript

Dr Maryanne Demasi: Dr Davis says if you want a more accurate picture of what's happening with brain cancer rates, you have to look more closely at specific groups rather than the general population rates.

Dr Devra Davis: **When you look at specific groups, however, you are seeing an increase in younger brain cancers in certain types, in certain locations.**

Dr Maryanne Demasi: Although brain cancer is rare, the latest US figures show a statistically significant increase in malignant and non-malignant brain and spinal cord tumours in adolescents. This doesn't mean it's caused by mobile phones, but it may be a factor.

Catalyst Response:

"The paper we referred to in the story demonstrates that there are increases in certain types of brain cancers (CNST) in certain groups (adolescents) in certain locations (US data).

This study was also discussed in our (off camera) correspondence to Prof Bernard Shaw, spokesperson of the Cancer Council of Australia.

There may be several reasons why there is a detected increase in these brain cancers i.e. change in diagnostics, increased use of mobile phones, environmental toxins, increased reporting etc. One can only hypothesise the reasons. Dr Davis hypothesized that mobile phone exposure could be one reason.

Therefore, we believe it was essential to give it the appropriate **context and caveat** in the story by our statement [in the program]..."this doesn't mean it's caused by mobile phones, but it may be a factor."

Assessment:

Audience and Consumer Affairs have given consideration to the program's treatment of the fact brain cancer appears to be increasing in young people. The paper cited by Catalyst, *Trends in Central Nervous System Tumor Incidence Relative to Other Common Cancers in Adults, Adolescents, and Children in the United States, 2000 to 2010* by Gittleman et al (<http://about.abc.net.au/wp-content/uploads/2016/07/GittlemanCommonCancerTrendsUnitedStatesRPTPage17.pdf>) finds an increase in malignant CNS (central nervous system tumours) in adolescents.

However, the paper does query the source of this increase and does note that "*the rarity of cancer in this age group may make it difficult to detect statistically significant differences over time...[as] it is difficult to assess whether these increases may have been influenced by the popularization of new imaging technology during this time.*"³

The papers notes that because of the histological differences between various CNSs in order to understand the changes in rates over time individual tumour types is important. As Dr Davis explains in the program, the tumour most associated with heavy mobile phone use is glioma. The Gittleman et al study specifically notes that "*the changes over time in the incidence of these 2 glioma subtypes (oligodendroglioma and oligastrocytoma) likely reflect the increased use by pathologists of molecular markers to supplement morphological data to yield more precise and objective diagnoses among these tumor subtypes.*"⁴

The program did not address any other possibilities for the increases in cancer rates among US adolescents, including that the increase in the specific subcategory of tumour associated with mobile phone use (glioma) is likely attributed to improvements in diagnostic methods according to the paper used to corroborate Dr Davis' statement.

However, the program makers did qualify that mobile phones 'may be a factor' in the increases in brain cancer rates amongst adolescents in the US. Although the program did not explain that the increase in glioma subtypes specifically are likely attributable to changes in diagnostic, this was not likely to materially mislead audiences to understand that mobile phone usage accounts for the increase in tumour rates amongst US adolescents.

Finding: No breach of 2.2

Transcript

Dr Devra Davis: Those who say the lack of increase in brain cancer tells you cell phones are safe don't understand brain cancer. It has a long latency. **When the bombs fell at the end of World War II on Japan, we followed every person who survived. Forty years is how long it took for brain cancer to develop after that exposure.**

³ Gittleman et al at pp 110

⁴ Gittleman et al at pp 111

Catalyst Response

“[Dr] Davis’ statement is **not** incorrect. Attached is a study [*Incidence of Intracranial Meningiomas in Nagasaki Atomic-Bomb Survivors*; Sadamori et al, International Journal of Cancer 1996, <http://about.abc.net.au/wp-content/uploads/2016/07/UICCIncidenceIntracranialMeningionasABombSurvivorsRPTPage18.pdf>] which shows brain tumours in the Japanese population of atomic bomb survivors. It says “**The range of latency was 36 to 47 years (mean 42.5 years).**”

This statement by Dr Davis was merely to demonstrate that some brain tumours may take decades to show up in a population because there is a long latency period.

The latency of brain tumours is not disputed among credible medical professionals. ARPANSA also acknowledge that there are some cancers that have a long latency in the general population (e.g. lung cancer took 2-3 decades to become obvious).”

Assessment:

Dr Devra Davis’ statement of the brain cancer incidences after the World War II nuclear bombings of Hiroshima and Nagasaki put forward a factual statement that brain cancers were first diagnosed in survivors 40 years after the bombings.

Audience and Consumer Affairs is satisfied that Dr Davis’ statement is a material fact for the purposes of the episode. It is presented as the key piece of evidence to counter ARPANSA’s argument that the stable rate of brain cancer in the Australian population over the last 30 years “refutes the idea that mobile phones cause brain cancer”.

The paper cited by Catalyst to corroborate Dr Davis’ claim, *Incidence of Intracranial Meningiomas in Nagasaki Atomic-Bomb Survivors*, investigates incidences of clinically diagnosed meningiomas in survivors of the Nagasaki atomic bombing only. As noted in the paper, intracranial meningioma are mostly “clinically benign and so can be treated surgically”. Only a small proportion of meningiomas are malignant (cancerous). According to the American Association of Neurological Surgeons, malignant meningioma only account for approximately 2-3% of all meningioma. Between 97-98% of all meningiomas are non-cancerous.⁵

Though it is correct that the Sadamori et al paper does conclude that the range of latency for meningioma in Nagasaki bomb survivors was between 36 and 47 years with a mean latency of 42.5 years, it is misleading for Catalyst to rely on this paper as corroboration of Dr Davis’ statement. The Sadamori et al paper does not consider “every person who survived” the bombs that fell on Japan (i.e. in both Nagasaki and Hiroshima), the paper only considers one type of tumour which is often not cancerous whereas Dr Davis referred to ‘brain cancer’.

Clinical and Epidemiologic Characteristics of First Primary Tumours of the Central Nervous System and Related Organs among Atomic Bomb Survivors in Hiroshima and Nagasaki, 1958-1995 by Yonehara et al (<http://onlinelibrary.wiley.com/doi/10.1002/cncr.20543/pdf>) considered all the central nervous system tumours diagnosed in survivors of the Hiroshima and Nagasaki bombings. In the Yonehara et al study between 1958-1995 a total of 187 first primary tumours of the central

⁵ <http://www.aans.org/Patient%20Information/Conditions%20and%20Treatments/Meningiomas.aspx>

nervous system and pituitary gland were clinically diagnosed. Of the 187 diagnosed tumours, 110 were diagnosed between 1958-1985. However, this figure includes tumours that are usually benign, including meningioma.

We note that in “Dr Davis’s response to the criticism” provided by Catalyst to Audience and Consumer Affairs following receipt of complaints, Dr Davis refutes the use of the Yonehara et al study because *“the chief type of brain tumor tied with mobile phones is glioma – as distinct from meningioma and other CNS tumours. The study ... showing an increase in brain cancer within less than forty years, reported an increase in meningioma, but does not report increase in glioma. In fact, a population-wide increase in glioma did not appear until 40 years later.”*

In the course of the episode, Dr Davis does state there is a specific association between glioma and mobile phone use. Notwithstanding that Dr Davis’ original statement did not specify glioma but referred to ‘brain cancer’ more broadly, Audience and Consumer Affairs have considered if it is accurate to claim that gliomas were not diagnosed until 40 years after the bombings in Hiroshima and Nagasaki, especially as gliomas are malignant tumours. The Yonehara et al study considers not only the total rates of CNS and pituitary tumours but also looks at specific types of tumours (meningioma, schwannoma, glioma and pituitary).

According to the Yonehara et al study of the clinically diagnosed first primary tumour between 1958-1995 a total of 34 are glioma, of which 19 were diagnosed in the 40 years immediately following the bombings in Hiroshima and Nagasaki. Ten of these were diagnosed prior to 1976, which was 31 years after the bombings. Of the total number of clinically diagnosed gliomas in survivors, 55% were diagnosed within 40 years of the bombings.

Catalyst has advised Audience and Consumer Affairs that the peak incidence of brain tumours was only reached after 40 years according to the Yonehara et al study. Having considered the Yonehara et al study, we agree with Catalyst however, the program as broadcast did not discuss the peak incidence. In the program, Dr Davis stated “forty years is how long it took for brain cancer to develop after that exposure.” Reasonable viewers would understand “develop” to mean the time it took for any brain cancer to become evident.

Audience and Consumer Affairs acknowledge that brain cancer can have a long latency however, Dr Davis’ statement that it took “40 years...for brain cancer to develop after exposure [to the bombings in Hiroshima and Nagasaki]” is incorrect. Reasonable efforts were not demonstrated by the program: this statement is not supported by the study which was provided by Catalyst (*Incidence of Intracranial Meningiomas in Nagasaki Atomic-Bomb Survivors*; Sadamori et al, International Journal of Cancer 1996), nor is it supported by the much broader Yonehara et al study. Further, the inaccuracy has the effect of overstating the latency period for brain cancer.

A number of complainants claimed that the program misleadingly equated ionising radiation with non-ionising radiation. With regard to the distinction between non-ionising radiation of Wi-Fi and mobile phones and the ionising radiation of the nuclear bombs dropped on Hiroshima and Nagasaki, Audience and Consumer Affairs are satisfied that the program made reasonable efforts to clarify the important difference within the context of the program. Dr Demasi explained the distinction: *“The spectrum of electromagnetic radiation ranges from ionising radiation like x-rays which have enough energy to knock electrons out of their orbit and cause cancer, to non-ionising radiation like microwaves which have much less energy and considered to be safer. Mobile phones, tables, phone towers, smart meters, baby monitors and Wi-Fi routers are all sources of radiofrequency microwave radiation.”*

Dr Davis' reference to the nuclear bombs used in Hiroshima and Nagasaki was attempting to illustrate the long latency of brain cancer and did not equate the ionising radiation of a nuclear weapon with the non-ionising radiation of mobile phones or Wi-Fi. Audience and Consumer Affairs are satisfied that a reasonable viewer would not conflate ionising radiation with the non-ionising radiation of mobile phones or Wi-Fi in this segment.

Finding: Breach of 2.1 re: WWII bombings

Finding: No breach of 2.1 re: context of ionising vs non-ionising radiation.

Complaint: Graphics used in the program are misleading

C8095-16

"The strange pictures of models holding phones to their heads to show looked like they had been coloured in. Where was the scientific thinking in this program?"

C7309-16

"Another major failing in your reporting could be seen by your handling of the presentation of data – in particular, the images showing the adult versus child's head. In these graphics, we see colour-coded images purporting to show how radiation 'penetrates' the head of an adult versus a child using the device. Firstly, no indication is given as to what is actually being measured in these images – is it the intensity of the signal, the temperature of the tissue, or some other factor? Second, no indication of scale is given – that is, what is the difference between red and blue?...In addition, there is no effort to correct for the size of the head."

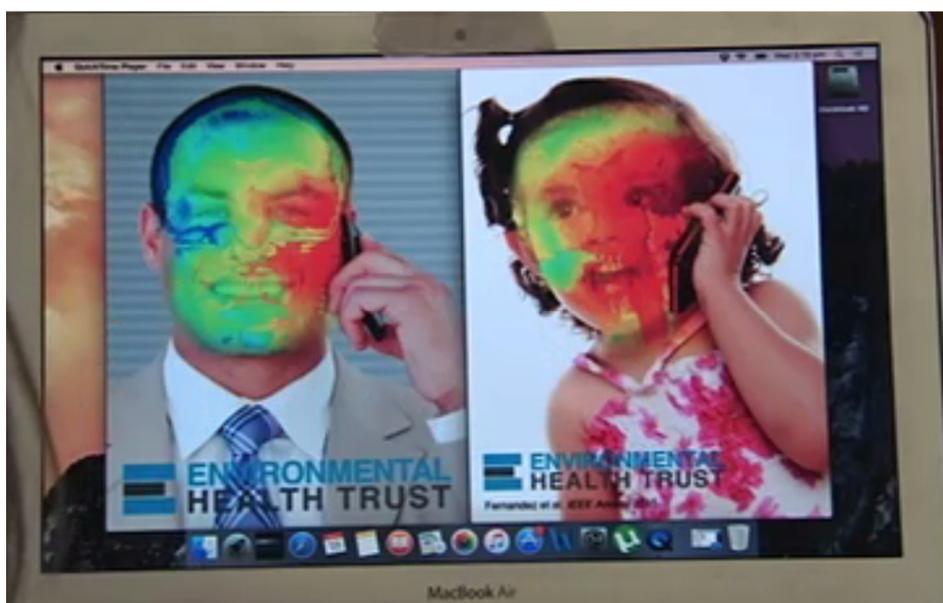
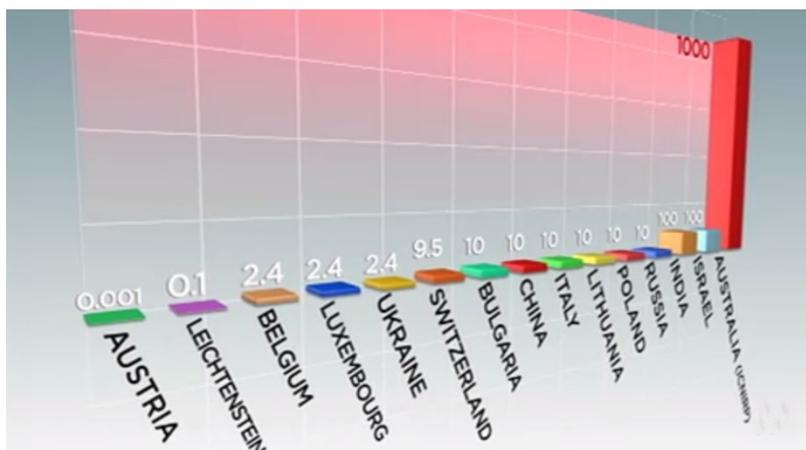
C10019-16

"...at one point during the episode Dr Devra Davis puts forward an image purporting to show the penetration of radiation in a male adult and a female child. The image of the child is a stock image that can be found online. Presumably the graphic shown by Dr Davis has had a graphic overlaid on the image of the child to represent the absorption of radiation. At no time during this segment is it articulated or inferred that the image is illustrated only, rather than a depiction of an actual head scan."

C7787-16

"Graphics such as the bar graph shown at 15 minutes into the episode, which did not have axis labels and was not described in any way, also seemed to serve no purpose other than causing unwarranted concern."

Images in Episode:



Catalyst Response

“The TV demonstration of “absorption of microwave radiation through the brain” was done by overlaying scientifically accurate dosimetry over stock images of a child versus and adult to depict the differences in radiation absorption levels...they do this by modelling the brain using voxel (a voxel represents a value on a regular grid in three-dimensional space) on actual human brains which have been MRI’d in hospitals.

More specifically, a Brazilian team led by Professor of Electrical Engineering, Alvaro de Salles from the Universidade Federal Du Rio Grande Del Do Sol - UFRGS (Federal University of Rio Grande) used Finite-Difference, Time-Domain (FDTD) computer simulation models from MRI scans of real human including men, women and children to calculate the absorbed radiation within their heads - <http://about.abc.net.au/wp-content/uploads/2016/07/ElectromagneticAbsorptionCharacteristicsAdultandChildPage22.pdf>.

These animations are simply their scientific imaging results laid over an image of child and adult so that the viewer can understand it.

The colours depict rates of energy absorption per gram of tissue (SAR or specific absorption rate). In these images, red is the area with the highest modelled energy absorption. Even at the same scale, the red area is nevertheless slightly larger in the child's head because:

- The child's skull is thinner, so more radiation reaches past the skull;
- Compared with an adult skull, the immature skull contains more water, so the skull and adjacent tissues are more similar in a child than an adult. This means less radiation is reflected in the interfaces (greater reflection occurs at interfaces of less similar substances), so again, more radiation enters a child's brain.
- The child's brain is a bit better at absorbing radiation because it contains proportionally more water and less fat than an adult's (myelination of the brain is incomplete).

The end result is that there is higher energy absorption deeper into a child's brain centers. Modern computer modelling is a powerful tool compared with the current standard large adult male manikin used for phone regulation certification.

...

We reject the claim that we did not give it context regarding the colours shown. Dr Davis was very clear that the intense areas (hotter red) were sections where there was greatest exposure and then indicates that the lighter sections (cooler blue) is where radiation doesn't really get far.

[...]

The graphic [graph of safety thresholds] was adapted from the publication attached by Dr Isaac Jamieson - <http://about.abc.net.au/wp-content/uploads/2016/07/BiosustainableDesignElectromaagneticHypersensitivityRPTPage23.pdf>... We used a slightly simplified (schematic) version for TV. The graph is simply meant to depict the dramatic differences in "safety thresholds" for various countries.

"1000" indicates 1000 $\mu\text{W}/\text{cm}^2$ [microwatts per centimeter squared] as indicated on **Page 2** of the report, which is the safety threshold set by ICNIRP - and adopted by ARPANSA - which sets Australia's safety threshold.

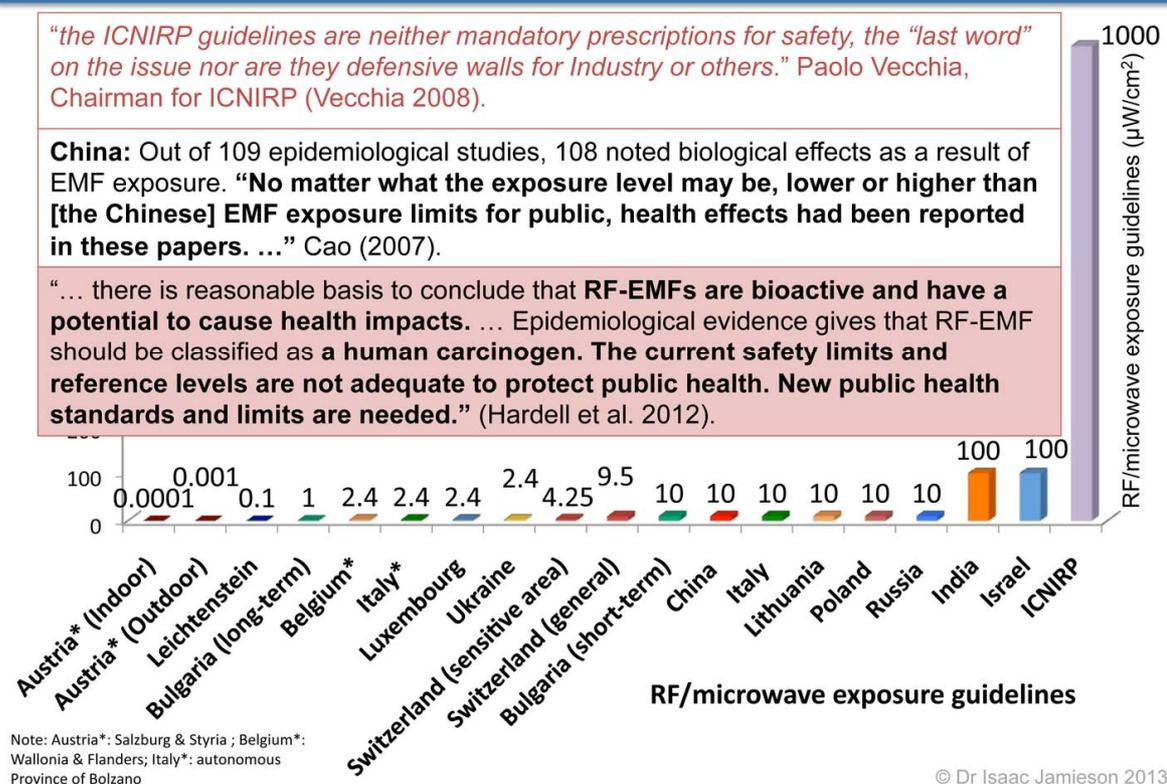
As you can see, there are many other countries around the world that have more stringent safety thresholds compared to Australia/ICNIRP/ARPANSA which was the premise for doing our story."

Assessment

With regard to the bar graph illustrating the variations in safety thresholds, the paper cited by the program only illustrates the safety threshold limits and non-binding recommendation within EU nations. The paper, unlike the graphic used in the program, further illustrates the different limits set according to the frequency of the RF field. Under the ICNIRP guidelines, RF fields of 2.1GHz have a safety threshold of 1000 $\mu\text{W}/\text{cm}^2$; RF fields of 1800 MHz a safety threshold of 900 $\mu\text{W}/\text{cm}^2$ and RF fields of 900MHz a safety threshold of 450 $\mu\text{W}/\text{cm}^2$. The graphic used by Catalyst only illustrates a single 'threshold' but it is unclear for which RF field.

Catalyst provided additional information and the original graph used to create the image in the program. Audience and Consumer Affairs have identified the source of this graph to be from a submission to the Australian Communications and Media Authority by ES.OZ (Electrosensitivity Australia) for an Issue for Comment in March 2014, “Remaking the Human Exposure Standard & Electromagnetic Radiation Labelling Notice”.⁶ The graph was submitted as part of ES.OZ’s submission taken from a presentation given by Dr Isaac Jamieson to the European Commission: Health and Consumers Directorate-General entitled “The need to improve risk communication & risk perception”.

Risk awareness and risk communication



Although it would have assisted viewers understanding of the graphic if it were appropriately labeled, Audience and Consumer Affairs are satisfied that the lack of labels would not materially mislead audiences as to the difference between the ICNIRP threshold and the more precautionary thresholds adopted by certain countries as determined by Dr Jamieson’s review.

Finding: No breach of 2.2

With regard to the images of the child’s head, according to the IARC Monographs Non-Ionizing Radiation, Part 2: Radiofrequency Electromagnetic Fields report: *“Due to the closer proximity of the*

⁶ <http://www.acma.gov.au/theACMA/Consultations/Consultations/Sunsetting/remaking-the-radiocommunications-human-exposure-standard>

phone to the brain of children compared with adults, the average exposure from use of the same mobile phone is higher by a factor of 2 in a child's brain and higher by a factor of 10 in the bone marrow of the skull. In addition, dielectric properties of certain tissues, notably the bone marrow, change with age. The marrow progressively incorporates more fat, and the bone itself increases in thickness, hardens and loses water over time. Both these tissues, therefore, have a higher conductivity in children than in adults and they receive a higher energy deposition from RF sources.

The use of hands-free kits lowers exposure from mobile phones to less than 10% of the value resulting from use at the ear, but it may increase exposure to other parts of the body. The rise in temperature inside the brain from use of a typical 3G mobile is small, approximately 0.1°C or less."

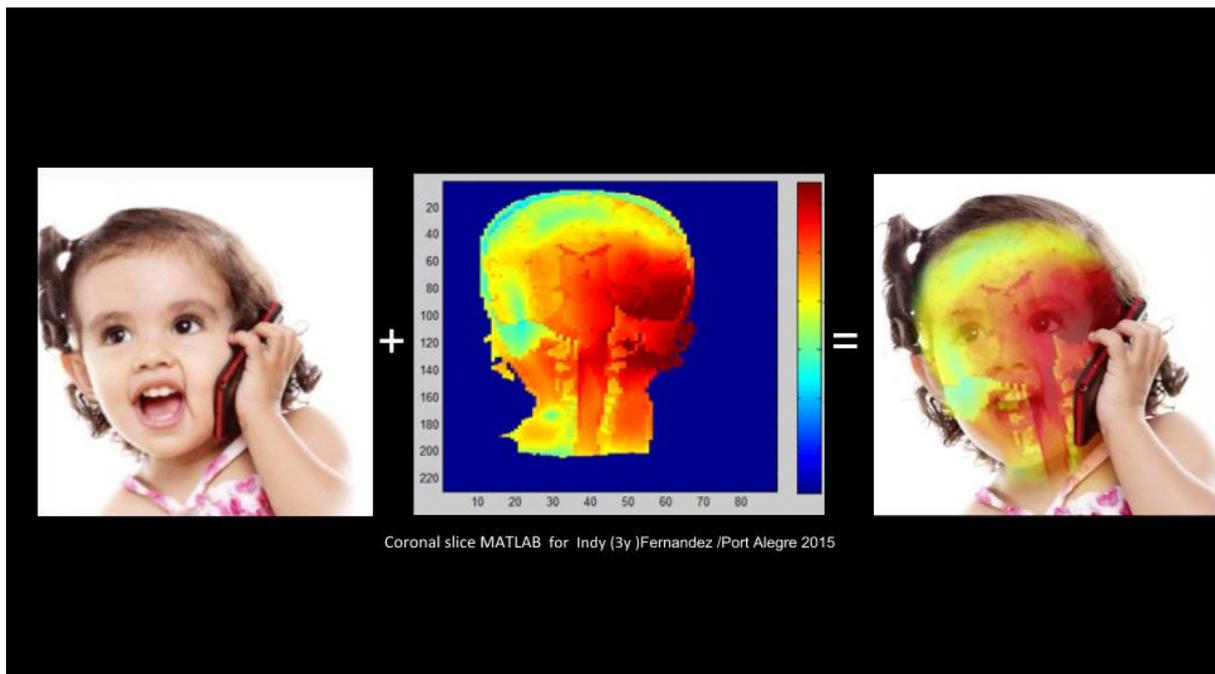
According to Catalyst the images used in the program were derived from a table published in the peer reviewed paper, *Dosimetric Simulations of Brain Absorption of Mobile Phone Radiation – The Relationship between psSAR and Age* by Fernandez-Rodriguez, De Salles and Davis -

[http://about.abc.net.au/wp-](http://about.abc.net.au/wp-content/uploads/2016/07/IEEEAccessBrainAbsorptionMobilePhoneRadiationRPTPage-25.pdf)

[content/uploads/2016/07/IEEEAccessBrainAbsorptionMobilePhoneRadiationRPTPage-25.pdf](http://about.abc.net.au/wp-content/uploads/2016/07/IEEEAccessBrainAbsorptionMobilePhoneRadiationRPTPage-25.pdf) -

demonstrating peak spatial SAR (specific absorption rate) in the brains of adults and children.

According to Catalyst this data was used to construct coronal 3D images of the brain, which were then overlaid with a stock image of a child using a mobile phone for better visual context.



Catalyst has provided Audience and Consumer Affairs with email correspondence between it and two of the paper's authors which confirms that the images used in the program were made in conjunction with the published paper, but were not themselves published in that paper. The data from which the images were derived was, however, published in figure 5.

Although it may have assisted viewers if the images featured in the program were labelled, the lack of labels would not have the tendency to mislead viewers as to the increased absorption of radiation by a child as compared to an adult. Furthermore, the program acknowledges that despite difference in the absorption of radiation in a child's head, this does not necessarily translate into health impacts:

Dr Demasi: That's incredible. Do we know that this translates into health effects for the child?

Dr Davis: No. We don't.

As reasonable efforts were made to ensure that the images used in the program were created in conjunction with a peer-reviewed paper and the images were presented in the appropriate context, Audience and Consumer Affairs are satisfied that the inclusion of the images of the absorption of radiation kept with the ABC's editorial standards.

Finding: No breach of 2.1

IMPARTIALITY

The ABC has a statutory duty to ensure that the gathering and presentation of news and information is impartial according to the recognised standards of objective journalism. The ABC aims to present fair and unbiased information which will help audiences gain a reasonable understanding of the issue and equip them to make up their own minds on the issues.

The Editorial Policies make clear that the ABC aims to apply its impartiality standard guided by the hallmarks for impartiality:

- a balance that follows the weight of evidence;
- fair treatment;
- open-mindedness; and
- opportunities over time for principal relevant perspectives on matters of contention to be expressed.

The Editorial Policies further elaborate that assessing the impartiality due in given circumstances requires consideration in context of all relevant factors including:

- the type, subject and nature of the content;
- the circumstances in which the content is made and presented;
- the likely audience expectation of the content;
- the degree to which the matter to which the content relates is contentious;
- the range of principal relevant perspectives on the matter of contention; and
- the timeframe within which it would be appropriate for the ABC to provide opportunities for the principal relevant perspectives to be expressed, having regard to the public importance of the matter of contention and the extent to which it is the subject of current debate.

Having considered these factors, similar to our consideration of the accuracy standards, we regard the following as particularly relevant:

- Catalyst is the ABC's flagship science program which is highly regarded and reaches a wide audience. Over time, Catalyst has developed a reputation for communicating complex scientific ideas in a straightforward and accessible way.
- The subject matter of the program was of considerable public interest given the prevalence of mobile telephones and Wi-Fi.
- Given the interest and importance of the subject matter and the reputation of the program, audiences were likely to expect a high degree of accuracy, fairness and impartiality. They would not expect the ABC to advocate a particular position, but to present the facts and various perspectives fairly to allow viewers to come to their own conclusions.

It is our view that audiences were likely to expect a high degree of impartiality; and that this edition of Catalyst was obliged to observe high standards of impartiality.

Relevant editorial standard:

4.5 Do not unduly favour one perspective over another.

Assessment

In assessing the program's compliance with clause 4.5, we have in particular been guided by the hallmark of impartiality that "balance follows the weight of evidence". In doing so, we have considered how this edition of Catalyst was signposted to audiences; the current scientific consensus on possible radiofrequency electromagnetic field health effects; the scientific papers and perspectives presented in or underpinning the program; and the findings for accuracy.

Signposting

ABC programs are free to question the orthodoxy of the scientific consensus provided that the program has indicated to audiences that the intention is to challenge the orthodoxy and the information is presented accurately, fairly and impartially.

This episode did not indicate an intention to challenge the orthodoxy. Although Dr Demasi states early in the program that "*some of the world's leading scientists and industry insiders are breaking ranks to warn us of the risks*", this would not have put the audience on notice to expect that the program's intention was to challenge the orthodoxy of the scientific consensus.

The focus of the program is explained by Dr Demasi as being an investigation of the latest research: "*In this episode, I investigate the latest research and advice about the safety of our modern wireless devices.*"

The program is clearly framed as an investigation of cutting edge research, and questioning whether Australia's safety standards for wireless devices offer sufficient protection in light of that research.

The scientific consensus

The scientific consensus on the health impacts of mobile phones is best understood as expressed by the 2011 IARC decision to classify radiofrequency electromagnetic fields as a Group 2B possible human carcinogen. As discussed in this paper, the finding was based on limited evidence of an increased risk for glioma associated with heavy use of wireless phones. The evidence presented to the IARC working group was "inadequate to draw conclusions for other types of cancers" and did not make any express findings on the risk associated with any other type of radiofrequency electromagnetic field.

In the finding, the IARC Working Group Chairman noted "the conclusion means that there could be some risk, and therefore we need to keep a close watch for a link between cell phones and cancer risk" despite the evidence not being strong enough to make a causative determination.

IARC Director, Dr Christopher Wild elaborated that until additional research could be performed and analysed, "it is important to take pragmatic measures to reduce exposure [to mobile phones] such as hands-free devices or texting."

The IARC decision noted that more research was needed into long term effects of mobile phone use and health effects, noting the longer latency of some types of health impacts and the improvements in mobile phone technology.

Although the IARC Working Group considered a broad range of pertinent epidemiological studies and cancer bioassays in experimental animals, only the INTERPHONE study and the "Swedish case-control studies" (the Hardell co-authored studies) were used to show an association between heavy mobile phone use and glioma.

It is pertinent to note that Hardell's studies have been described as 'non-replicable' and as an outlier. In a literature review featured in the peer-reviewed journal *Epidemiology* by Ahlbom et al, the Hardell studies were treated as outliers and the summary of findings by Ahlbom et al were presented both including and excluding Hardell's findings. The exclusion of Hardell's studies does not indicate that Hardell's findings are incorrect but rather acknowledges the significant "deviation of the findings of the Hardell studies from those of other investigators."

However, the IARC finding cited Hardell's studies extensively in its decision to classify radiofrequency electromagnetic fields as possibly carcinogenic to human. The IARC Monograph noted that "the comparative weakness of the association in the INTERPHONE study and inconsistencies between its results and those of the Swedish study led to the evaluation of *limited evidence* for glioma and acoustic neuroma, as decided by the majority of the members of the Working Group."

Although the IARC Monograph used Hardell's studies to substantiate the classification of radiofrequency electromagnetic fields, there is an acknowledgement that Hardell's findings are inconsistent with the larger INTERPHONE study, but given the rigorous nature of Hardell's studies, cannot be dismissed without consideration.

ARPANSA's Review of the Scientific Literature 2000-2012 (<http://about.abc.net.au/wp-content/uploads/2016/07/ARPANSARadionFrequencyHealthReportPage29.pdf>, published in 2014) stated: "It is clear from the published literature that no overall increase in the risk of brain tumour or acoustic neuroma due to the use of wireless phones has been observed. There are some indications of an increased risk of glioma and acoustic neuroma in the sub-group with the heaviest use however methodological shortcomings prevent a causal connection. The long-term risk affecting individuals who report heavy use will require further research."

The 2015 SCENIHR Final Opinion on potential health effects of exposure to electromagnetic fields (EMF) elaborates on the limited evidence, stating "overall, the epidemiological studies on mobile phone RF EMF exposure do not show an increased risk of brain tumours. Furthermore, they do not indicate an increased risk for other cancers of the head and neck region. Some studies raised questions regarding an increased risk of glioma and acoustic neuroma in heavy mobile phone users. The results of cohort and incidence time trend studies do not support an increased risk for glioma while the possibility of an association with acoustic neuroma remains open. Epidemiological studies do not indicate increased risk for other malignant diseases, including childhood cancers."⁷

The IARC 2011 decision, the 2014 ARPANSA literature review and the 2015 SCENIHR Final Opinion establish the scientific consensus as being – there is overall no link between mobile phone use and an increased risk for brain tumour, however, there is an association shown in selected studies (INTERPHONE and Hardell) between heavy users and glioma, but methodological shortcomings mean this association cannot be deemed causative. As noted in the findings in relation to accuracy, none of these studies come to any conclusions about the possible health risks of Wi-Fi or Wi-Fi routers.

Scientific papers and principal relevant perspectives

Catalyst has cited a number of scientific papers both in the program and to Audience and Consumer Affairs. We understand that the main papers used to underpin the program were the IARC classification, the INTERPHONE study, the Hardell papers ('the Swedish case-control studies') and the Bioinitiative Report.

⁷ SCENIHR Final Opinion pg 5

Audience and Consumer Affairs accept the validity of these papers for inclusion; however, as the findings for accuracy demonstrate, the program needed to clearly explain the necessary caveats for the IARC classification in relation to Wi-Fi and the criticisms of the BioInitiative report.

The program did not include reference to or reflect in its treatment of the subject a number of relevant papers and studies which would have contributed to the impartiality of the piece. For example, the program did not include reference to the 2015 SCENIHR Final Opinion and only mentioned the 2014 ARPANSA literature review briefly.

The 2015 SCENIHR Final Opinion represents one of the most recent and in-depth examinations of the current science on the health impacts of radiofrequency electromagnetic fields. The findings of the Scientific Committee state “epidemiological studies on mobile phone RF EMF exposure do not show an increased risk of brain tumours”, “overall, there is a lack of evidence that mobile phone RF EMF affects cognitive functions in humans” and “the previous SCENIHR Opinion concluded that there were no adverse effect on reproduction and development from RF fields at non-thermal exposure levels. The inclusion of more recent human and animal data does not change this assessment.”

The SCENIHR Final Opinion, like the 2014 ARPANSA literature review, considers the Hardell studies as being highly relevant to their findings but ultimately judged the Hardell studies as not compelling enough to warrant a conclusion that mobile phones cause cancer.

The SCENIHR Final Opinion did not address the BioInitiative Report as a whole, but as with the ARPANSA literature review, considered a number of papers featured in the Report. In the 2014 ARPANSA literature review, the BioInitiative Report (2007) was “not included as one of the Reports to be considered in the present Report, primarily because it does not count as an expert body review (rather, it is the opinion of one author only). However, all Human Provocation studies cited in the BIR, as well as the conclusions reached from these, are considered in this Report to determine whether they provide evidence that RPS3 [*“Radiation Protection Standards ‘Maximum Exposure Levels to Radiofrequency Fields - 3KHz to 300GHz”* the 2002 standards published by ARPANSA] requires reconsideration.”

Both the ARPANSA literature review and the SCENIHR Final Opinion considered a much broader range of papers than the BioInitiative Report and concluded that there is no general risk in the use of mobile phones and only an indication in some papers of a risk with heavy use. Both studies considered the Hardell findings, and both afforded considerable weight to the Hardell findings. The program, however, omitted the findings of these reports in the episode but also highlighted Hardell’s findings in isolation without consideration of the significant additional evidence included in the IARC, ARPANSA and SCENIHR findings which appropriately contextualised the Hardell findings.

Without including reference to the SCENIHR Final Opinion and more information on the ARPANSA literature review the program has not afforded the audience the opportunity to understand the merits of all positions in the debate. Importantly, the exclusion of information on these studies had the effect of not presenting the “latest research and advice” as outlined by Dr Demasi at the beginning of the program.

The weight of evidence, as illustrated by these papers which have considered all the same studies and findings as the program and many other relevant findings, supports the scientific consensus that a causal link between mobile phone use and health effects has not been established, and that Wi-Fi cannot be equated with mobile phones for the purposes of determining potential health impact. However, the program did not appropriately present this weight of evidence.

Further, the prominence given to the perspectives of a number of interviewees did not reflect the weight of evidence. Concerns regarding the accuracy of Dr Davis' statements have been dealt with above; while Dr Davis is clearly a principal relevant perspective her views required further context and fact checking.

Frank Clegg and Libby Laura, while both arguably relevant viewpoints, were afforded prominence to express opinions on the scientific research without having scientific expertise. Ms Laura was presented as a concerned parent who has advocated for higher safety standards for Wi-Fi in schools. Ms Laura commented at some length on the health impact of Wi-Fi and speculated about the 'layering effect' of radiofrequency microwave radiation. Catalyst have not provided Audience and Consumer Affairs with any research that establishes a scientific basis for Ms Laura's claims about a 'layering effect'.

Mr Clegg was presented as a former Microsoft executive with advocacy interests in implementing more stringent standards for radiofrequency electromagnetic emitting devices in his capacity as CEO of Canadians for Safe Technology (<http://c4st.org/>). One of Mr Clegg's more alarming claims is that potential health risks from wireless devices are analogous with tobacco:

Dr Maryanne Demasi

Mr Clegg is concerned there'll be a repeat of the mistakes from the past.

Television commercial

You never had a better cigarette...

Frank Clegg

One of the best analogies I've heard in this scenario is using the tobacco model where we know the first science came out showing smoking cigarettes caused harm back in the 1960s, and the tobacco industry was able to delay legislation, delay the message to the public for decades.

Announcer

Craven Filter, the clean cigarette!

Again, there is no scientific basis to these claims and the program does not contextualise these statements with reference to the scientific consensus; rather, Mr Clegg's claims are reinforced by the program with images from tobacco advertising and comments from Dr Davis.

Audience and Consumer Affairs have concluded that the selection of scientific papers and perspectives and the way in which these were presented did not follow the weight of scientific evidence with regard to radiofrequency electromagnetic field health effects.

Findings on accuracy

Audience and Consumer Affairs have determined that there are a number of inaccuracies within the program. These inaccuracies all tend to favour the unorthodox view that mobile phones and Wi-Fi cause (non-thermal) health impacts including brain tumours.

The statement— "*newer studies showing that people who begin to use cell phones regularly and heavily as teenagers have four to eight times more malignant glioma, that's a brain tumour, ten years later*" – is in the view of Audience & Consumer Affairs materially misleading; as discussed above the additional studies provided by Catalyst do not corroborate the claim, and the statement has the effect of significantly overstating the risks identified in the 2009 Hardell & Carlberg study.

Further, because of insufficient context in presenting these comments, it was strongly implied that this study was not considered by IARC, when in fact it was.

There was some ambiguity in Dr Davis' references to this research, which had the effect of suggesting that people who use wireless phones regularly were also at risk. Dr Davis' comments favour the unorthodox position and without a clear indication to viewers of Dr Davis' intention to refute the scientific consensus these comments unduly favour one perspective.

The insufficient context around the Bioinitiative Report tends toward endorsing the unorthodox position over the scientific consensus. The program appears to favour the findings in the Bioinitiative Report without acknowledging that is a contentious report which has selected papers with the position that radiofrequency electromagnetic fields do have a non-thermal biological impact at levels currently permitted by Australian safety standards.

Similarly, IARC determined the Group 2B classification with specific reference to heavy mobile phone use. Without explaining this, the conflation of the findings relating to mobile phones with the potential impact of Wi-Fi (and any other EMF emitting device) unduly favours the unorthodox perspective.

Other than Wi-Fi falling into the broad RF spectrum, nothing in the program is offered to establish why Wi-Fi should be treated with the same caution as heavy mobile phone use. Nothing in the program justifies the assumption that Wi-Fi is or should be treated as equivalent to mobile phones and therefore justifying the evidence used to question the health impacts of heavy mobile phone use to be applied equally to Wi-Fi or any other EMF emitting devices.

Conclusion

The cumulative effect of the inadequate signposting for the audience; the selection and lack of context in the scientific papers referenced in or underpinning the program; the prominence given to views challenging the scientific consensus; and the findings for accuracy all unduly favour the unorthodox perspective that wireless devices and Wi-Fi pose significant health risks.

Finding: Breach of 4.5

Audience and Consumer Affairs

24 June 2016