2B: possibly carcinogenic to humans!
A communication challenge

Peter Wiedemann
Karlsruhe Institute of Technology
WF EMF – Science Forum EMF
One of the greatest challenges facing any public health agency is that of risk communication.

Public understanding of the 2B classification of RF EMF emissions from cell phones

- What does 2B mean?
- Impact on concern and behaviour?
The starting point
The WHO/International Agency for Research on Cancer (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 Working Group did not quantitate the risk; however, one study of past cell phone use (up to the year 2004), showed a 40% increased risk for gliomas in the highest category of heavy users (reported average: 30 minutes per day over a 10-year period).
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A quick look at the IARC system

Group 1: Carcinogenic to humans
Group 2A: Probably carcinogenic to humans
Group 2B: Possibly carcinogenic to humans
Group 3: Not classifiable as to its carcinogenicity to humans
Group 4: Probably not carcinogenic to human
The purpose of the IARC system

- IARC classifies the strength of evidence for carcinogenicity
- Differentiates among various levels of evidence
- (Provides orientation for action)
Group 1
‘carcinogenic to humans’
(highest risk)
includes anything for which strong evidence of an increased risk of cancer in humans, and
a plausible mechanism, exists
examples: tobacco, alcohol, asbestos
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Group 2A
‘probably carcinogenic’
limited evidence in humans but strong evidence of an increased risk of cancer from
animal studies, where the mechanism in humans is likely to be similar
examples: diesel engine exhaust, hot mate
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**Group 2A**
‘probably carcinogenic’
limited evidence in humans but strong evidence of an increased risk of cancer from animal studies, where the mechanism in humans is likely to be similar
examples: diesel engine exhaust, hot mate

**Group 2B**
‘possibly carcinogenic’
limited evidence of increased risk of cancer in both humans and animals, or evidence only of a potential mechanism
examples: coffee acid, DDT
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Group 3
‘not classifiable’
there are currently insufficient scientific studies to assess the likelihood of something
causing cancer – often this means that further research is needed
examples: cholesterol, hydrogen peroxide
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examples: cholesterol, hydrogen peroxide

Group 4
‘probably not carcinogenic’
there is strong evidence to suggest that something does not cause cancer
examples: there is only 1, caprolactam
2B classification features

**Group 2B:** "The agent (mixture) is *possibly carcinogenic to humans.*"

"The exposure circumstance entails exposures that are possibly carcinogenic to humans.

- This category is used for agents, ...for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence of carcinogenicity in experimental animals.
- It may also be used when there is inadequate evidence of carcinogenicity in humans but there is sufficient evidence of carcinogenicity in experimental animals.

- ...
IARC classification

- The IARC-system is about hazard, not about risk!
- IARC classifies the level of evidence that speaks for a hazard.

„These categories refer only to the strength of the evidence that an exposure is carcinogenic and not to the extent of its carcinogenic activity (potency) nor to the mechanisms involved.“ IARC 2006
What does “limited evidence” mean?

- Limited evidence – epidemiological studies

  A causal interpretation is considered to be credible, but chance, bias or confounding could not be ruled out with reasonable confidence.

  Is that beyond reasonable doubt?
Communication issues
Communication challenges

- The overarching aim of RC is supporting proper understanding of the messages
  - Message 1: “Possibly carcinogenic to humans”
  - Message 2: “40% risk increase of glioma”
- Enhancing appropriate actions
People’s understanding of “possibly carcinogenic”

What we have found in qualitative interviews

- High diversity of interpretation
  - is just a hypothesis, risk not predictable, only under certain conditions the case, ..., serious situation

- Tendency to overestimate/underestimate the available evidence

- Confusion in relationship with with 40% increase of risk for glioma

- Uncertainty is attributed to circumstances, long latency period, genetic variability, exposure to other hazards, personality traits and amount of exposure
Means and SD's of how people interpret qualitative probability terms

Explaining the strength of evidence

- Do not use the word “risk” in an assessment of hazards.

However, if so, then explain the difference between hazard and risk (uncertainty about the existence vs. uncertainty about the magnitude of a risk).

- Use phrases based on a common word stem with varying modifiers (e.g., word stem: likely; modifiers: very likely, somewhat likely, very unlikely,...)

- Indicate the argumentation structure (what speaks for and what against the hazard) and describe briefly the sources of uncertainty.
People’s understanding of 40% risk increase

What we have found in qualitative interviews

- 40% - difficulties to translate into numbers
  - > low numeracy
  - 1 out of 4, 4 out of 10
  - if the risk was in the past 1%, than it is now 1,4%

- 40% of what?
  - 40% more glioma after the introduction of cell phones
  - 40% more glioma in the entire population
  - 40% more glioma in long term /heavy users
40% : What does it mean?

To put this 40% risk increase into context,

Incidence:

- The age-adjusted incidence rate for brain and other CNS tumours is 6.5 per 100,000 men and women per year (based on US data from 2006)

- Gliomas account for about half of all brain tumours; so their age adjusted incidence rate is about 3.25 per 100,000 per year

- A 40% increase in risk would mean an excess of 1.4 per 100,000 or increase from 3.25 to 5 per 100,000 per year
Explaining risk increase

- Use natural frequencies (1 out of 1000)
- Provide a meaningful risk indicator (life time risk?)
- Explain the reference case (40% increase in X in comparison with Y)
- Putting risk increase in context - attributive risk
Comparisons might be helpful for understanding the relevance of 2B

Two ways:
- To explain 2B -> giving background information
- Giving an reference case - another 2B case -> impact depends on the reference case : coffee or DTT
Enhancing actions

Many countries take precautionary measures, however what are the effects?

- Health
- Risk perception
- Trust in risk management
<table>
<thead>
<tr>
<th>Country</th>
<th>Info</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSES (F)</td>
<td>✔</td>
<td>Prior position confirmed: precaution</td>
</tr>
<tr>
<td>ARPANSA (AU)</td>
<td>✔</td>
<td>No alarm; but precaution</td>
</tr>
<tr>
<td>BAG (CH)</td>
<td>✔</td>
<td>Prior position confirmed: precaution</td>
</tr>
<tr>
<td>BfS (GE)</td>
<td>✔</td>
<td>Prior position confirmed: precaution</td>
</tr>
<tr>
<td>Dutch Health Council (NL)</td>
<td>✔</td>
<td>Contradicts</td>
</tr>
<tr>
<td>FDA (USA)</td>
<td>✔</td>
<td>Contradicts</td>
</tr>
<tr>
<td>Health Canada</td>
<td>✔</td>
<td>More precaution</td>
</tr>
<tr>
<td>HPA (UK)</td>
<td>✔</td>
<td>Some precaution</td>
</tr>
<tr>
<td>SSM (SE)</td>
<td>✔</td>
<td>Precaution</td>
</tr>
<tr>
<td>National Health Council (IT)</td>
<td>✔</td>
<td>Precaution, further action needed</td>
</tr>
<tr>
<td>STUK (FIN)</td>
<td>✔</td>
<td>Prior position confirmed: Strong precaution</td>
</tr>
</tbody>
</table>
All in all, how threatened do you feel by electromagnetic radiation emissions from cell phones?

Information measures

Precautionary limits

Protecting sensitive people

Exposure minimization

Difference Scores (with 95% CI)
Do you trust that the public's health is sufficiently protected against electromagnetic radiation emissions from cell phones?

- Information measures
- Precautionary limits
- Protecting sensitive people
- Exposure minimization

Difference Scores (with 95% CI)
Enhancing actions

- Informing people about precautionary measures results in increased risk perceptions.

- Informing people about precautionary measures results does not result in elevated trust in risk management.

- Therefore, our data demonstrate the need to rethink current approaches to risk communication regarding precautionary measures.
Final conclusions

- Hazard assessors should take into account black swans.
- Public health official should put potential risks into context.
- Risk communicators should assess the impacts of their messages and select the option with the highest benefit and the lowest countervailing effect.
- There is plenty of room for improving the 2B communication.
Recommendation

- 2B communication
  - Explain the focus of IARC’s classification
  - Say what 2B is not
  - Give a comparison
  
  - 40% increase, if at all addressed, give the baseline information and explain the reference case
  
  - Address precaution not via “risk perception”! Focus on habits.
“What is simple is wrong, what is complex is useless.”

Paul Valéry
Thank you very much for your attention!

peter.wiedemann@wf-emf.org