

“Trouble with TETRA” report of a joint PHMEG (Public Health Medicine Environmental Group) NRPB (National Radiological Protection Board) seminar on 25 May 2004

In early 2004, NRPB were contacted by a number of CCDCs who were responding to public concerns about tetra (terrestrial trunked radio) and other telecommunications masts. The focus for public concerns seems to be changing from cancers towards more diffuse symptoms. HPA is being asked to comment on levels of symptoms in the community and whether the masts pose a significant risk to public health. PHMEG offered to host a seminar to provide an update on the scientific evidence from NRPB, share local experiences and strategies to deal with these problems and give an opportunity for mutual learning.

The seminar was a great success, 35 people attended and the results, and slide presentations given on the day will be available on the PHMEG website or directly from Jill Meara at NRPB.

The group began by discussing expectations for the day. These included:

1. What is pulsing, do tetra systems pulse?
2. Is there really a public health problem?
3. What is electrical hypersensitivity?
4. Practical strategies for dealing with public concern
5. Where do we go from here?

The physics of mobile telephony, similarities and differences of the tetra system

Simon Mann, NRPB explained that all cellular radio systems are designed to work with minimum power so that the frequencies can be re-used short distances away without interference. Masts are placed to give the most even possible signal over the coverage area. The signals are affected by the buildings and other features of the environment. The signals penetrate poorly into concrete and other obstacles that contain high levels of water.

The personal exposure from using a phone, which can approach the international exposure guidelines, is thousands of times greater than the exposure from phone masts.

Capacity is the total number of calls that can be made at the same time from one antenna. Ordinary mobile antennae have higher capacity than tetra systems.

The tetra handset sends a pulsed signal (one time period on, 3 periods off), but the base station receives a constant signal being the sum of signals from 4 mobiles (or dummy signals if fewer than 4 mobiles are in use).

The tetra base station sends a continuous signal, the mobile selects quarter of the total information that it wants. While the base station is transmitting, the amplitude of the signal varies greatly, for a brief period as it switches to the next handset, the amplitude stabilises, but dose not drop to zero. This is not the same as pulsing, where the amplitude of the signal drops to zero, it merely becomes less variable. Therefore, there is no reason to treat TETRA base stations any differently to ordinary mobile phone base stations.

Distance from a phone antenna (conventional or tetra) is not a good proxy for signal strength because of the reflection of signals around the environment. An experiment which relied on measures of personal exposure would have to include use of phones and exposure to signals throughout the day.

A question was raised about the potential of tetra to cause television interference. Interference matters are the responsibility of Ofcom. Interference with TV sets is no indication of a hazard posed by RF signals in the environment since TV tuners are designed to be very sensitive in order to receive the weak signals found at large distances from the broadcast masts.

Someone also asked about the effect of exposures of adding additional antennae to an existing mast. Public exposure levels in the vicinity of mobile phone masts tend to be so low that adding further a further mobile phone or TETRA operator to the mast would not alter the situation that exposures would be expected to be small fractions of guidelines. As an example, if two signals each produce an exposure contribution that is 1000 times below the ICNIRP guidelines, the exposure produced by both signals acting together is still 500 times below the ICNIRP guidelines.

NRPB do not have any details about whether the tetra system is meeting its objectives. These issues are the responsibility of government.

The biology of mobile technology and possible health effects

Zenon Sienkiewicz, NRPB explained that TETRA is probably not a threat to health. The public concern is surprising given the reassuring research evidence going back over 30 years and similarity of mobile telephony to other well accepted technologies.

Measuring personal exposure (dosimetry) is far from simple. The basic biology gives few clues to outcomes so it is difficult to know what outcomes to study. Over the years many studies have been done looking at a wide range of outcomes (cancer, electrophysiology, cell physiology). Except for the heating effects, no reliable biological (animal or cellular) model for radiofrequency exposure has been found. In general the better-conducted studies find fewer effects. Many effects found in one study are not replicated. Reproductive and development effects are comparable to effects from heating and if there is no heating, there are no effects. The overall summary of the evidence is that there is no proven biological effect of radiofrequency radiation at the levels the public are exposed to from mobile telephony.

The MTHR (Mobile telecommunications health research, £7.4 million) programme is jointly funded by the government and industry, with an independent advisory group. The Home Office is also funding research into health effects of Tetra in police staff.

In answer to a question about whether the Stewart report overstated the possible risks of 17 MHz, Zenon stated that the balance of evidence has probably changed since the publication of the Stewart report and this was reflected in the recent AGNIR (Advisory Group on Non-ionising Radiation) report. NRPB (now chaired by Sir William Stewart) will be producing an updated statement on the health risks of mobile telephony (including Tetra) in the autumn.

The prevalence of symptoms in the community

Simon Wessely from the Institute of Psychiatry/King's College London explained that symptoms are "the stuff of life", common and compatible with normal health. There are a finite number of common symptoms of very high prevalence in the community. There is a strong correlation between fatigue, other common symptoms and anxiety/depression. Most symptoms are not associated with structural changes or disease but the symptoms are real. It is a paradox that as

objective measures of health improve and people live longer, then they report more symptoms. Medicine gets better at dealing with disease, but has not really addressed symptoms.

There is an increasing tendency to attribute symptoms to environmental causes. The symptom spectrum remains the same and the causes are usually described as "not my fault", "modern" or "external". There are some interesting examples in the literature, most of them from some time ago. These include a US paper describing an outbreak of symptoms in a community who found that they lived near to a toxic dump. Eventually it was found that the dump did exist, but was actually some distance away. This showed that the symptoms were due to knowledge and anxiety, rather than toxins.

Local experiences

David Hagen, CCDC, Haydn Smith, Assistant Director (Health & Housing) and James Appleton, Assistant Director (Planning), Worthing Borough Council explained that "The trouble with TETRA is that it does affect people's health. The masts are symptom magnets".

The mobile telephone companies have not helped because of lack of public consultation and inconsistencies in the planning laws, for example a tall mast can be erected at the end of the garden, but the householder may not be permitted to erect a potting shed.

There is less obvious public benefit to tetra systems than conventional mobile phones.

Local authority officials are in the front line because they are responsible for implementing planning laws at local level. Planning refusals often incur large costs for local authorities because the operator invariably appeals, and often wins on appeal. This makes the council seem ineffective and weak. The Worthing team presented the great pressure they were under to measure symptoms in local residents that are attributed to a tetra mast. There are plenty of websites and self-appointed experts that reinforce the notion that the existing science is ignoring the "real" health effects. Authorities are accused of hiding a substantial risk because they do not say that masts are "definitely safe". The media are keen to report this debate. The public view is that the "easy experiment" of turning the mast off to see if the symptoms disappear is valid and should be done.

HPA Chemical Hazards and Poisons Division, introduction to the draft guidelines for the investigation of suspicious or alleged clusters with potential exposures to environmental chemicals

Jill Meara on behalf of Pat Saunders, HPA ChaPD explained that the brief is to produce guidelines for the investigation of suspicious or alleged clusters of diseases with potential association with exposures to environmental chemicals for local authorities and primary care trusts.

Many cluster investigations do not yield positive results but inappropriate refusal to conduct a study can also cause problems. There is a major challenge to allay community concerns without seeming to avoid the issue.

The draft guidance reviews several existing guidelines for cluster investigation and proposes a set of guidance for the HPA. The guidance proposes a staged approach starting with screening and incorporating review at the end of each stage. The guidance is currently being reviewed by experts and examples worked through. It aims to give HPA staff the right method at the right time and the confidence, if appropriate not to conduct a study.

Denise Catney and Anna Gavin from the Northern Ireland Cancer Registry/Queens University Belfast has recently published a paper on their

investigation of an alleged cancer cluster near a telecommunications mast in the province.

Experiences of talking about mobile phone masts at public meetings and dealing with "mavericks"

Mike Clark, NRPB said that early public concerns were about the handsets, now they are all about the masts.

Mike described some successful methods to explain the science to the community. For example:

Compare the devastating health effects of the early researchers into radioactivity with the lack of damage to early radio pioneers such as Marconi.

Explain that a few seconds talking on a mobile gives the same exposure as a day living near a mast.

Pulsing is when the amplitude of the signal drops to zero, this does not happen with tetra masts although there is a period of the transmission where the signal becomes less variable.

Give a clear description of the hierarchy of scientific evidence (anecdote to randomised controlled trial).

Mike described some of the characteristics of the "maverick" activists, some of whom have a scientific background in electrical engineering, biological research or epidemiology.

Public concern is very variable around the country.

MTHR funded research on the effects of mobile phone use on symptoms and neuroendocrine function in "normal" and "hypersensitive" users.

James Rubin from King's College London said that hypersensitivity to mobile phones does not have a common set of symptoms, prevalence or triggers. A systematic review of previous studies found 30 blind or double blind studies. 24 were negative but of low power, 6 were positive (i.e. found a link between radiofrequency exposure and symptoms in susceptible individuals). Of the 6 positive studies, 2 were not positive on replication, 2 were statistically unreliable and 2 gave mutually inconsistent results.

There is no consistent pattern of symptoms reported or believed triggers. There appear to be strong cultural determinants to which symptoms are expressed.

James is doing a study, funded by the MTHR programme that will recruit 60 hypersensitives and a similar number of controls for double blind testing.

Plenary session

There was a wide ranging discussion including:

How do you predict which new technology is likely to arouse public concern?

Some "fright factors" can be identified including risks of dread diseases, lack of benefit to individuals etc but there is also a random element.

How do you predict which "scare stories" will run and which will just wrap tomorrows chips?

It is clear that in some cases masterly inactivity from authorities is followed by low levels of public concern, but in other cases the scare is amplified and authorities end up on the back foot. Actions likely to lead to high levels of public concern include:

- Erecting masts in the middle of the night
- Unwillingness to talk
- Mixed messages or wrong information
- Profit for big businesses
- No perceived public benefit

References

Advice on Limiting Exposure to Electromagnetic Fields (0–300 GHz)
Documents of the NRPB Vol 15; No 2; 2004

The Dump that wasn't there. Science 1982; 214 645

Investigation of cancer incidence in the vicinity of Cranlome telecommunications mast Denise Catney, Anna Gavin Northern Ireland Cancer Registry, Department of Epidemiology and Public Health, Queens University Belfast. May 2004.