



# Risk Management

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# Definition of a Hazard and Risk

## ▶ What is a **Hazard**?

- ▶ A **hazard** is any source of **potential** damage, harm or adverse health effect(s) to people or the environment

## ▶ What is a **Risk**?

- ▶ A **Risk** is the chance or **probability** that a person will be harmed or experience an adverse health effect if exposed to a hazard. It also applies to situations that lead to harmful effects on the environment

# Definition of Risk Management

- ▶ The identification, analysis, *assessment*, control, and *avoidance*, minimisation, or elimination of unacceptable *risks*
- ▶ May involve the use of *risk* assumption, *risk* avoidance, or other strategy (or combination of strategies) to properly *manage and mitigate* possible (unwanted) future events
- ▶ The risk management process from a health and safety perspective has the primary objective of *eliminating* or *minimising* the **risks of harm**

# Risk Management – Risk Attributes

- ▶ **Risk Description** – identification of the risk being detailed
- ▶ **Likelihood** of risk materialising – classification can be numbers (i.e. 0 to 4) or descriptive labels (i.e. unlikely, seldom, occasional, likely, definite)
- ▶ **Severity** – Impact of risk should it materialise – classification can be numbers or labels (insignificant, minor, moderate, high, critical)
  - ▶ The impact classification needs to consider population size exposed, the impact on **wellbeing** and the **cost** (treatment, lost wages etc.) if risk materialises
- ▶ **Mitigation Strategy** to prevent or manage an identified risk

# Risk Assessment Matrix

- ▶ A chart that plots the severity of a risk event vs the probability of it occurring

		Impact Severity			
		Acceptable	Tolerable	Undesirable	Intolerable
Likelihood	Improbable	Low -1-	Medium -4-	Medium -6-	High -10-
	Possible	Low -2-	Medium -5-	High -8-	Extreme -11-
	Probable	Medium -3-	High -7-	High -9-	Extreme -12-

Risk Rating	Low	Medium	High	Extreme
		0 - acceptable	1 - ALARA (As low as reasonably achievable)	2 - Generally unacceptable
	No Action Required	Take Mitigation Action	Take action – Reconsider all activities leading to risk	Stop all actions that will lead to risk

# The Problem

Risk Management is not about requiring established evidence of harm

Risk Management is about recognising the **potential for harm** and if, necessary, taking **precautionary measures**

# Current Challenge

- ▶ Lack of public awareness of real risks – wireless devices are assumed to be completely safe
- ▶ Most studies are not designed to answer the question of whether there are possibly multiple downstream health effects, including those in the second exposed generation
- ▶ Experiments performed with controlled exposures not representative of typical real life exposures
  - ▶ Are typically short term acute exposures
  - ▶ Effects of radiation are additive (different frequencies) and cumulative (cell damage)
- ▶ Very limited investigation of synergistic effects with other environmental/man made toxins
  - ▶ Cell membrane permeability changes and cellular stress can augment actions of chemicals and other toxins
- ▶ Bio-effects routinely found in well conducted studies are not being addressed by health bodies for their potential to cause harm

# Missing in Action – A Robust Risk Management Policy

- ▶ All potential risks are not being clearly identified – Absence of a formal risk register
- ▶ Mantra – “no established evidence of harm” is used to give public false sense of security
- ▶ Limited assessment of risks (TR-164) shown to be inaccurate and biased
- ▶ Uncertainty is routinely used to downplay risks and cloud the issue
  - ▶ How much uncertainty is real vs manufactured? Perhaps a study should be conducted to look at this
- ▶ Continued rollout of evolving wireless technologies 2G, 3G, 4G and now 5G when:
  - ▶ Wireless products have never been formally tested for health and safety
  - ▶ Occurring despite the balance of scientific evidence suggesting serious risks – cancer, neurodegeneration, cardiovascular disease, immune system disorders etc.
- ▶ **Risk mitigation suggestions are weak and warning labels absent from product packaging**

# Possible Causes for Inaction

Radiation Protection bodies are often

- ▶ Missing essential expertise
  - ▶ Lacking experts with specialist biological and medical science proficiency
  - ▶ Risk assessments are being performed in the absence of medical advice
- ▶ All singing from the same ICNIRP hymn book – a minority clique of scientists holding the same ideas and not representative of all scientific opinion
- ▶ Are not truly independent - often seen working closely with industry representatives and placing industry and government economic interests ahead of public health
  - ▶ Blinded by the economic benefits the technology brings – not looking at the economic costs
- ▶ In the case of ARPANSA - limited in freedom to act by ARPANSA Act 1998
  - ▶ Act not to prejudice Australia's defence (Radar, Communications, Missile Guidance, ECM etc.)
  - ▶ Act not to prejudice national security (Communications, Surveillance and other covert action)

# Our Future Health

- ▶ If we fail to address the risks identified by science this will undoubtedly lead to:
  - ▶ Increased costs to support those who have been injured
  - ▶ **Increased disease burden and unnecessary suffering**
  - ▶ Lost productivity
  - ▶ Lost opportunities due to failing health and in some cases, ruined careers
  - ▶ **Threat of serious and/or irreversible environmental damage**
- ▶ Is completely avoidable if Govt. agencies acted responsibly and in the public's best interest
- ▶ The general public have the right to know what science is showing without manipulation and filtering

***"The greater the risk, the greater the fear to change"*** - *The High Cost of Doing Nothing*

# Balance of Evidence

SOURCE: ORSAA DATABASE

<http://www.orsaa.org/orsaa-database.html>

## Find Search Summary Totals

Peer Reviewed Studies Showing Biological Effects

Number of records used : **2186** of **3009**

Auditory Dysfunction / Hearing loss / Tinnitus	40	Apoptosis (Programmed Cell Death)	95	Brain Tumours	45
Blood Brain Barrier Permeability Changes	16	Breast Cancer	10	Cellular Stress	62
Brain Development / Neuro Degeneration	52	Biochemical Changes	342	EEG changes / Brain Waves	105
Neuro Behavioural Effect / Cognitive Effects	192	Cell Irregularities/ Damage/ Morphological Changes	193	Effects on Mitochondria	39
Calcium Influx / Efflux	18	Fatigue	45	Altered Enzyme Activity / Protein Levels / Protein Damage	363
Circadian Rhythm Disruption	13	Altered Gene Expression	144	Headaches/Migraines	67
DNA Damage / Mutagenic / Genotoxic	145	Altered Glucose Level / Glucose Metabolism	21	Inflammation	22
Endocrine / Hormone Effects	68	Cardiovascular/Vascular Effects	72	Hepatic Effects (Liver)	24
Miscarriage / Spontaneous Abortion / Foetus Resorption	4	Immune System Effects	71	Impaired / Reduced Healing/ Bone Density Changes	5
Memory Impairment	63	Oxidative Stress / ROS/ Free Radicals	240	Speech Impairment	4
Sperm / Testicular Effects	89	Sleep Effects	63	Haematological Effects	52
Tumour Promotion	37	Neurotransmitter Effects	34	Synergistic/Combinative Effects	56
Thyroid Effects	14	Visual Disturbances/ Ocular Effects	44	Autism	9
Leukemia	4	Parotid Gland Malignancy	4	Neoplasia/ Hyperplasia (Abnormal Tissue Growth)	5
Depression	24	Induced Adaptive Response	52	Dizziness / Vertigo / Vestibular Effects	24

Continue

A responsible way of managing risks is to:

1. Look at the balance of scientific evidence; and
2. Assess the probability of harm

Common biological effects found in RF Research are numerous

These bio-effects can be used as a starting point to identify potential health risks

- May have a role in disease pathways/well being
- A known cause of disease

Source: ORSAA Database – RF Bioeffect summary

# Identified Risks

- ▶ Brain Tumours
- ▶ Other Cancers
- ▶ Cardiovascular Disease
- ▶ Diabetes
- ▶ Neurodegeneration
- ▶ Mental illnesses
- ▶ Pregnancy Complications / Developmental Problems
- ▶ Immune Disorders (Allergies & Autoimmune Conditions)
- ▶ Infertility/Sterility
- ▶ Chronic Illness (CFS, Fibromyalgia etc.)
- ▶ Nuisance Effects (headache, hot ear, vertigo, tinnitus etc.)
- ▶ Sleep Disorders

Note: Insurance Agencies do not provide cover for EMF induced injuries

Cost/Benefits

RISK MANAGEMENT

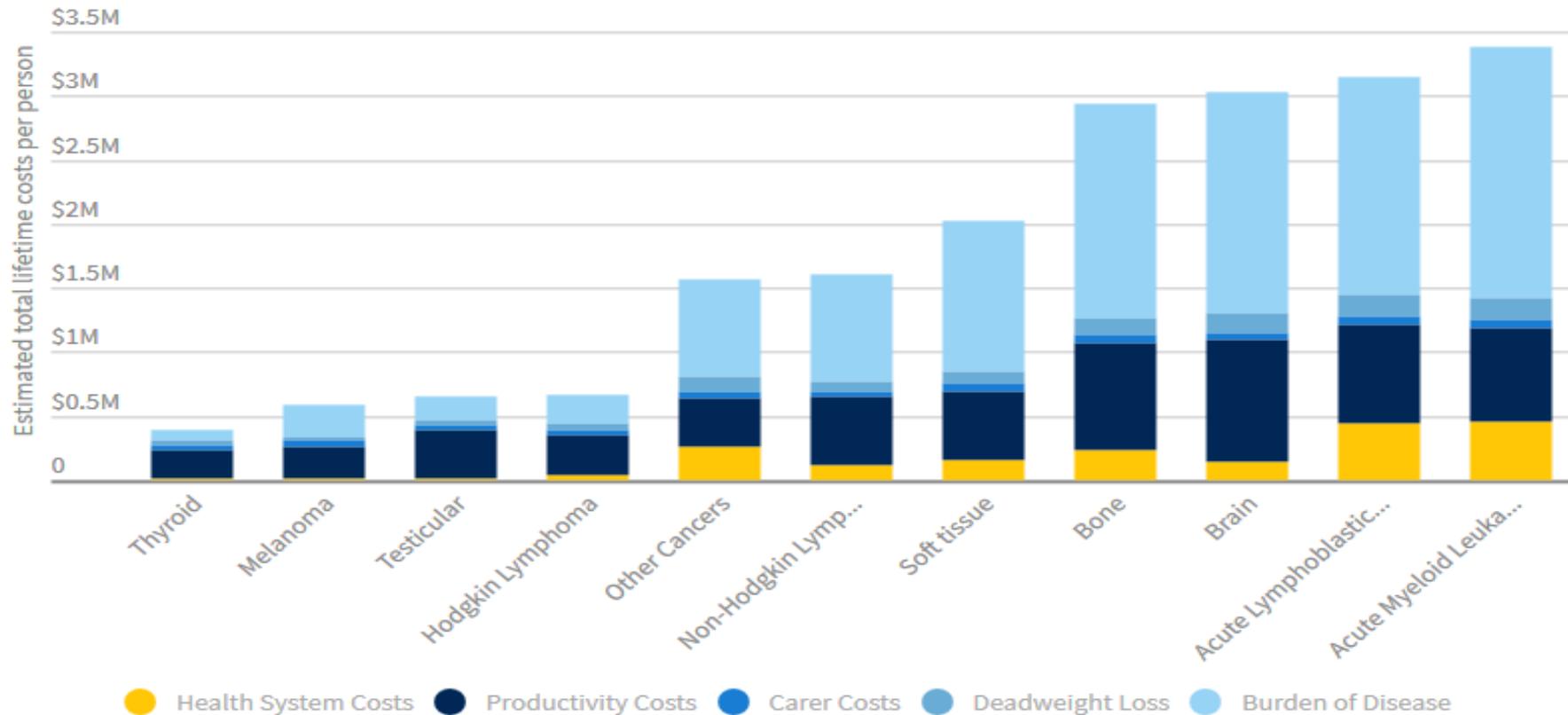
# What are the costs to be considered?

- ▶ **Direct financial costs** to the Government health system – Hospital, nursing homes, GP and specialist services reimbursed from Government medical insurance programs, pharmaceuticals and ‘other’ direct costs
- ▶ **Productivity costs** – patient productivity losses, long term employment impacts, premature mortality etc.
- ▶ **Administrative costs** and **other financial costs** include government and non-government programs such as respite, community palliative care, special education, transport etc.
- ▶ **Transfer costs** comprise the **deadweight losses** associated with government transfers such as taxation revenue foregone, welfare and disability
- ▶ **Non-financial cost** covers pain, suffering and premature death. Can be analysed in terms of the years of healthy life lost, both quantitatively and qualitatively, known as the ‘**burden of disease**’.

Costs borne by:

- ▶ Patient
- ▶ Friends and family
- ▶ Employers
- ▶ Federal Government
- ▶ State and local Government
- ▶ Rest of Society

# Economic Costs - Cancer



Source: CanTeen Australia (2017), *The economic cost of cancer in adolescents and young adults*

# Risk Management – Cost Benefits

- ▶ ~1900 Brain tumours are diagnosed each year in Australia
- ▶ 3 Million\$ cost estimate per person
- ▶ 5.7 Billions\$ economic loss per year

Question: How many brain cancers can be attributed to RF exposure from cell phones/towers?

- ▶ Other cancers and non cancers also need to be factored in
- ▶ Potential savings of many billions\$ per year could be easily achieved by simply:
  - ▶ Disclosing risks so there is public awareness
  - ▶ Advising the public to adopt safer usage habits
  - ▶ Providing clear warning labels on packaging

# Risk Mitigation Strategies

LIFE IS INHERENTLY  
RISKY. THERE IS ONLY  
ONE BIG RISK YOU  
SHOULD AVOID AT  
ALL COSTS, AND  
THAT IS THE RISK OF  
DOING NOTHING.

DENIS WAITLEY

[QuotePixel.com](http://QuotePixel.com)

THE SOLUTION

# A Responsible Risk Management Approach

- ▶ Risk Management for Radiofrequencies can include:
  - ▶ Reinforcing existing hierarchy of controls to follow a similar approach taken by ionising radiation protection
  - ▶ Educating the public by providing an honest account of potential risks and how to minimise exposure - it should not be just for those who are concerned as current fact sheets are written
  - ▶ Educating the Government (particularly the ACMA) and Industry on a precautionary approach and the concept of ALARA
  - ▶ Requiring Industry to create safer devices and transmitters
  - ▶ Mandatory labelling of wireless device packaging with health warnings
- ▶ The **First Step** requires a change in mindset
  - ▶ Recognition that RF exposure at levels well below current public limits can result in biological effects that are potentially harmful – and is not limited to just cancer

# Risk Mitigation Steps

- ▶ Turn Wi-Fi off if it is not needed
- ▶ Do not have wireless transmitters in the bedroom
- ▶ Create regulations requiring “smart” power meters not to be installed near main living areas – i.e. recommend garage wall and permit exemptions on health grounds
- ▶ Design wireless devices with health and safety in mind
- ▶ Attach warning labels to packaging – like cigarette packets
- ▶ Use shielding materials on phones/phone covers to deflect signals away from the body
- ▶ Prioritise wired connections over wireless options in education and health contexts
- ▶ Recommend parents encourage children to avoid the usage of wireless devices
- ▶ Advise a precautionary approach to government, industry and the public
- ▶ Ban wireless devices and transmitters in elementary school classrooms

# It is time to act responsibly

- ▶ The current philosophy of putting economic benefits and cost to industry as a roadblock for implementing a precautionary approach is unethical and immoral
- ▶ The balance of evidence is clearly showing the potential for harm, therefore;
  - ▶ A moratorium on 5G should be established until it has been fully studied from a health perspective
  - ▶ A proper risk assessment needs to be performed by appropriately credentialed medical professionals
    - ▶ Should not only focus on human health, but environmental impacts also need to be considered
  - ▶ Cell phone towers should not be located in proximity to nursing homes, hospitals or schools
  - ▶ Wireless free zones should be created in each state to allow personal choice
  - ▶ A new biologically based RF Standard is required that provides protection against a range of potentially harmful effects that are observed at non-thermal exposure levels
- ▶ **The cost of doing nothing may exceed any economic benefit this technology brings**

Identified Risks	Likelihood (Probability)		Impact				Final Risk Rating
	Single Exposure	Chronic Long-Term Exposure	Size of Pop. Exposed	Impact on Health	Costs	Impact Rating	
Brain Tumours	Improbable	Probable	Very Large	Very High	Very High	Intolerable	Extreme-12
Other Cancers	Improbable	Possible	Very Large	Very High	Very High	Intolerable	Extreme-11
Cardiovascular Disease	Improbable	Possible	Very Large	High	High	Undesirable	High-8
Diabetes	Improbable	Possible	Very Large	High	High	Undesirable	High-8
Neurodegeneration	Improbable	Possible	Very Large	Very High	Very High	Intolerable	Extreme-11
Mental Illness	Improbable	Possible	Very Large	High	Medium	Undesirable	High-8
Developmental Issues	Improbable	Possible	Very Large	High	High	Undesirable	High-8
Immune Disorders (Allergies/Autoimmune)	Improbable	Possible	Very Large	Medium	Medium	Tolerable	Medium-5
Infertility	Improbable	Possible	Very Large	Low	Medium	Tolerable	Medium-5
Chronic Illness	Improbable	Possible	Very Large	High	Medium	Undesirable	High-8
Nuisance Effect (headache, hot ear)	Possible (based on duration)	Probable	Very Large	Medium	Low	Tolerable	High-7
Sleep Disorders	Improbable	Probable	Very Large	High	Medium	Undesirable	High-9

↑  
What RF Regulators are suggesting

↑  
What Research is suggesting

*Special Note:* Economic benefit of technology has not been factored into the preparation of this matrix

# Annexure

Supporting materials

## In vivo & in vitro papers combined for RF frequencies

Group	Exposure Time	Total Papers	Effect	Uncertain Effect	No Effect
0	Not specified	344	271 (78.8%)	21 (6.1%)	52 (15.1%)
1	10 seconds to 1 hour	225	188 (83.6%)	6 (2.7%)	31 (13.8%)
2	1.01 hours to 1 day	390	296 (75.9%)	19 (4.9%)	75 (19.2%)
3	1 Day to 1 Week	239	206 (86.2%)	9 (3.8%)	24 (10%)
4	1 Week to 1 Month	67	56 (83.6%)	3 (4.5%)	8 (11.9%)
5	1 Month +	57	46 (80.7%)	3 (5.3%)	8 (14%)
Subset of 5	1 Year +	17	13 (76.5%)	2 (11.8%)	2 (11.8%)

\*Excludes all Industry Funded Studies

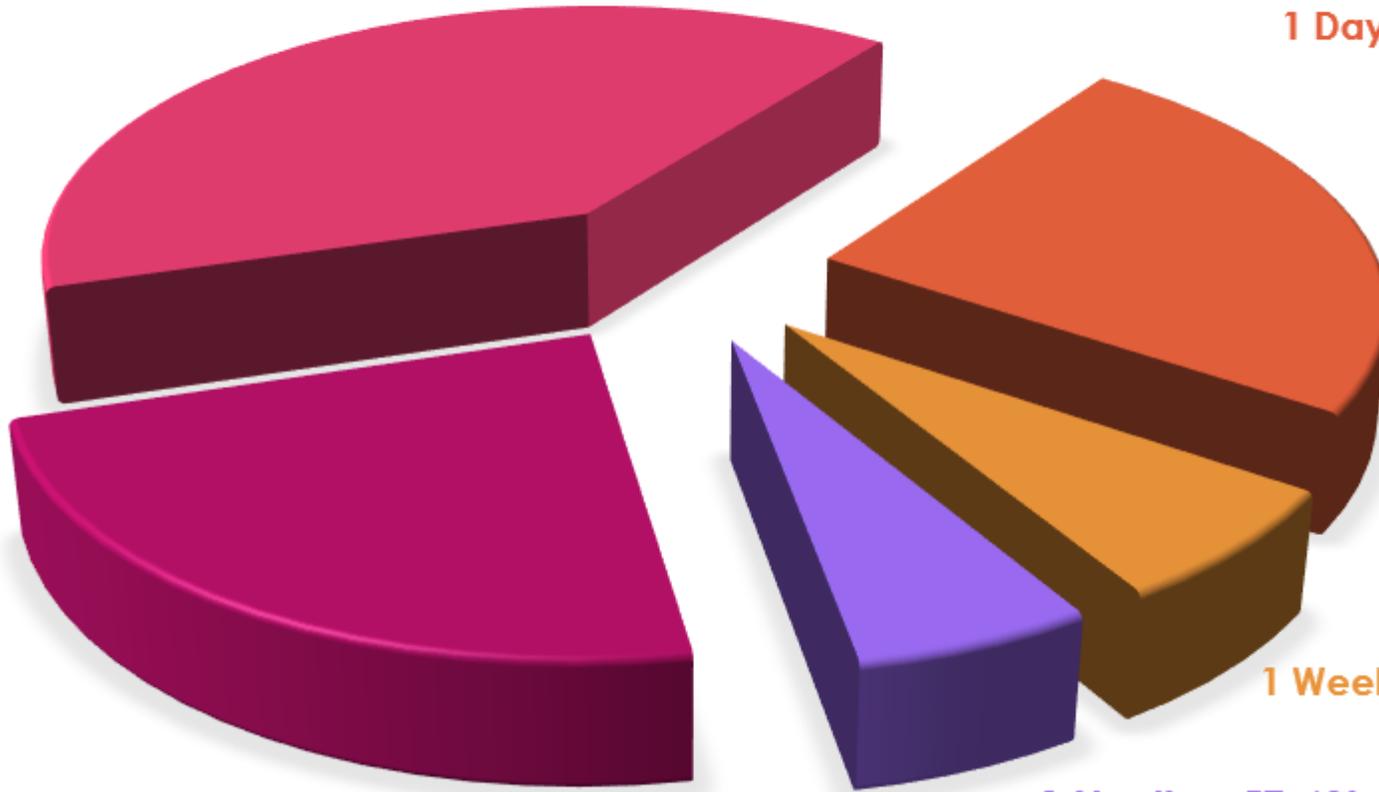
## Bio-effect rankings based on exposure duration (Group 5 being the longest)

Top 5 Bio Effects	Group 0	Group 1	Group 2	Group 3	Group 4	Group 5
Ranked 1	Enzyme Activity (65)	Enzyme Activity (71)	Enzyme Activity (61)	Oxidative Stress (108)	Enzyme Activity (30)	Enzyme Activity (15)
Ranked 2	Cell irregularities/ Damage (33)	Oxidative Stress (31) Gene Expression (31)	Oxidative Stress (60)	Enzyme Activity (99)	Oxidative Stress (24)	Cell irregularities/ Damage (10)
Ranked 3	Behavioural Changes (31)	Cell irregularities/ Damage (21)	Apoptosis (24)	Cell irregularities/ Damage (50)	Behavioural Changes (13)	Oxidative Stress (8) Immune System Effects (8)
Ranked 4	Oxidative Stress (29)	DNA Damage (25)	Cell irregularities/ Damage (30))	DNA Damage (34)	DNA Damage (9)	Haematological Effects (7) DNA Damage (7)
Ranked 5	Gene Expression (25)	Apoptosis (20)	Neurodegeneration (22)	Sleep Effects (33)	Neurodegeneration (8) Cell irregularities/ Damage (8)	Gene Expression (6) Neurodegeneration (6)

## EXPERIMENT - RF EXPOSURE TIMES

1.01 hours to 1 day, 390, 40%

1 Day to 1 Week, 239, 24%



10 seconds to 1 hour, 225, 23%

1 Week to 1 Month, 67, 7%

1 Month +, 57, 6%

# NTP Study - Neoplastic Lesions

## Carcinogenic Rating

Carcinogenic Rating	Neoplastic Lesions: GSM Modulation
	<b>Male B6C3F1/N mice, exposed to GSM-modulated cell phone RFR at 1,900 MHz</b>
Equivocal Evidence	Combined incidences of fibrosarcoma, sarcoma, or malignant fibrous histiocytoma in the skin.
Equivocal Evidence	Incidences of alveolar/bronchiolar adenoma or carcinoma (combined) in the lung.
	<b>Female B6C3F1/N mice, exposed to GSM-modulated cell phone RFR at 1,900 MHz</b>
Equivocal Evidence	Incidences of malignant lymphoma (all organs)
	<b>Male Hsd:Sprague Dawley SD rats, exposed to GSM-modulated cell phone RFR at 900 MHz</b>
<b>Clear Evidence</b>	Incidences of malignant schwannoma in the heart.
<b>Some Evidence</b>	Incidences of malignant glioma in the brain.
Equivocal Evidence	Incidences of benign or malignant granular cell tumors in the brain.
Equivocal Evidence	Incidences of adenoma in the pars distalis of the pituitary gland.
<b>Some Evidence</b>	Incidences of pheochromocytoma (benign, malignant, or complex combined) in the adrenal medulla.
Equivocal Evidence	Incidences of pancreatic islet cell adenoma or carcinoma (combined).
	<b>Female Hsd:Sprague Dawley SD rats, exposed to GSM-modulated cell phone RFR at 900 MHz</b>
Equivocal Evidence	Incidences of malignant schwannomas in the heart.

Based on the IARC preamble to the monographs, RF radiation should be classified as Group 1: The agent is *carcinogenic* to humans.

# NTP Study - Neoplastic Lesions

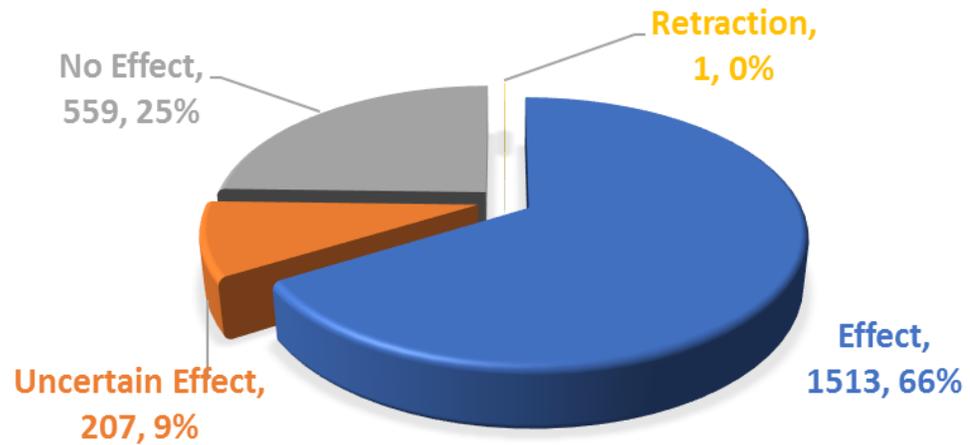
## Carcinogenic Rating

Carcinogenic Rating	Neoplastic Lesions: CDMA Modulation
	<b>Male B6C3F1/N mice, exposed to CDMA-modulated cell phone RFR at 1,900 MHz</b>
Equivocal Evidence	incidences of hepatoblastoma in the liver.
	<b>Female B6C3F1/N mice, exposed to CDMA-modulated cell phone RFR at 1,900 MHz</b>
Equivocal Evidence	incidences of malignant lymphoma (all organs).
	<b>Male Hsd:Sprague Dawley SD rats, exposed to CDMA-modulated cell phone RFR at 900 MHz</b>
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