

Radiofrequency fields are a probable human carcinogen

Anthony B. Miller, MD, Professor
Emeritus

Dalla Lana School of Public Health,
University of Toronto

IARC process to develop monograph on carcinogenicity

- Decision taken to assess carcinogenicity of an exposure
- Literature review perform
- Experts selected
- Experts assigned tasks and review (their segment of) the literature
- Experts assembled for 8 day intensive discussions
- Decision taken on level of carcinogenicity, 1, 2 a, 2b, 3, 4

Informative studies for Monograph 102

- Epidemiology studies
 - ✧ Interphone – multicountry, case control
 - ✧ Hardell case-control studies
 - ✧ Danish cohort study
- Mechanistic data
- Animal studies

Interphone – Appendix 2 for Glioma

Time since start of regular use (years)	Cases	Controls	OR	95% CI
1-1.9	93	159	1.00	
2-4	460	451	1.68	1.16-2.41
5-9	468	491	1.52	1.06-2.22
10+	190	150	2.18	1.43-3.31

Epidemiology Studies since Monograph 102

- Occupational (Cardis et al), 2013
- New Hardell, 2013, 2014
- French – Cerenat, 2014

Cerenat – 231 cases, 446 control

Brain cancer	Exposure period	OR	95% CI
Glioma	After 2 years	2.89	1.41-5.93
	After 3 years	3.03	1.47-6.26
	After 5 years	5.3	2.1-13.23
Ipsilateral glioma	All	2.11	0.73-6.08
Meningioma	All	2.57	1.02-6.08

Pending epidemiology studies

- COSMOS Cohort study in 5 European countries
- Mobi-kids case-control study (involves Canada – Montreal, Ottawa, Toronto, Vancouver)
- More are needed

Foundation for Identifying Radiofrequency Fields as an avoidable cause of Breast Cancer

- 7 unusual clinical case reports
- Exposure modeling
- Toxicology
 - ✧ in vitro with human and animal cells
 - ✧ in vivo

Marketing for Cell Phones and Gear in Bras



TECHNOLOGY

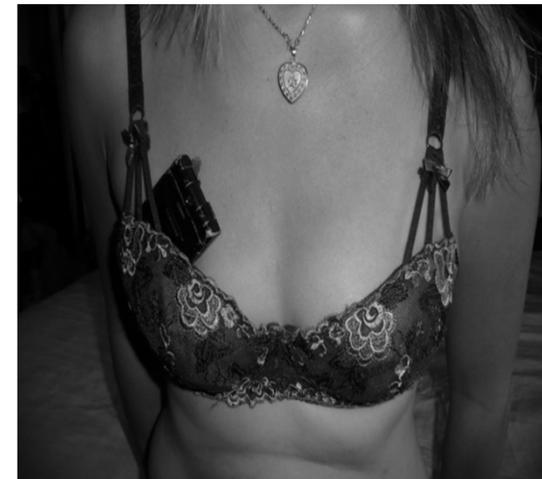
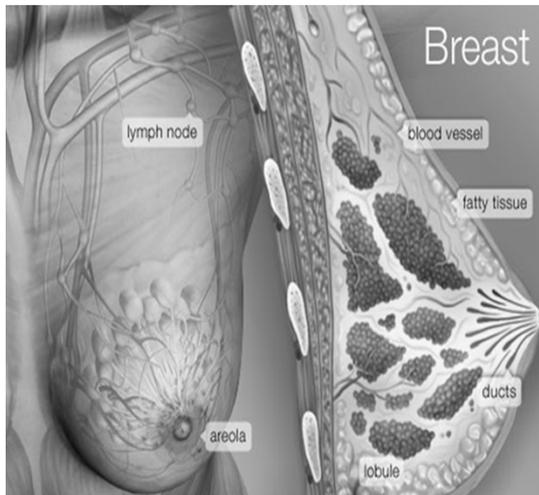
OMG

Bra That Holds Your Cell Phone Is Every Woman's Dream

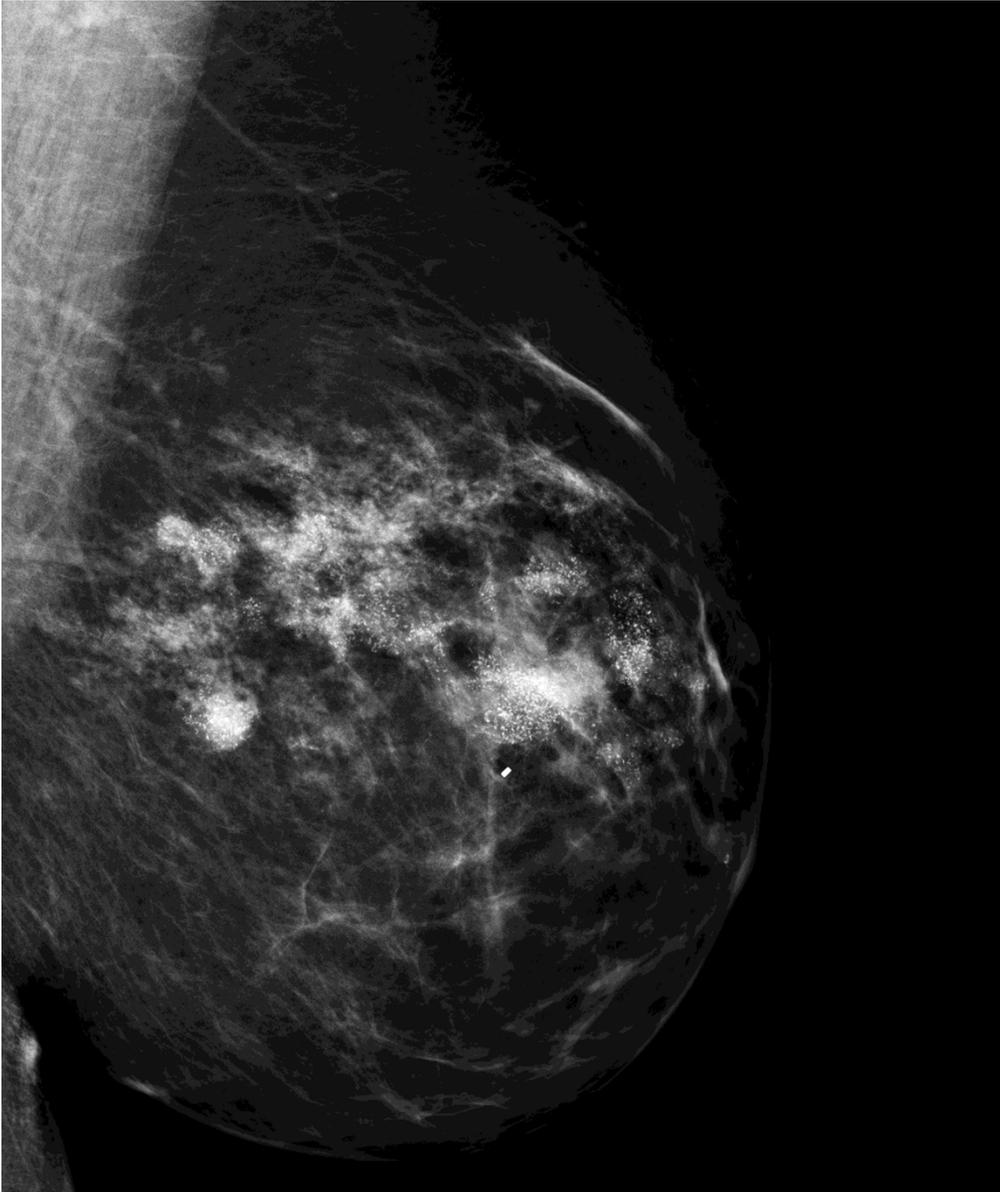


Risk of Breast Cancer tied with cellphone radiation

The younger the breast the greater fluid and fat and greater microwave absorption

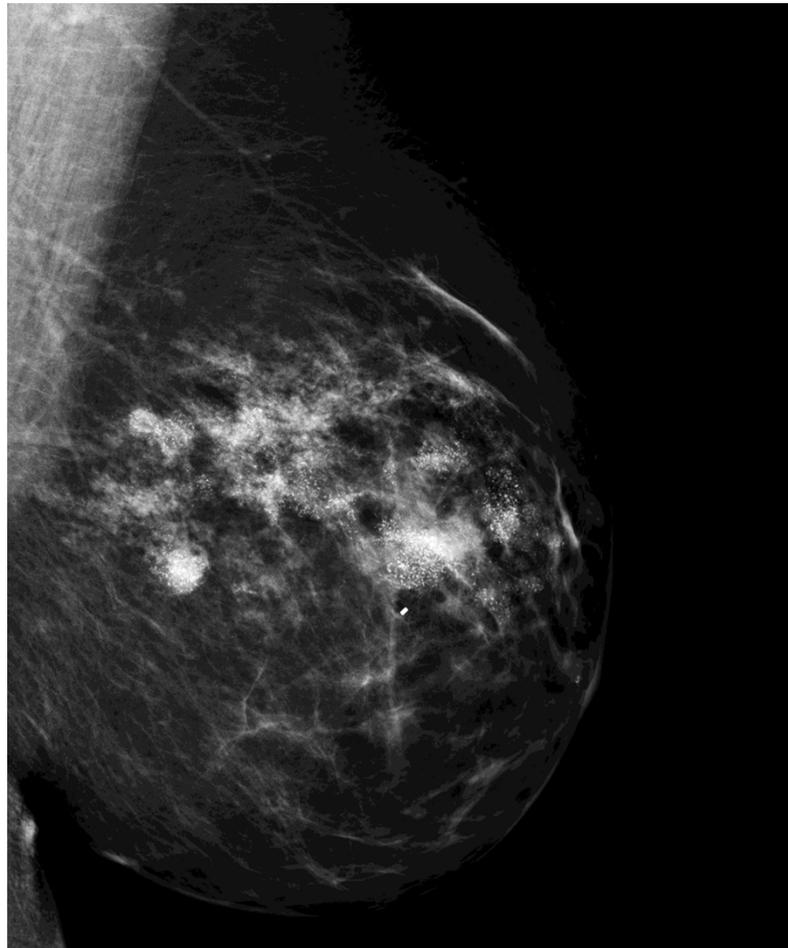


First case report, 2009

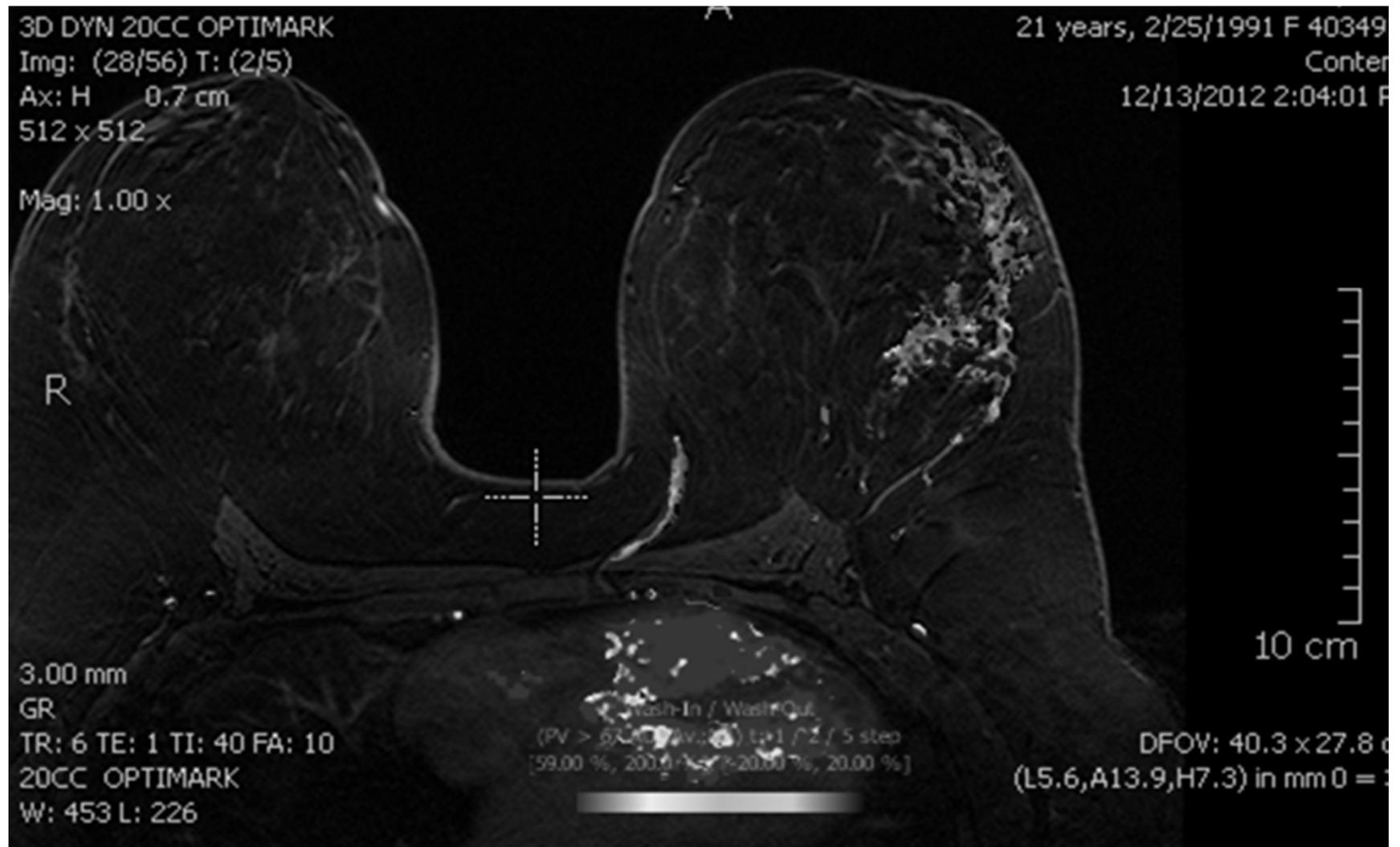


Invasive multiple primary tumors in 34 year old, avid runner Chinese-American woman who used cellphone 4 hours a day in her bra for 10 years—reported by Robert Nagourney, MD, PhD

Two cases age 21 with multi-focal tumors
linked to cellphones kept in bra from age 13-
21, 2012



Case Report—21 yr old multi-focal tumors linked to cellphone kept in bra



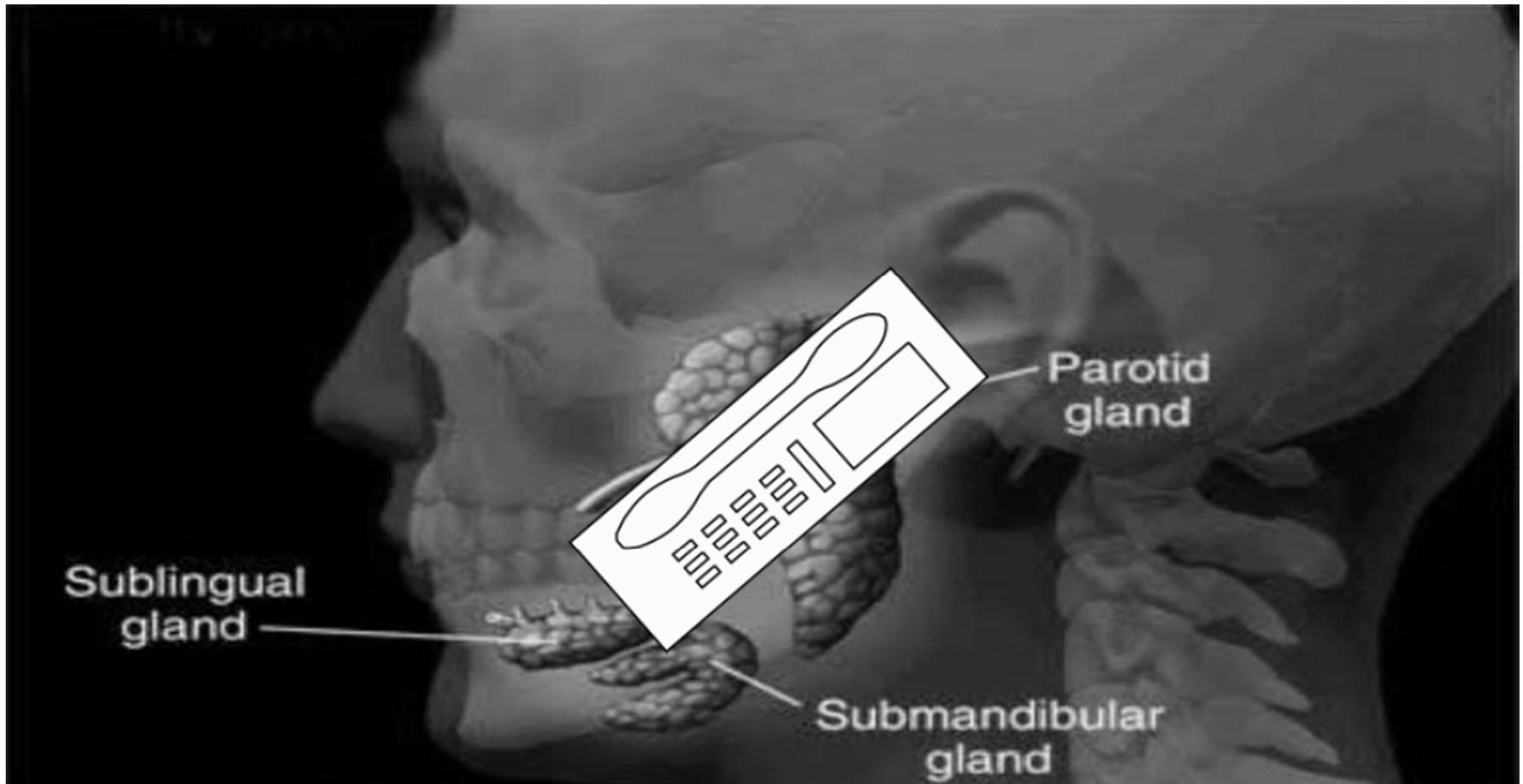
Summary of 7+ cases

- Negative for BRCA1/2
- No family history or other risk factors
- Unusual location of multi-focal tumors where phones were kept with mix of tubular/solid patterns of identical nuclear morphology & grade
- No significant histology in ductal and lobular units away from the areas of cellular phone use
- Two with metastases

Reasons for deducing that radiofrequency fields is (an epigenetic) breast carcinogen

- Exposure Information
- In vitro toxicology
 - ◆ RFF stimulates apoptosis in normal fibroblasts
 - ◆ RFF impedes efficacy of tamoxifen
 - ◆ RFF interferes with melatonin
 - ◆ RFF is a xenoestrogen
- In vivo toxicology studies

Parotid or Salivary Gland Tumors Tripled in Israel: 1 in 5 under age 20



Increase in Parotid Gland Tumors in Israel Over the Last 30 Years

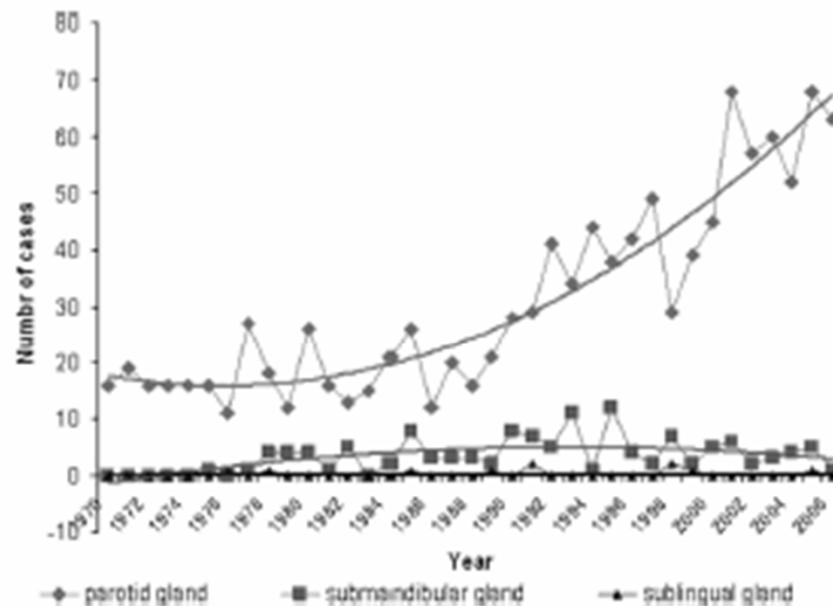


FIGURE. For trend analyses, we added regression lines and calculated R^2 values. Parotid gland cancer: $R^2 = 0.83$; Submandibular gland cancer: $R^2 = 0.36$; Sublingual gland cancer: $R^2 = 0.02$.

Source: *Epidemiology*, 22, p.130, *January 2011*

2007 Israeli case control finding: Association Between Tumors and Cell Phone Use

“Based on the largest number of benign [parotid gland tumors] patients reported to date, our results suggest an association between cellular phone use and PGTs.”

The authors recommend continued research and implementation of precautionary measures by governments until further evidence becomes available.

Sadetzki et al. Am. J. Epidemiol. (2008) 167 (4): 457-467.

Israeli Dental Association Warning

- One in every five rare malignant tumors of the cheek occurs in someone under age 20
- Young people should use headsets and speakerphones and limit direct exposure of the head to microwave radiation from cell phones

Overall conclusions

- RFF are a Probable Human Carcinogen (IARC Category 2A)
- Radiofrequency fields are now ubiquitous
- Even if risk per individual is low, it is widely distributed and could become a major public health concern
- The Precautionary Principle must be applied now.