



Università
 degli Studi
 di Padova



DIPARTIMENTO DI PSICOLOGIA GENERALE

16 Aprile 2018
Aula I. Nuovo Palazzo del Bo
Università di Padova

of Sciences Consciousness

con la partecipazione di **FEDERICO FAGGIN**

INGRESSO LIBERO
(fino a esaurimento posti)

Questo evento, promosso dal Science of Consciousness Research Group del Dipartimento di Psicologia Generale, ha lo scopo di presentare per la prima volta a studenti, colleghi e al pubblico, lo stato dell'arte della ricerca sulla natura della coscienza, dell'esperienza soggettiva e della

sua relazione con il mondo fisico. La scienza della coscienza è una disciplina nuova e intrinsecamente interdisciplinare comprendente le neuroscienze, la filosofia, la psicologia, la fisica e l'antropologia, che indaga la relazione ancora incompresa tra la mente, il cervello e la realtà fisica.

Si affronteranno quindi temi che spaziano dalle implicazioni epistemologiche alla base della scienza della coscienza, agli aspetti psicologici e neurobiologici (Facco e Burgio) per estendersi fino alla fisica dell'irriducibilmente piccolo (Fracas), dell'irriducibilmente grande (Tormen) e all'intelligenza artificiale (Faggini).

PROGRAMMA

9.15: Presentazione a cura di **Daniela Lucangeli**

Relazioni

9.30: **Enrico Facco**
L'emigrazione della Coscienza

10.30: **Ernesto Burgio**
Evoluzione e sviluppo del cervello ed emergenza della coscienza

Pausa

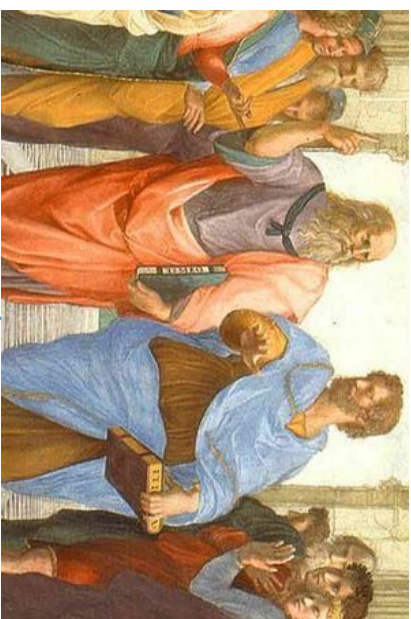
11.45: **Fabio Fracas**
Il mondo secondo la Fisica Quantistica

12.45: **Giuseppe Tormen**
Noi e l'irriducibilmente grande

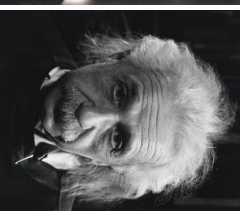
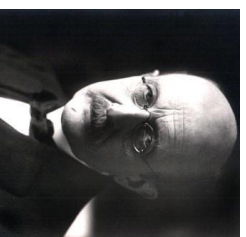
Pausa

14.45: **Federico Faggini**
Robot coscienti: realtà o fantascienza?

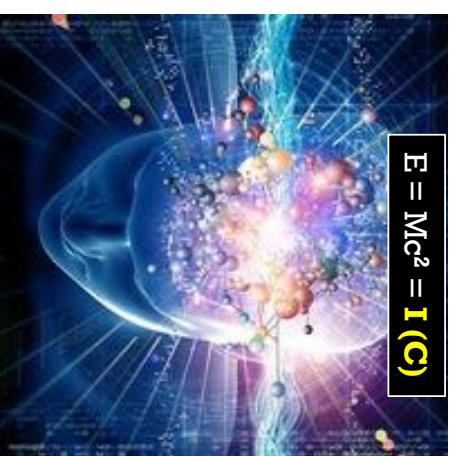
16.00: Tavola rotonda con tutti i relatori e dibattito generale



Evoluzione /Sviluppo del Cervello e(d emergere) della Coscienza



Ernesto Burgio (ECERI, Brussels, Belgium)





$$E = Mc^2 = \mathbf{I}(\mathbf{c})$$



I regard consciousness as fundamental. I regard matter as derivative from consciousness. We cannot get behind consciousness. Everything that we talk about, everything that we regard as existing, postulates consciousness.

(Max Planck)

nature

International weekly journal of science

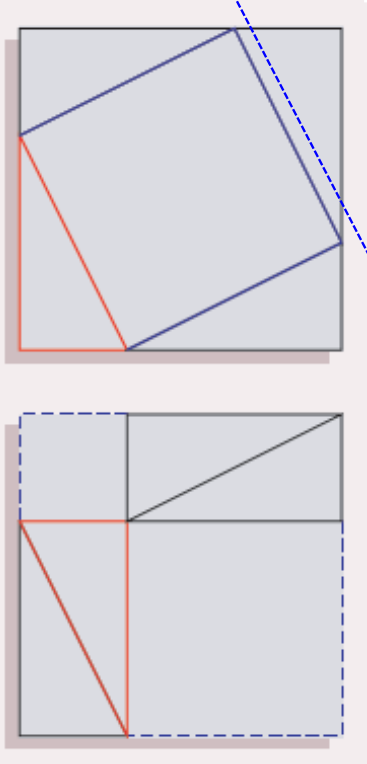
Concept

The mental Universe

Richard Conn Henry¹

1. Richard Conn Henry is a Professor in the Henry A. Rowland Department of Physics and Astronomy, The Johns Hopkins University, Baltimore, Maryland 21218, USA.

The only reality is mind and observations, but observations are not of things. To see the Universe as it really is, we must abandon our tendency to conceptualize observations as things.

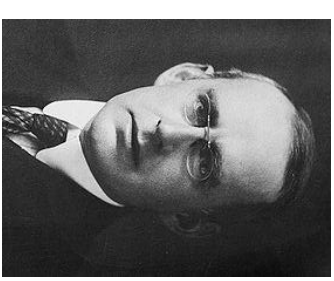


Proof without words: Pythagoras explained things using numbers.

correct understanding of physics was accessible even to Pythagoras. According to Pythagoras, “number is all things”, and numbers are mental, not mechanical. Likewise, Newton called light “particles”, knowing the concept to be an ‘effective theory’ — useful, not true. As noted by Newton’s biographer Richard Westfall: “The ultimate cause of atheism, Newton asserted, is ‘this notion of bodies having, as it were, a complete, absolute and independent reality in themselves.’” Newton knew of Newton’s rings and was untroubled by what is shallowly called ‘wave/particle duality.’

The 1925 discovery of quantum mechanics solved the problem of the Universe’s nature. Bright physicists were again led to believe the unbelievable — this time, that the Universe is mental. According to Sir James Jeans: “the stream of knowledge is heading towards a non-mechanical reality; the Universe begins to look more like a great thought than like a great machine. Mind no longer appears to be an accidental intruder into the realm of matter... we ought rather hail it as the creator and governor of the realm of matter.” But physicists have not yet followed Galileo’s example, and convinced everyone of the wonders of quantum mechanics. As Sir Arthur Eddington explained: “It is difficult for the matter-of-fact physicist to accept the view that the substratum of everything is of mental character.”

Physicists shy from the truth because the truth is so alien to everyday physics. A common way to evade the mental Universe is to invoke ‘decoherence’ — the notion that ‘the physical environment’ is sufficient to create reality, independent of the human mind. Yet the idea that any irreversible act of amplification is necessary to collapse the wave function is known to be wrong: in ‘Renninger-type’ experiments, the wave function is collapsed simply by your human mind seeing nothing. The Universe is entirely mental.

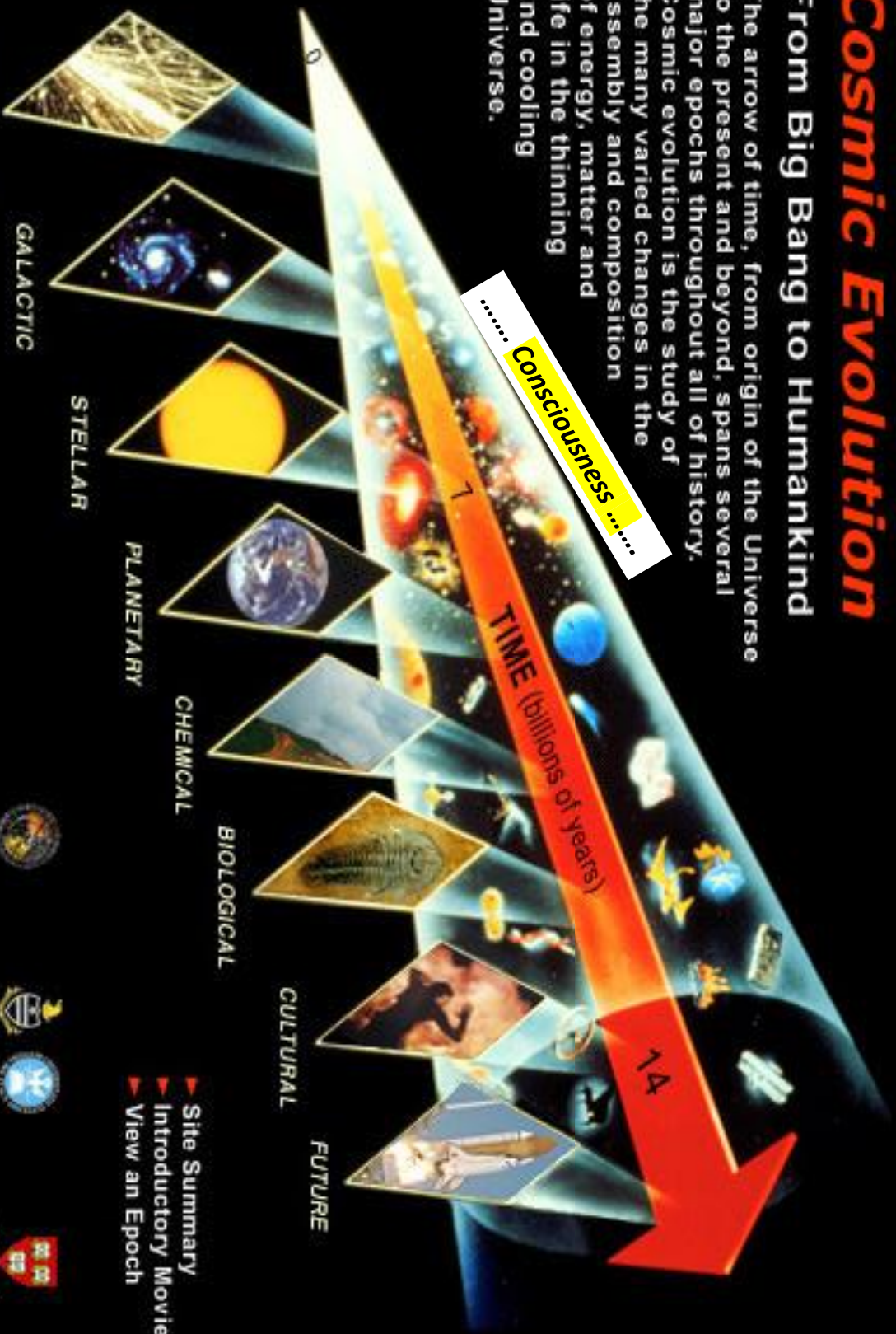


Cosmic Evolution

From Big Bang to Humankind

The arrow of time, from origin of the Universe to the present and beyond, spans several major epochs throughout all of history. Cosmic evolution is the study of the many varied changes in the assembly and composition of energy, matter and life in the thinning and cooling Universe.

..... Consciousness
7



when (?)

where (?)

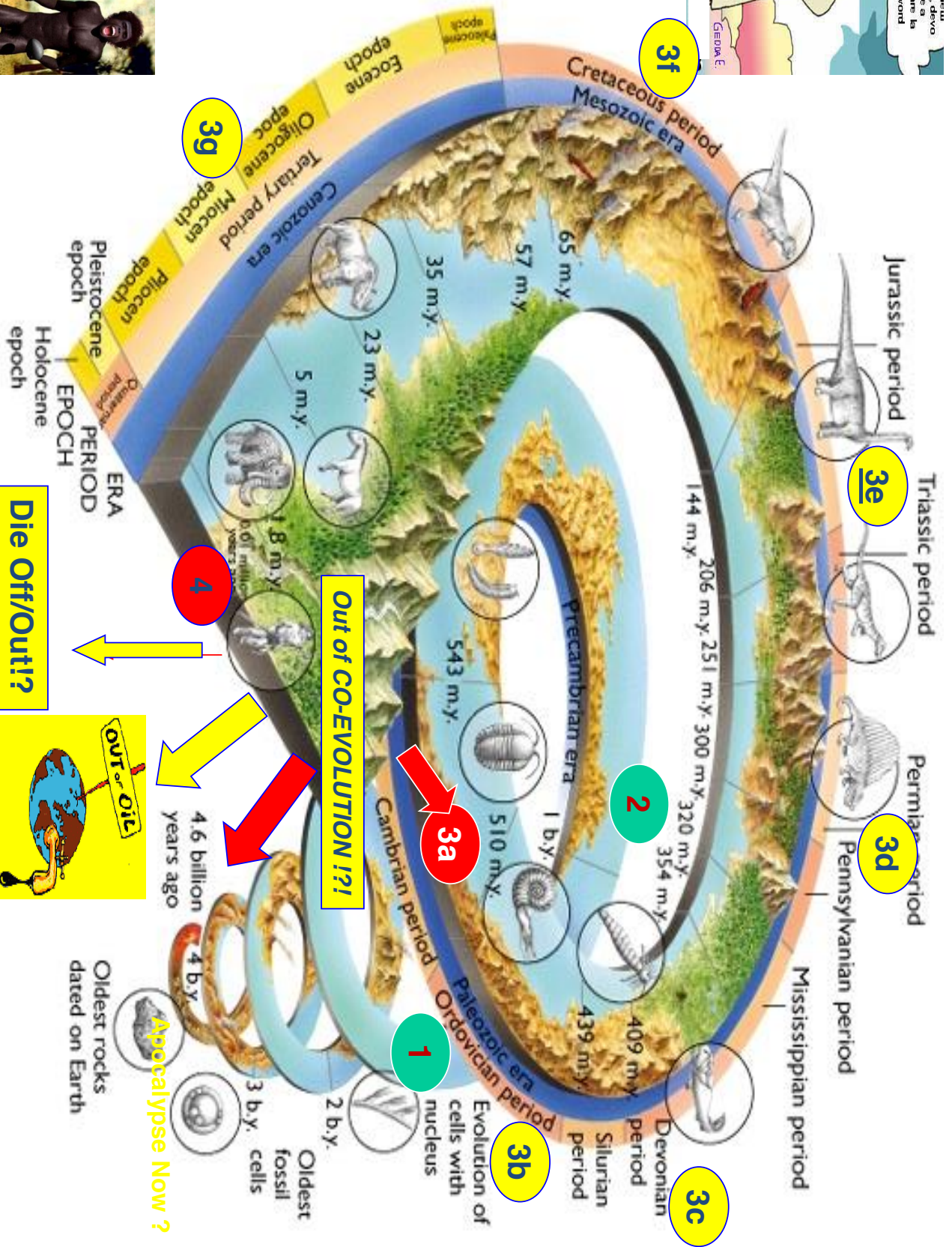
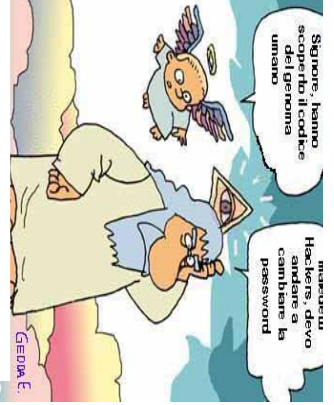
how (?)

- ▶ Site Summary
- ▶ Introductory Movie
- ▶ View an Epoch

WEB AWARDS

Wright Center for Science Education
Tufts University

Harvard Course Syllabus



(OLOCENE)

31 DICEMBRE - ULTIMO MINUTO



- ore 23,59'15" --> i **Sumeri** in Mesopotamia
- ore 23,59'43" --> Alessandro Magno - Primo "Impero"
- ore 23,59'46" --> **Gesù Cristo**
- ore 23,59'49" --> **Caduta Impero Romano** d'Occidente
- ore 23,59'57" --> **Scoperta dell'America**
- ore 23,59'59" --> **Rivoluz. Industriale** * e Francese - **Colonialismo**- **Guerre Mondiali**- **Globalizzazione**

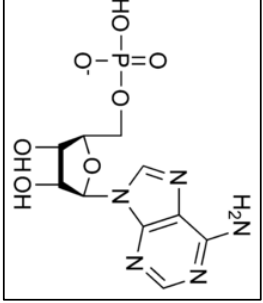
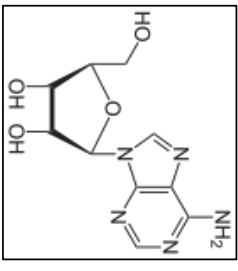
*¹¹ **Antropocene**: con la I (**Carbone/Macchine**) e soprattutto con la II (**Chimica/Petrolio**)

Rivoluz. Industriale **Homo S. Sapiens** si è trasformato in **potenza tellurica** (Stoppani 1873

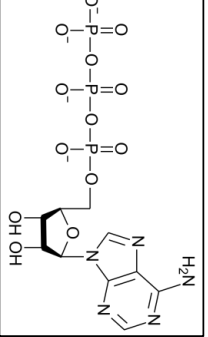
- Crutzen 1995).. Con la III (**Telematica**) è nata una **nuova entità**: la **Prima Specie Globale** (WWW)

$$E = Mc^2 = I$$

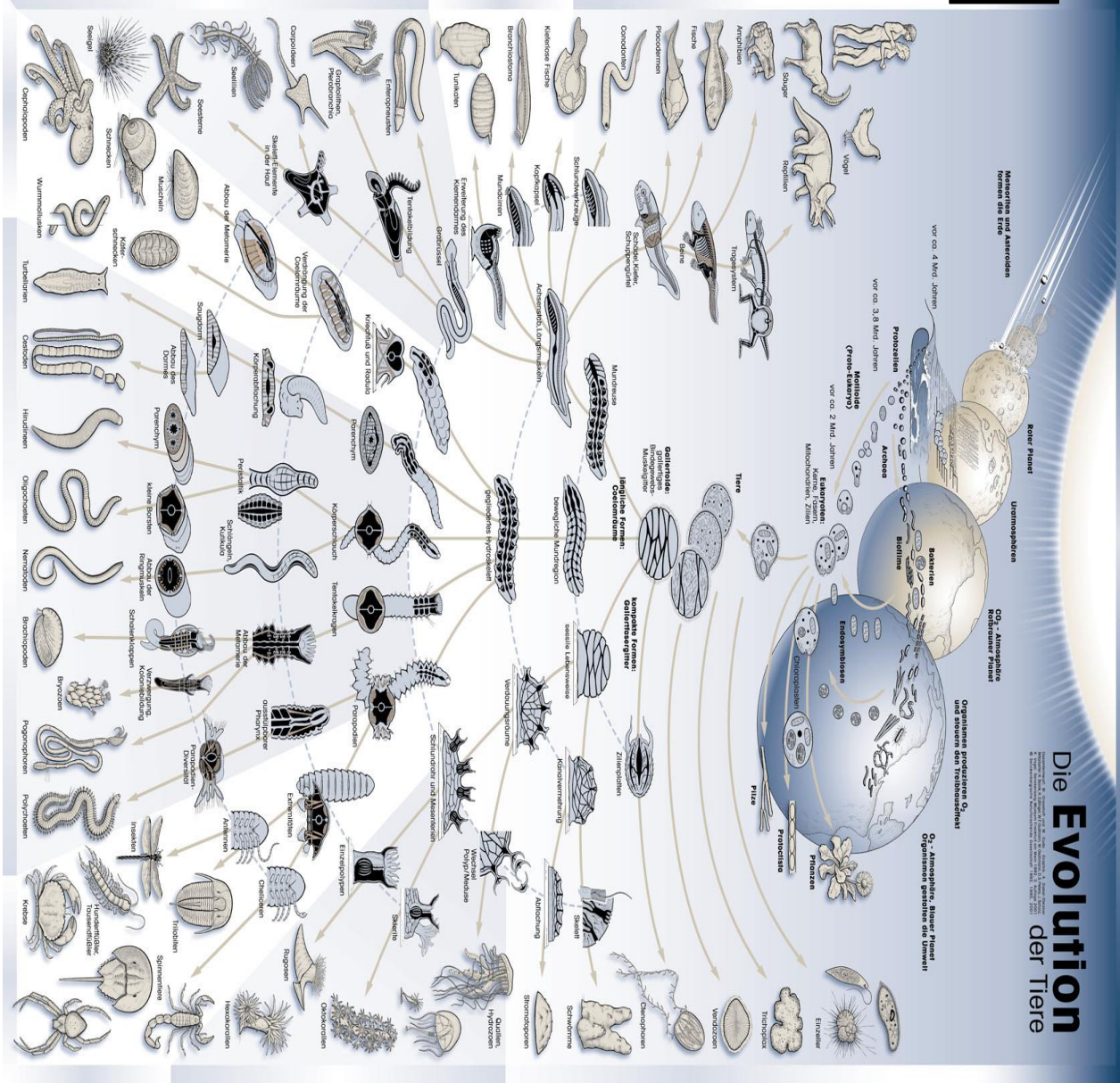
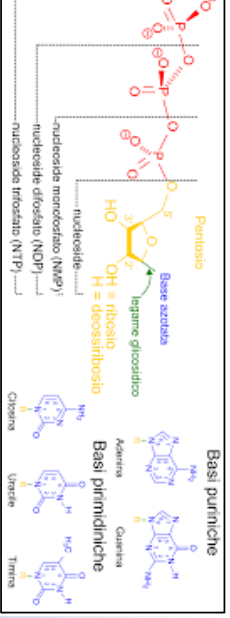
L'**adenosina** è un nucleoside che ha un ruolo fondamentale sia nel **trasferimento di Energia** (ATP → ADP), sia nella **costituzione degli acidi nucleici** (**Informazione**), sia nella **trasduzione del segnale** (cAMP = secondo messaggero)

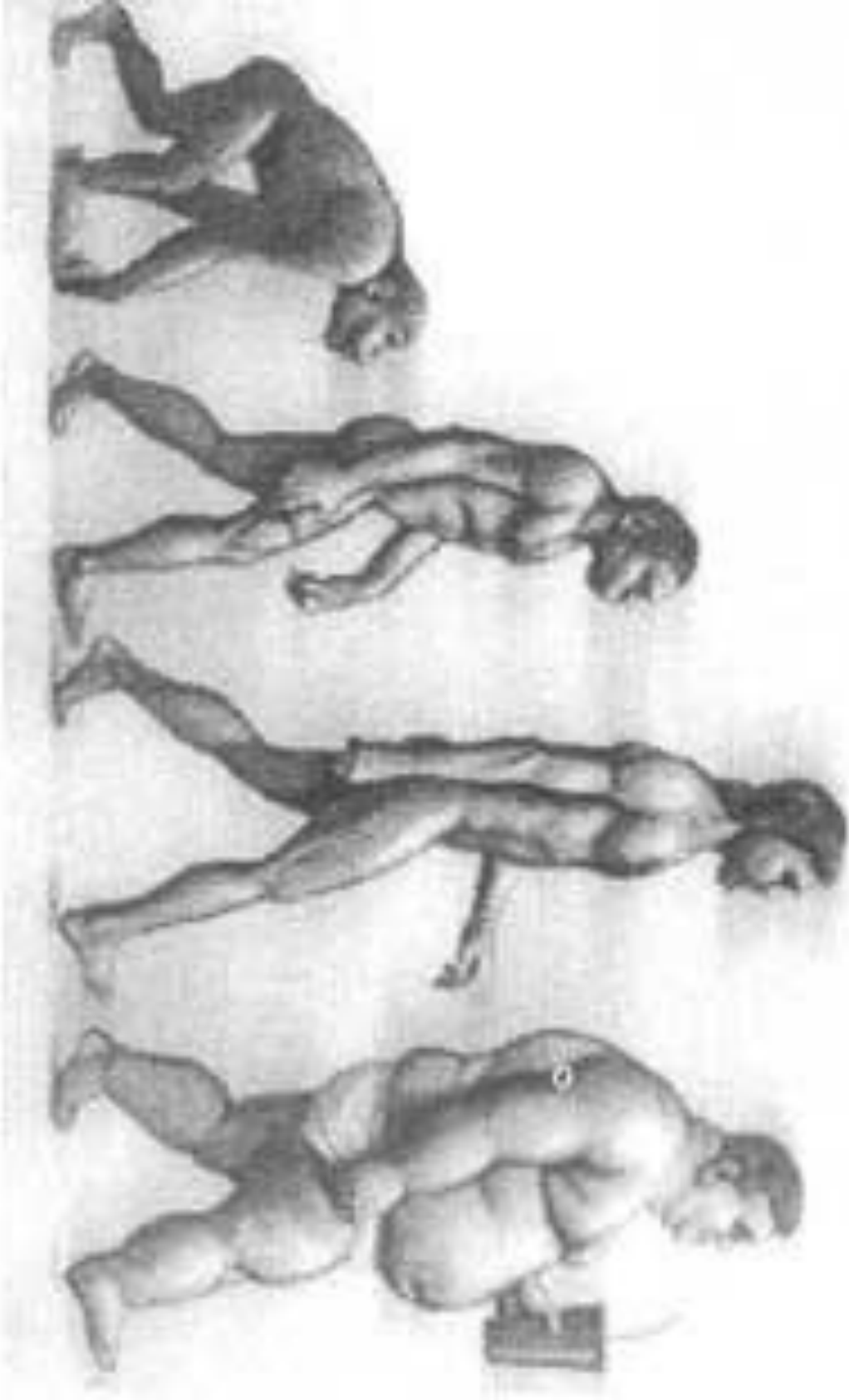
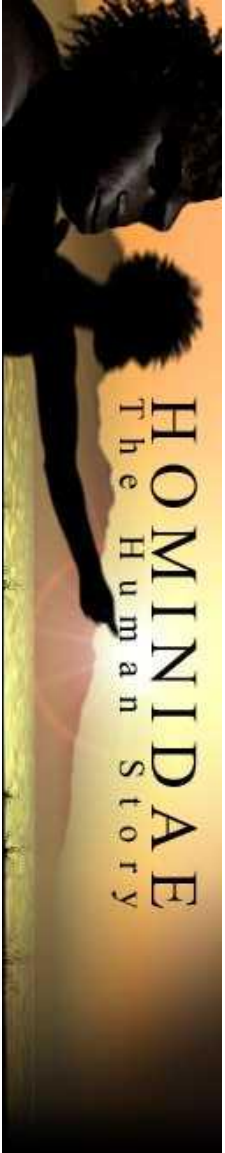


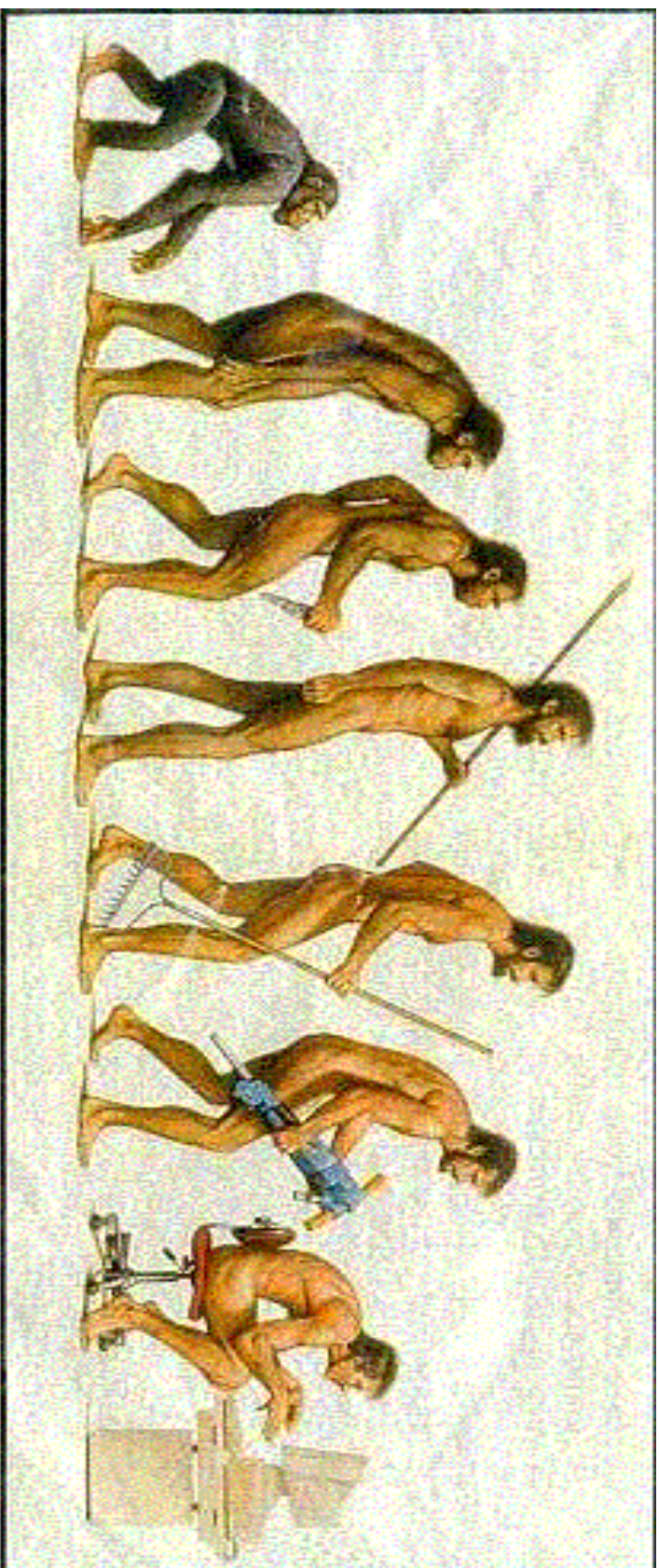
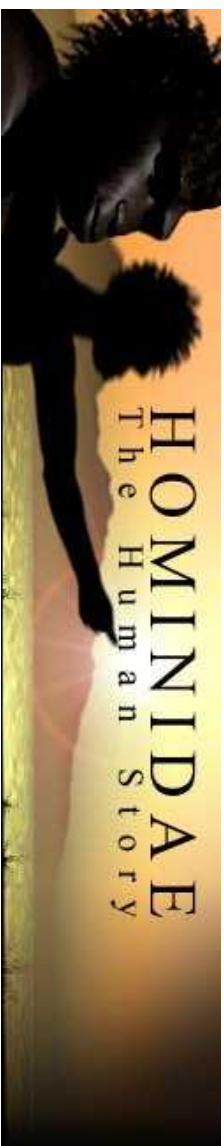
AMP - Adenosina monofosfato



ATP - Adenosina trifosfato







Irgendwo lief irgendetwas falsch...



HOMINIDAE

The Human Story

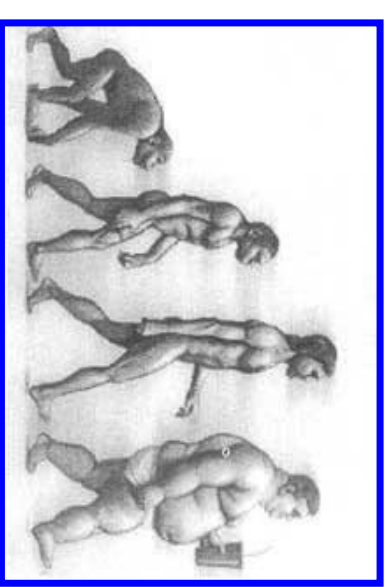




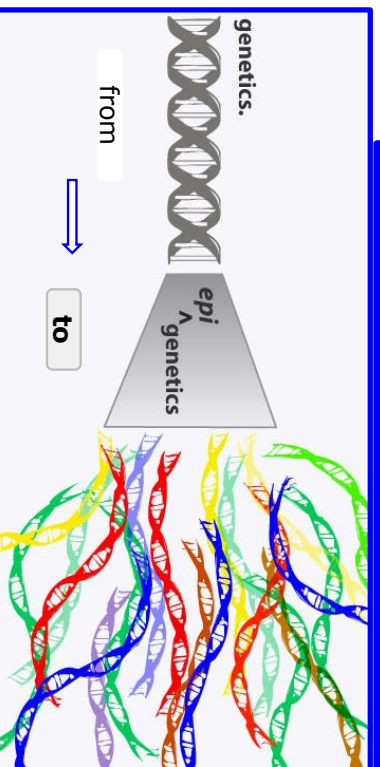
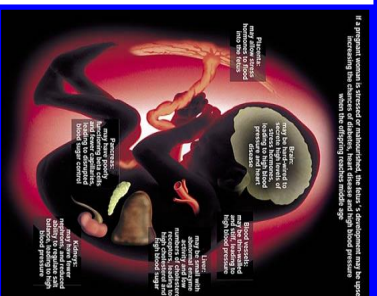
1st World Congress on
**MATERNAL
FETAL
NEONATAL
MEDICINE**

from periconception to early infancy

www.worldmfm.eu



Evolution of DOHAD: the impact of environmental hazards on the origins of current “pandemics”



ERNESTO BURGIO
ECERI - European Cancer and Environment
Research Institute



On sait depuis de nombreuses années que **le fœtus n'est pas entièrement protégé dans le microenvironnement utérin. Mais seulement au cours de la dernière décennie** nous nous sommes concentrés sur **les mécanismes et les modalités de l'exposition maternelle et fœtale** à une gamme impressionnante de **produits chimiques (ex: perturbateurs endocriniens), physiques (ex: CEM) et biologiques (ex: virus)** capable **d'induire des changements épigénétiques potentiellement adaptatifs et prédictifs dans le génome embryo-fœtal, interférant ainsi avec la programmation des tissus et des organes de l'enfant de manière souvent irréversible.**

Environment and fetal programming: the origins of some current “pandemics”

Ernesto Burgio

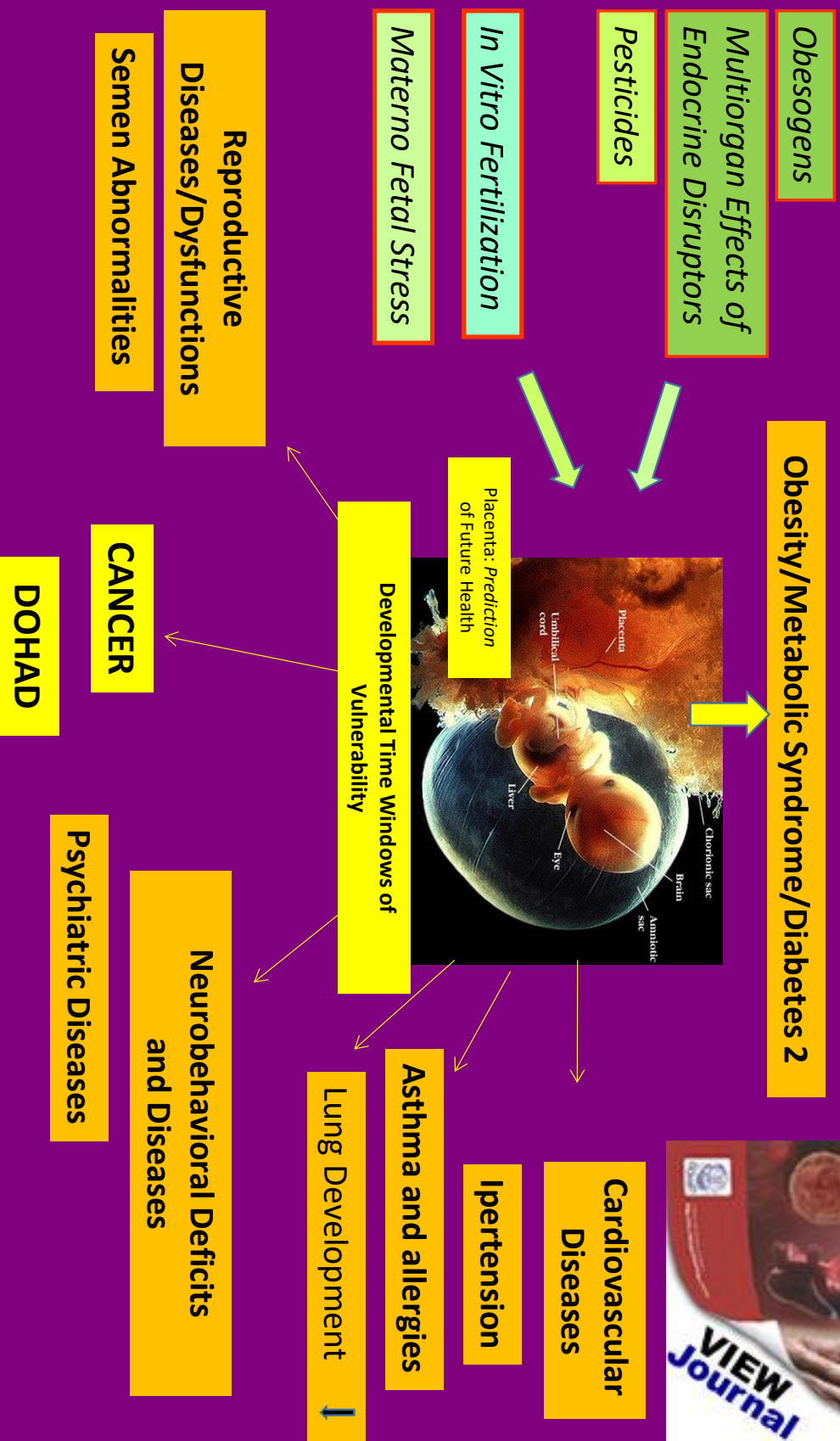
“The womb may be more important than the home”
David Barker

ECERI – European Cancer and Environment Institute, Bruxelles, Belgium
ISDE – International Society of Doctors for Environment (Scientific Office), Arezzo, Italy

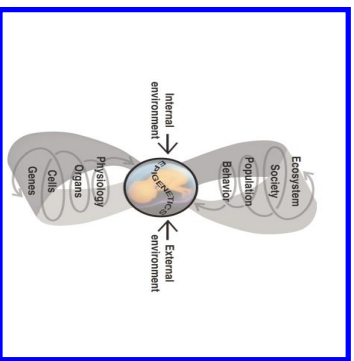
This new paradigm is important not only to explain in a more exhaustive way the embryo-foetal origins of all the above mentioned disorders and their dramatic increase over the last decades, but also to try to effectively face this epidemiological transition. The key-term in this context is certainly primary prevention: only by reducing the maternal-foetal factors of distress and the exposure of the foetus (and of its gametes) to pollutants, it would be possible to protect the correct programming of cells, tissues and organs.

The key-term in this context is certainly primary prevention

Enfin, au cours des dernières années la Barker Hypothesis a été transformée à partir d'une théorie utile pour expliquer l'origine de certaines maladies de l'âge adulte, dans la théorie-clé des origines embryo-fœtales des maladies chroniques (DOHA-Developmental Origins of Health and Maladies)



The 7 keywords: from genetics to epigenetics



3

Fetal programming

2

Environment

The **environment** should be considered as a **continuous flow of information** coming from outside and reaching the epigenome, causing it to activate and to continuously change its molecular structure (Chromatin)

Ontogeny*

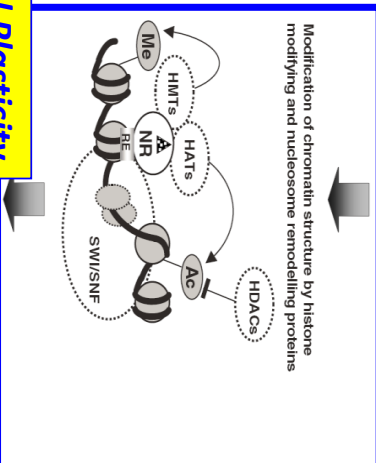
4

Developmental Plasticity

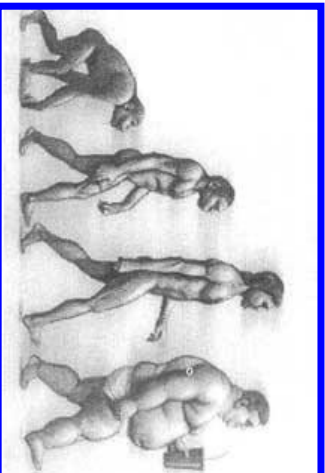
Phylogeny*

5

Evolutionary Medicine



Modification of chromatin structure by histone modifying and nucleosome remodeling proteins



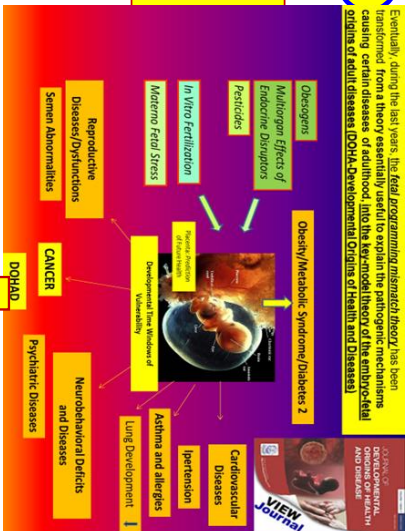
Devo → Evo



According to the **Lamarckian paradigm**, the **environment not only selects, but also actively induces** the main changes that shape the evolution of living beings ..

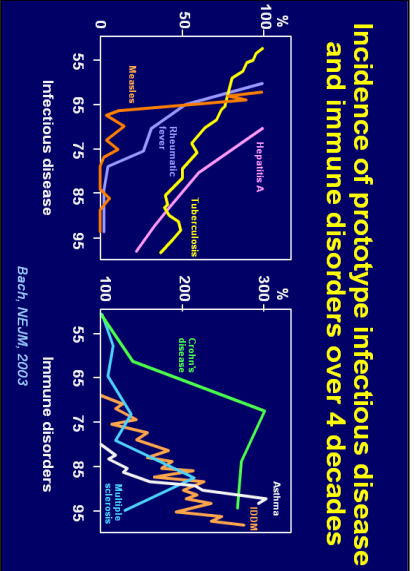
Epi-genetic Mismatch DOHA

6



Essentially, during the last years, the **Fetal programming/mismatch theory** has been causing certain diseases of adulthood, mainly because of the embryonic-fetal origins of adult diseases (DOHA: Developmental Origins of Health and Disease)

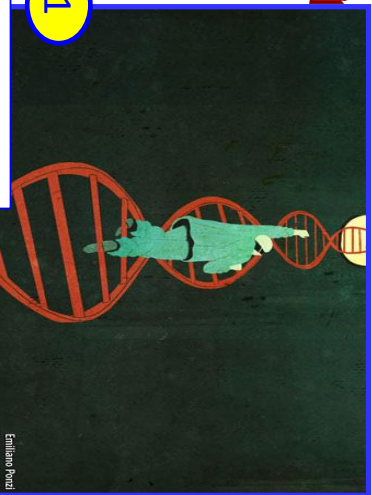
7



Incidence of prototype infectious disease and immune disorders over 4 decades

Bach, NEJM, 2003

From Genetics to Epigenetics

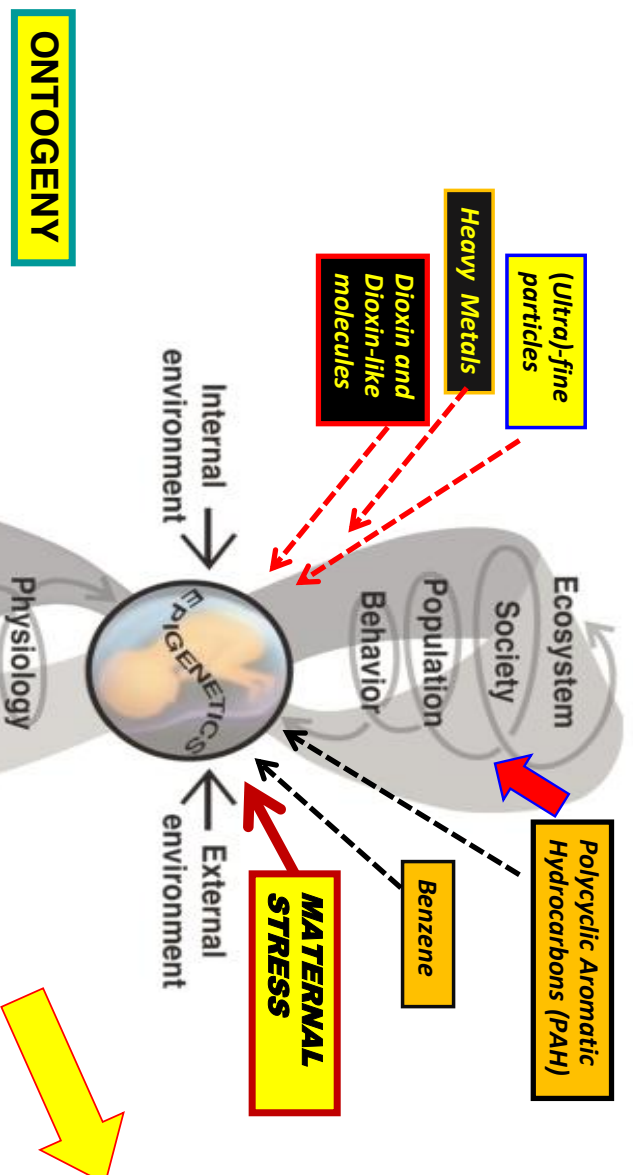


1

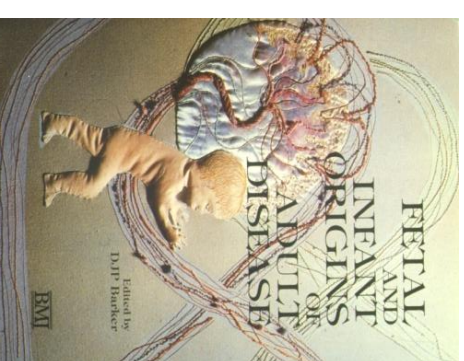
Towards a paradigm shift in biomedicine. **Environmental interference** with the human (epi)genome

XXI Century Epidemiological Transition

The third key word is **fetal programming** ...



ONTOGENY



1 ... a technical term that refers to the **capability** and, at the same time, the **requirement, for embryo-foetal cells to define their epigenetic setting in a predictive and adaptive way**, in relation to the information coming from the mother and, through her, from the outer world ..

A **predictive adaptive response (PAR)** is a developmental trajectory taken by an organism during a period of **developmental plasticity** in response to perceived environmental cues..

2 Fig. 1. The fetus is particularly vulnerable to changes in the external and internal environments, which interact to influence fetal development and have both immediate and life-long consequences. Such environmentally induced changes can occur at all levels of biological organization, from the molecular to the organism's behavior and place in society, and tend to be amplified in their consequences as they ascend through these levels. Ultimately, these influences may be epigenetic in nature inducing mitotically heritable alterations in gene expression without changing the DNA.

3

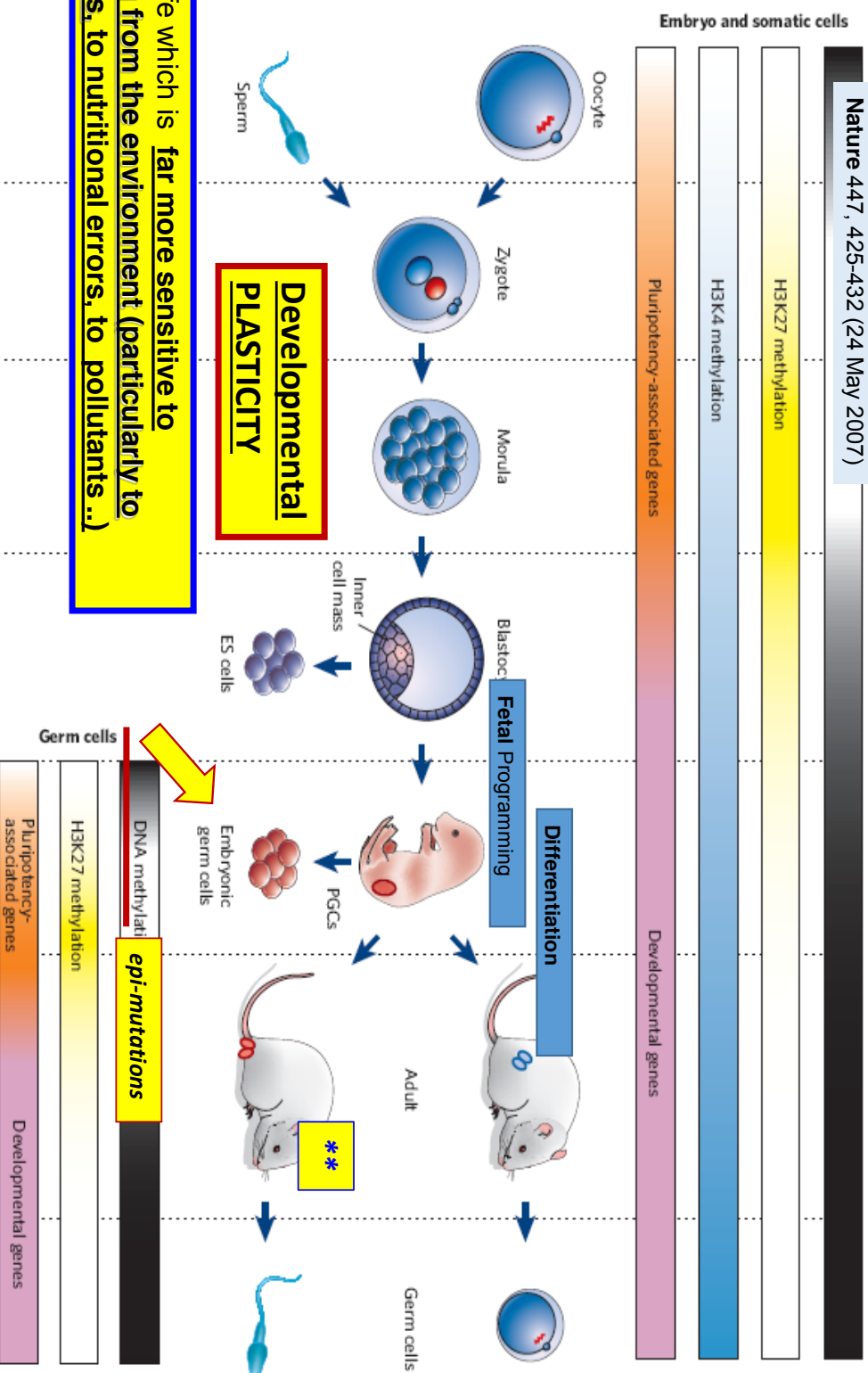
The fourth keyword is **developmental plasticity**

Cellular Differentiation: an epigenetic process

Stability and flexibility of epigenetic gene regulation in mammalian development

The actual genetic program of a single multicellular organism is the product of nine months of epigenetic **adaptive-predictive "formatting" of trillions of cells**

Nature 447, 425-432 (24 May 2007)



This is the stage of life which is **far more sensitive to information coming from the environment (particularly to maternal-fetal stress, to nutritional errors, to pollutants ..)**

The **brain**** is by far the **most plastic organ** during all (human) life

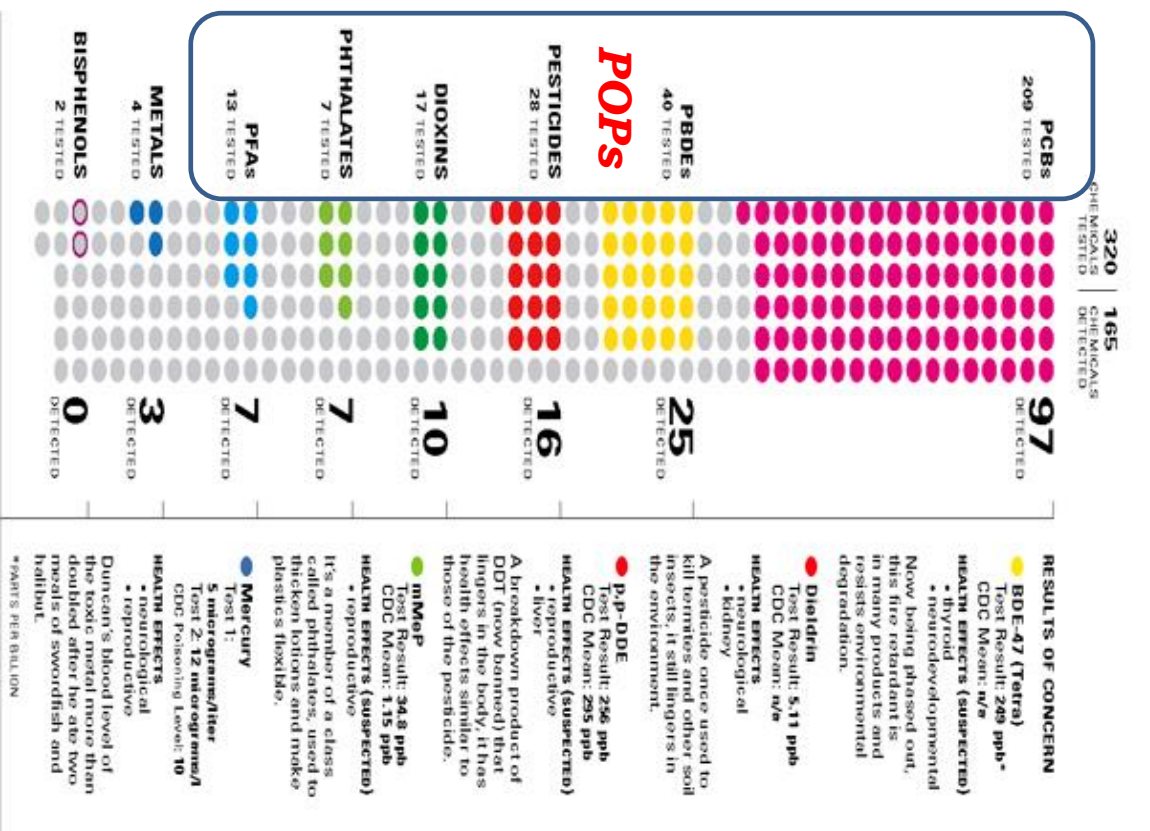
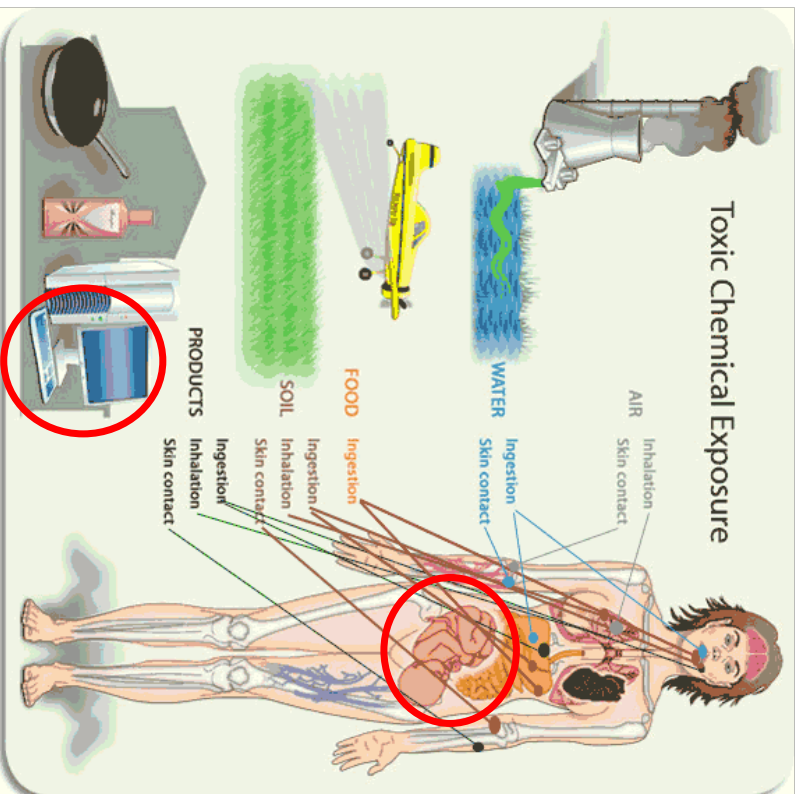
1 ↓ 2

Differentiation is the process through which the organism changes from a zygote to a complex system of tissues and 200 cell types (genetically identical.. each with its own epigenetic and morpho-functional characteristics)

methylation. During the early development of PGCs, DNA methylation and

Monitoring Body-Burdens

> 700 different synthetic chemicals or heavy metals found in cord blood..



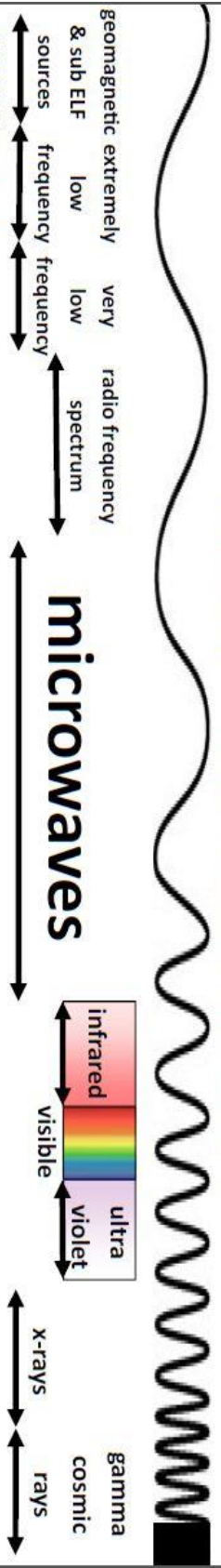
THE ELECTROMAGNETIC SPECTRUM

SELF 3Hz ELF 3KHz VLF 30KHz LF/MF/HF/VHF/UHF 30KHz-300GHz SHF 300GHz-30PHz EHF 30PHz-300EHz
 DC 3Hz 3KHz 30KHz 300GHz 5GHz 300GHz 430-750THz 30PHz 3EHz 300EHz

non-ionizing

ionizing

λ (wavelength) f (frequency) = C (speed of light) / λ (wavelength)



EMF Sources

earth & subways AC power CRT monitors TV cell towers mobile AM/FM smart meters sunlight medical x-rays	CRT monitors TV cell phones smart meters satellites sunlight medical x-rays	radio frequency spectrum microwaves WiFi satellite ovens sunlight medical x-rays	cell towers smart meters satellites sunlight medical x-rays	mobile AM/FM smart meters satellites sunlight medical x-rays
--	---	---	---	--

Gigahertz (GHz) 10-9 Terahertz (THz) 10-12 Petahertz (PHz) 10-15 Exahertz (EHz) 10-18 Zetahertz (ZHz) 10-21 Yotahertz (YHz) 10-24

Il problema dell'esposizione collettiva /crescente → limiti epidemiologia

nome	f in Hz	λ in m	indicazione	esempi
Bassa frequenza	3 Hz	10^8		Oscillazioni di terremoti, maree, ponti, torri, graticci, pendoli di orologio
BF	30 Hz	10^7		telecriteri
	300 Hz	10^6		25 Hz 50 Hz 16 2/3 Hz Industriali
Very Low Frequencies VLF	3 kHz	10^5	onde miliametriche	300 Hz telefono 3,4 kHz suoni percepibili
Low Frequencies LF	30 kHz	10^4	onde chilometriche	20 kHz ultrasuoni
Medium Frequencies MF	300 kHz	10^3	onde ettometriche	150 kHz onde lunghe 285 kHz 525 kHz onde medie 1605 kHz 3,95 MHz onde corte
High Frequencies HF	3 MHz	10^2	onde decametriche	radio 47 MHz 30 MHz
Very High Frequencies VHF	30 MHz	10^1	onde metriche	26,1 MHz 40 MHz ultracorte 223 MHz televisione 790 MHz
Ultra High Frequencies UHF	300 MHz	10^0	onde decimetriche	
Super High Frequencies SHF	3 GHz	10^{-1}	onde centimetriche	gamma infrarossi, luce e raggi x 40 GHz radar ipersuoni-
Extremely High Frequencies EHF	30 GHz	10^{-2}	onde	

... Tout ce qui n'est pas le produit de cette coevolution moleculaire peut faire des degats → DANGER SIGNAUX.. HSPS

Fino al 1930 circa, la parte dello spettro delle onde radio sopra i 30 MHz era praticamente vuota: non esistevano segnali prodotti dall'uomo

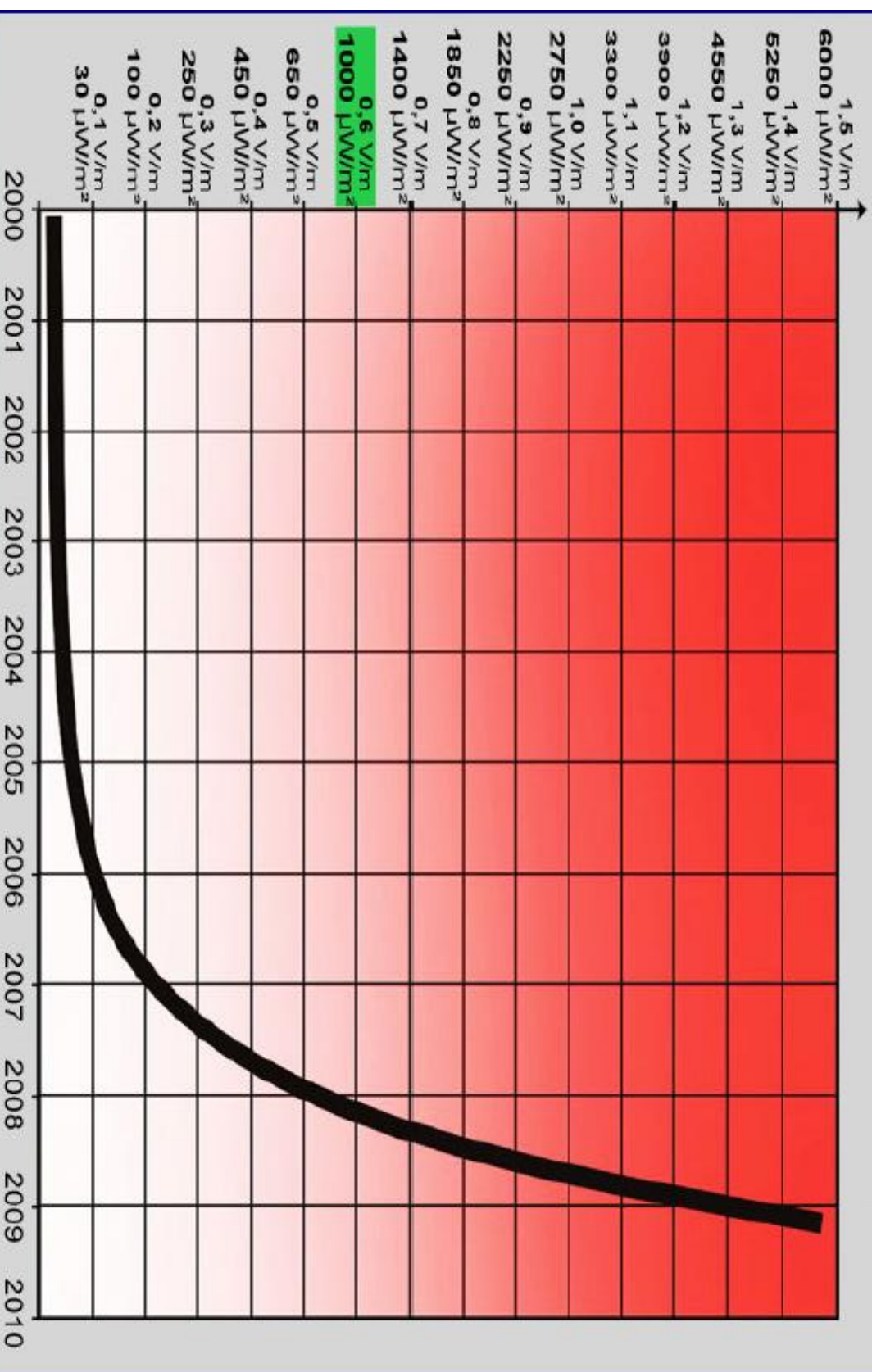
Ai giorni nostri, lo spettro delle frequenze radio è estremamente sfruttato e viene per comodità diviso in varie **bande di frequenza** dai **3 kHz delle frequenze molto basse (VLF) fino ai 300 GHz delle frequenze estremamente alte (EHF).**

Le bande di frequenza sono divise in base alle caratteristiche che ne determinano l'impiego in certi settori piuttosto che in altri.



Valeur moyenne constatée en milieu urbain de

l'irradiation artificielle HF micro-onde de 900 MHz - 2,5 GHz



Plausibilità biologica (limiti delle attuali rappresentazioni: radiazioni ionizzanti...)

Tipologia di radiazione	Lunghezza d'onda
Onde Elettriche	Tra 10^3 e 10^4 m
Onde Radio	Tra 10^4 e 10^2 m
Microonde	Tra 10 e 10^{-3} m
Raggi Infrarossi	Tra 10^{-4} e 10^{-6} cm
Luce Visibile	Tra 760 e 380 nm
Luce Ultravioletta	Tra 380 nm e 10^{-8} m
Raggi X	Tra 10^{-8} e 10^{-10} m
Raggi Gamma e Raggi Cosmici	Ai di sotto di 10^{-10} m

La luce visibile è la radiazione elettromagnetica con lunghezza d'onda dai circa 380 nm del violetto ai 760 nm del rosso.

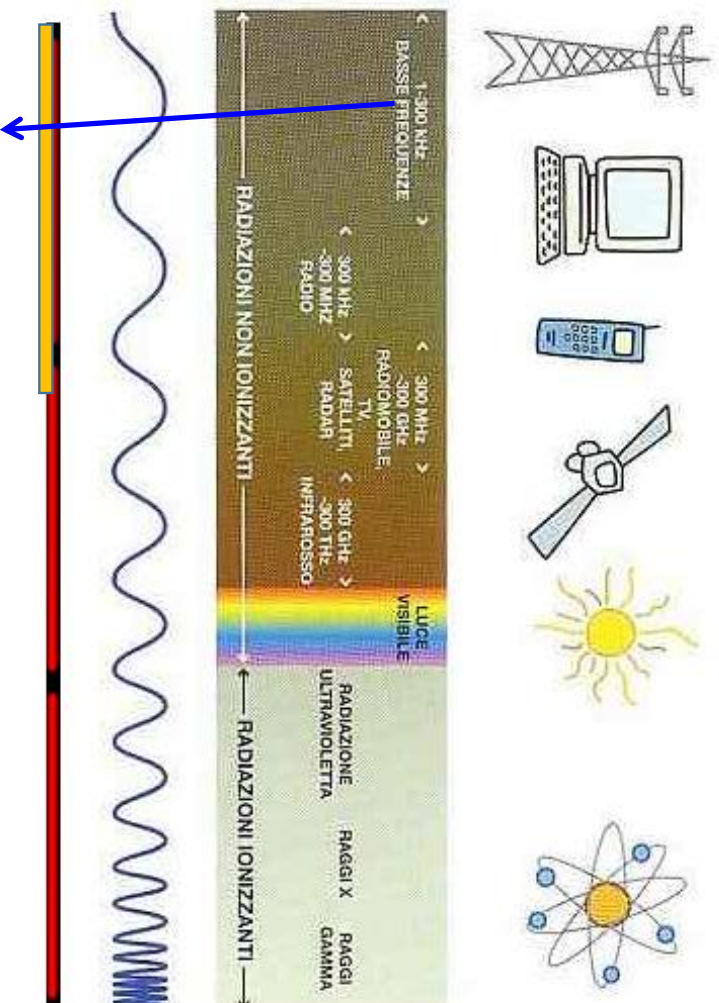
$$f = \frac{c}{\lambda}$$

Tanto più è alto il valore della frequenza dell'onda tanto minore è la lunghezza d'onda della stessa..
In genere si sostiene che solo se l'energia della radiazione incidente sulla materia è sufficiente a ionizzarne gli atomi (→ radiazione ionizzante)... può creare dei danni biologici, **agendo sul DNA o su altre biomolecole**

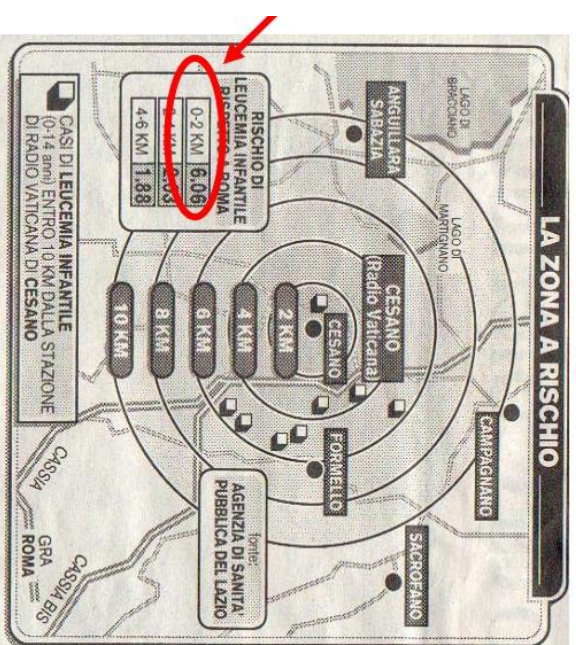
QUESTA REGOLA NON HA VALIDITA' ASSOLUTA

Bande di frequenze e lunghezza d'onda

(Dal libro: *Lezioni ed esercizi di elettronica 2*; Ediprint La Scuola)

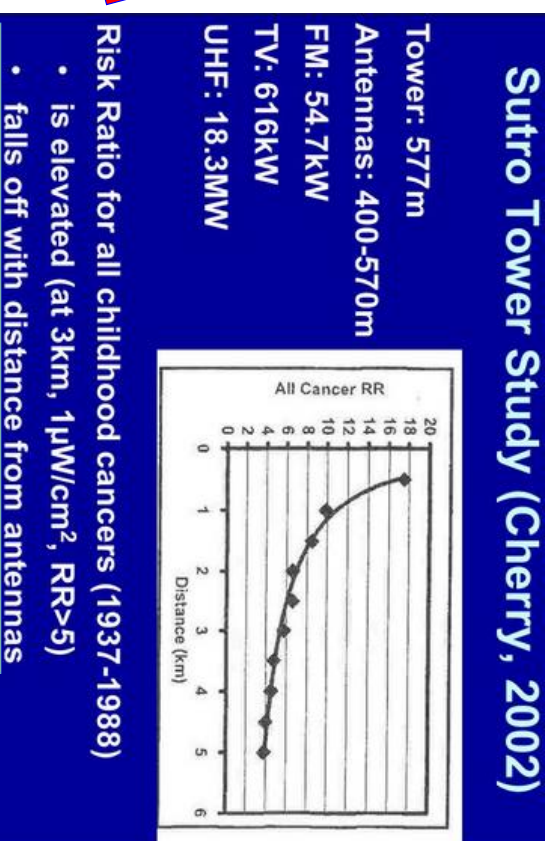
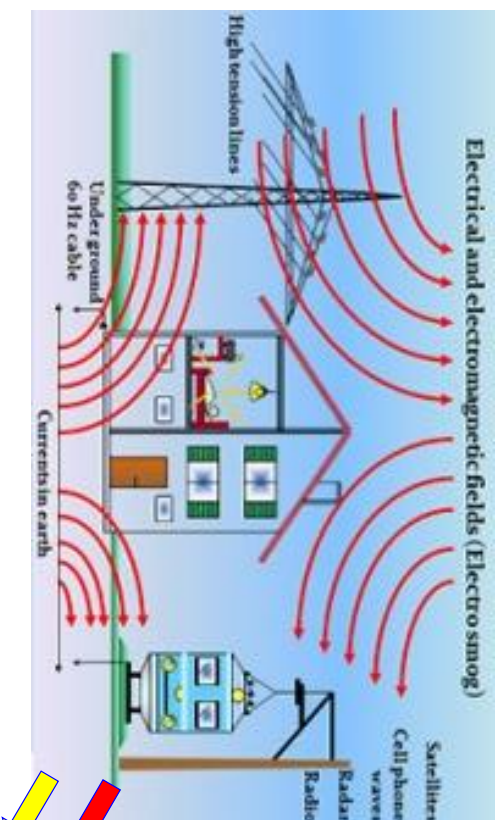


L'esposizione prolungata a campi magnetici **di bassa intensità e di bassa frequenza** aumenta il **rischio di leucemia, linfoma e tumori al cervello nei bambini**

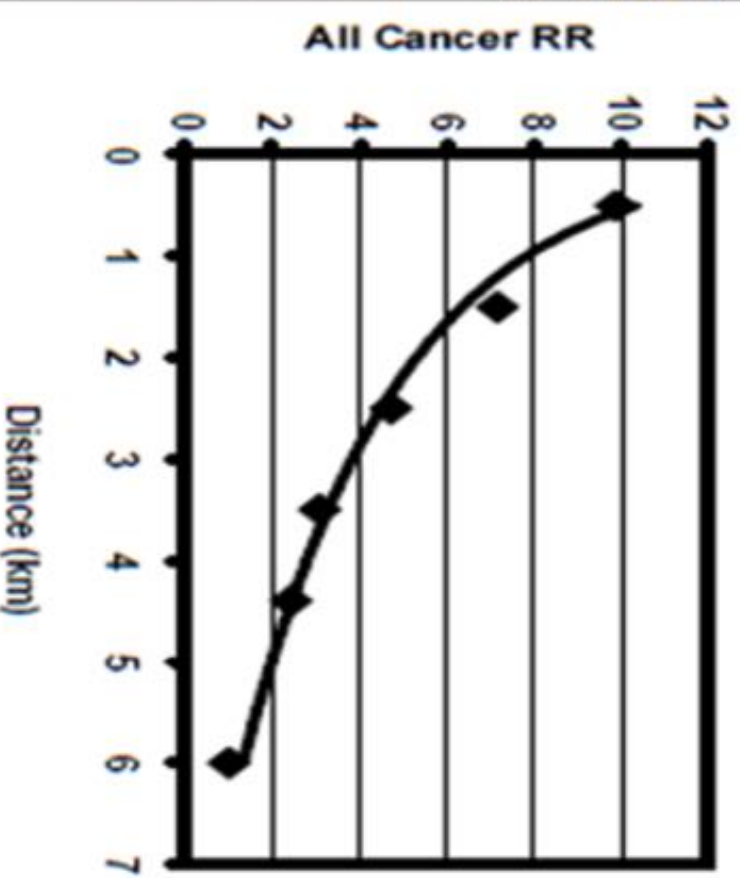
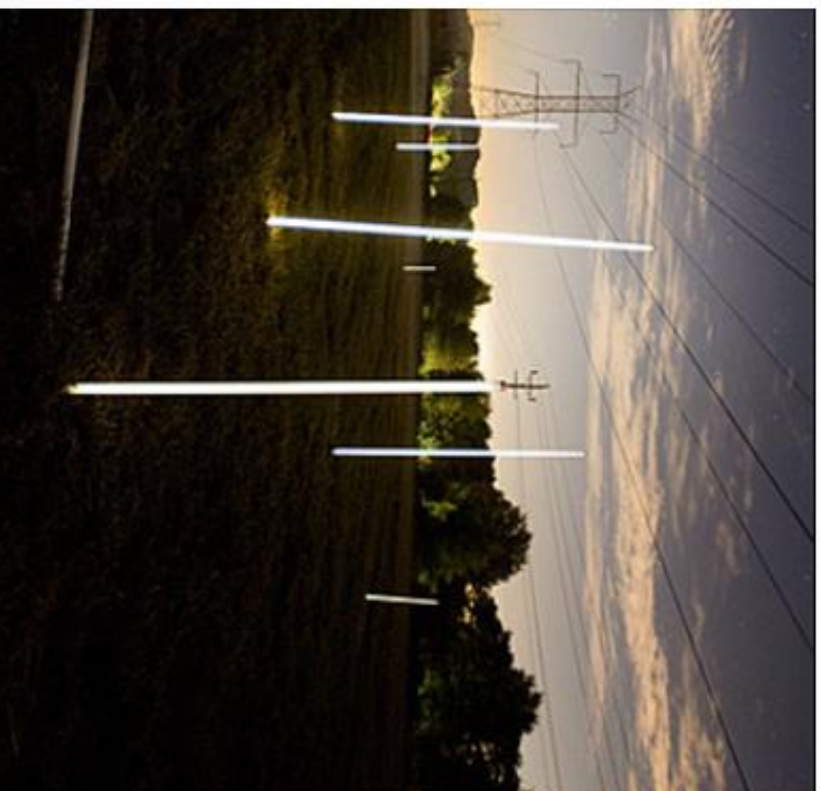


EVIDENCE FOR CHILDHOOD CANCERS (LEUKEMIA)

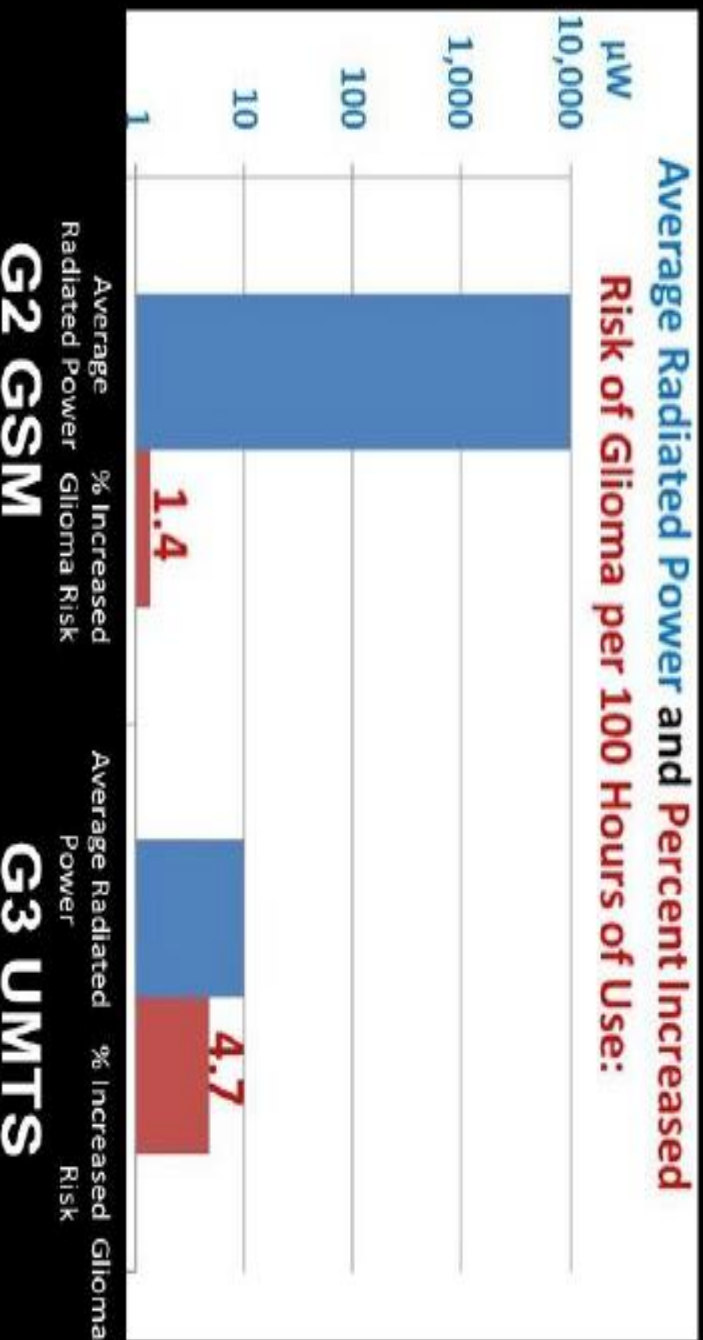
With overall 42 epidemiological studies published to date power frequency EMFs are among the most comprehensively studied environmental factors. Except ionizing radiation no other environmental factor has been as firmly established to increase the risk of childhood leukemia. Sufficient evidence from epidemiological studies of an increased risk from exposure to EMF (power frequency magnetic fields) that cannot be attributed to chance, bias or confounding. Therefore, according to the rules of IARC such exposures can be classified as a Group 1 carcinogen (Known Carcinogen).



- ❖ Epidemiological study (2010) showed increased risk of leukemia in children exposed to ELF fields > 30 mG
- ❖ Cherry found living within 1 km of Sutrö tower increased the risk of developing cancer in childhood 9.9 times; with 15.5 times increased risk seen for brain cancer and lymphoma



Brain Cancer Risk: GSM Versus UMTS



As a recent example, consider the recent research that compares 2G (GSM technology) to 3G (UMTS-talk, text, and data-Smartphone technology). People usually assume, the more power you absorb, the higher the risk. However, when scientists reviewed the first ever paper that looks at brain cancer risk by type of phone used- 2 or 3 G- they came to a stunning conclusion. The lower power 3G UMTS phones had a higher glioma (a type of brain cancer) risk than the *higher* power 2G GSM phones. Although 3G technology has up to 1000 less power, this technology shows a more than three times for glioma in comparison to 2G. These differences speak to the complexity of understanding wireless communication exposures and how various signal characteristics, such as modulation and waveform

Un recente studio sperimentale ha documentato **effetti CANCEROGENI da esposizione a RF-EMF su topi (tumori polmonari, eptocarcinomi, linfomi) a livelli di esposizione da bassi a moderati** (0,04 e 0,4 W / kg di SAR), ben al di sotto dei limiti correnti

Biochemical and Biophysical Research Communications 459 (2015) 585–590

Contents lists available at ScienceDirect

Biochemical and Biophysical Research Communications

Journal homepage: www.elsevier.com/locate/ybbr



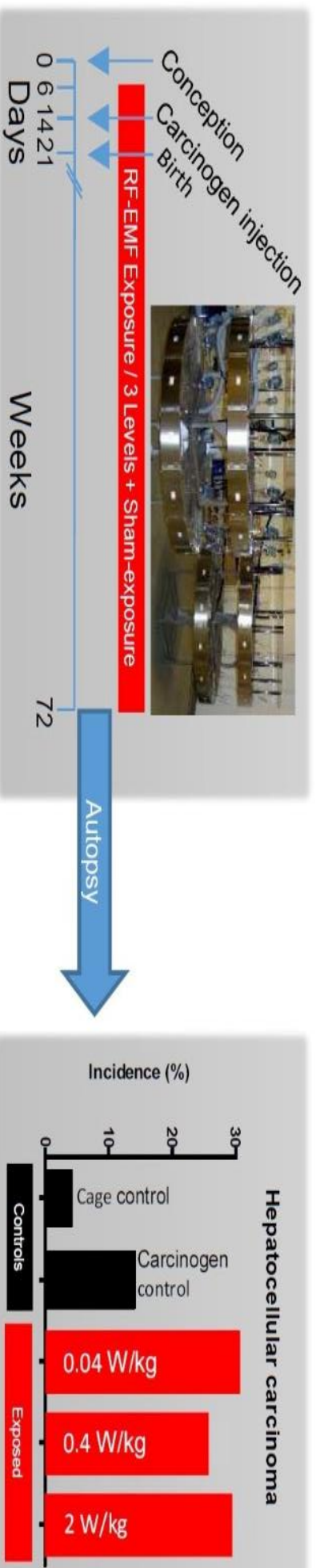
Tumor promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans

Alexander Lerch^{a,*}, Melanie Klose^a, Karen Grote^a, Adalbert F.X. Wilhelm^b, Oliver Spathmann^c, Thomas Fiedler^c, Joachim Streckert^c, Volkert Hansen^c, Markus Clemens^c

CrossMark



New Study “Fully Confirms” Tumor-promoting Effects of RF-EMF Exposed Mice



Graphic Credit: Abstract for “Tumor Promotion by Exposure to Radiofrequency Electromagnetic Fields Below Exposure Limits for Humans”; by A. Lerch, et.al.; *Biochemical and Biophysical Research Communications* (2015).



BioInitiative 2012

A Rationale for Biologically-based Exposure Standards
for Low-Intensity Electromagnetic Radiation

BIOINITIATIVE 2012 - CONCLUSIONS Table 1-1

(Genetics and Neurological Effects Updated March 2014)

<http://www.bioinitiative.org/>

BIOEFFECTS ARE CLEARLY ESTABLISHED

Bioeffects are clearly established and occur at very low levels of exposure to electromagnetic fields and radiofrequency radiation. Bioeffects can occur in the first few minutes at levels associated with cell and cordless phone use. Bioeffects can also occur from just minutes of exposure to mobile phone masts (cell towers), WI-FI, and wireless utility 'smart' meters that produce whole-body exposure. Chronic base station level exposures can result in illness.

Overall, more than 1800 or so new studies report abnormal gene transcription (Section 5); genotoxicity and single-and double-strand DNA damage (Section 6); stress proteins because of the fractal RF-antenna like nature of DNA (Section 7); chromatin condensation and loss of DNA repair capacity in human stem cells (Sections 6 and 15); reduction in free-radical scavengers - particularly melatonin (Sections 5, 9, 13, 14, 15, 16 and 17); neurotoxicity in humans and animals (Section 9); carcinogenicity in humans (Sections 11, 12, 13, 14, 15, 16 and 17); serious impacts on human and animal sperm morphology and function (Section 18); effects on offspring behavior (Section 18, 19 and 20); and effects on brain and cranial bone development in the offspring of animals that are exposed to cell phone radiation during pregnancy (Sections 5 and 18). This is only a snapshot of the evidence presented in the BioInitiative 2012 updated report.

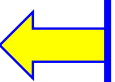
A linear, dose-response relationship test is probably invalid for testing of RFR and EMF (as is done in chemicals testing for toxicity).

Resonant frequencies may result in biological effects at very low intensities comparable to base station (cell tower) and other microwave sources used in mobile communications. These exposures can cause health risk. The current safety standards are insufficient to protect from non-thermal microwave effects.

The data about the effects of microwave at super-low intensities and significant role of duration of exposure in these effects along with the data showing that adverse effects of non-thermal microwave from GSM/UMTS mobile phones depend on carrier frequency and type of the microwave signal suggest that microwave from base-stations/masts, wireless routers, WI-FI and other wireless devices and exposures in common use today can also produce adverse effects at prolonged durations of exposure.

Safety standards based on heating are irrelevant to protect against EMF-levels of exposure. There is an urgent need to revise EMF exposure standards. Research has shown thresholds are very low (safety standards must be reduced to limit biological responses). Biologically-based EMF safety standards could be developed from the research on the stress response.

(Blank, 2012 – Section 7)





ELSEVIER

Electromagnetic fields stress living cells

Martin Blank^{a,*}, Reba Goodman^b

^a *Department of Physiology, Columbia University, New York, NY, USA*

^b *Department of Pathology, Columbia University, New York, NY, USA*

Received 30 January 2009; accepted 30 January 2009

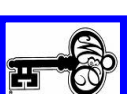
Abstract

Electromagnetic fields (EMF), in both ELF (extremely low frequency) and radio frequency (RF) ranges, activate the cellular stress response, a protective mechanism that induces the expression of stress response genes, e.g., HSP70, and increased levels of stress proteins, e.g., hsp70. The 20 different stress protein families are evolutionarily conserved and act as ‘chaperones’ in the cell when they ‘help’ repair and refold damaged proteins and transport them across cell membranes. Induction of the stress response involves activation of DNA, and despite the large difference in energy between ELF and RF, the same cellular pathways respond in both frequency ranges. Specific DNA sequences on the promoter of the HSP70 stress gene are responsive to EMF, and studies with model biochemical systems suggest that EMF could interact directly with electrons in DNA. While low energy EMF interacts with DNA to induce the stress response, increasing EMF energy in the RF range can lead to breaks in DNA strands. It is clear that in order to protect living cells, EMF safety limits must be changed from the current thermal standard, based on energy, to one based on biological responses that occur long before the threshold for thermal changes.

© 2009 Elsevier Ireland Ltd. All rights reserved.

DANGER SIGNALS !

... it is important to realize that the stress response occurs in reaction to a potentially harmful environmental influence. The stress response is an unambiguous indication that cells react to EMF as potentially harmful. It is therefore an indication of compromised cell safety, given by the cell, in the language of the cell.



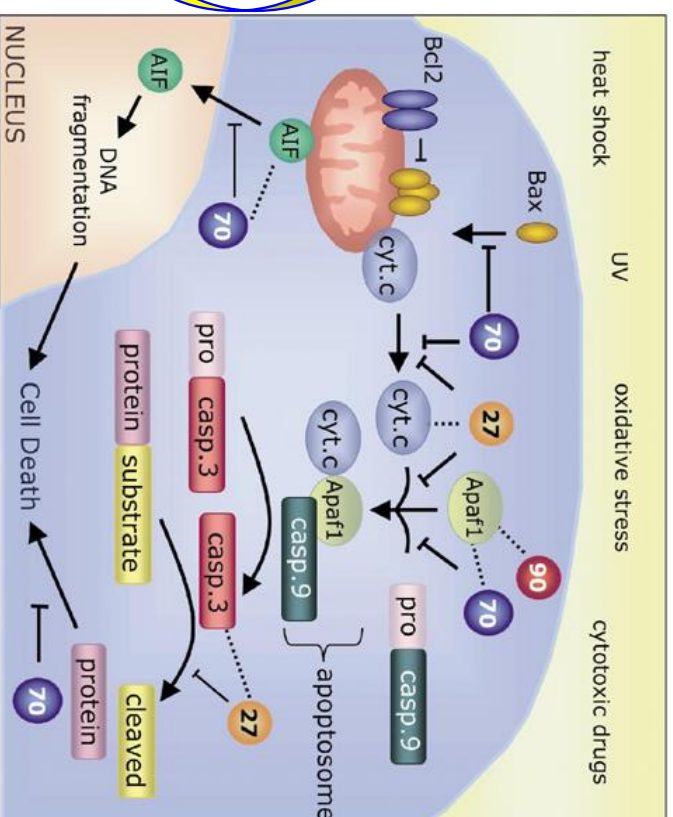
The low threshold level of the stress response shows that the current safety standards are much too high to be considered safe.



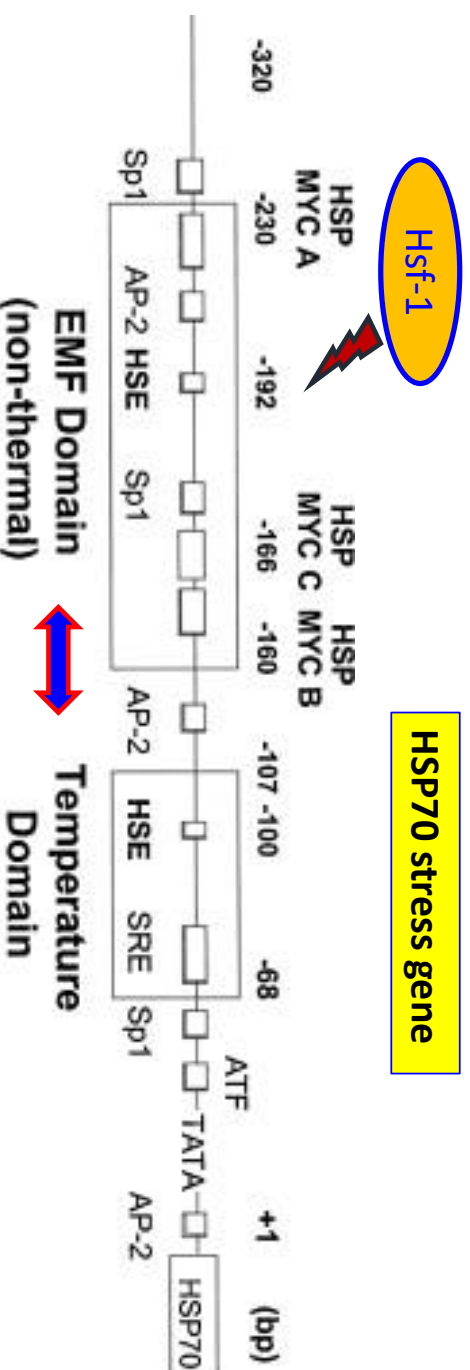
The relatively low field strengths that can affect biochemical reactions is a further indication that cells are able to sense potential danger long before there is an increase in temperature ... the thermal standard used by agencies to measure safety is at best incomplete, and in reality not protective ...

Non-thermal ELF mechanisms are as effective as thermal RF mechanisms in stimulating the stress response and other protective mechanisms.

Finally, since both ELF and RF activate the same biology, simultaneous exposure to both is probably additive and ... total EMF exposure is important...



Specific DNA sequences on the promoter of the HSP70 stress gene are responsive to EMF...



Synthesis of this stress protein is initiated in a region of the promoter where a transcription factor known as Heat Shock Factor 1 (HSF-1) binds to a Heat Shock Element (HSE).

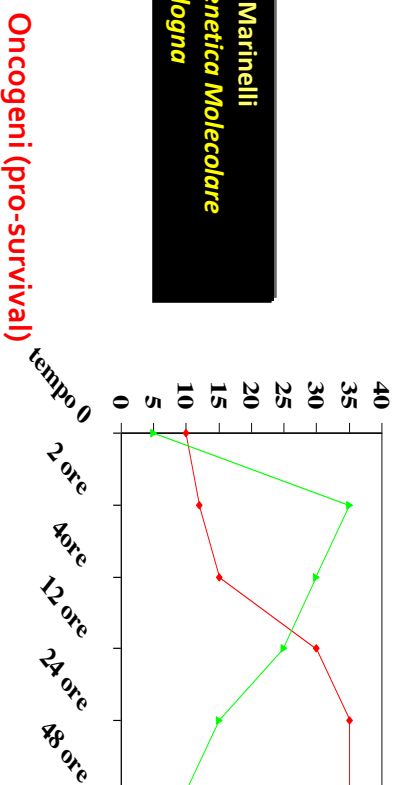
The EMF sensitive region on HSP70 promoter is upstream from the thermal domain of the promoter and is not sensitive to increased temperature. The binding of HSF-1 to HSE occurs at -192 in the HSP70 promoter relative to the transcription initiation site.

The EMF domain contains three nCTCTn myc-binding sites -230, -166 and -160 relative to the transcription initiation site and upstream of the binding sites for the heat shock (nGAAn) and serum responsive elements... The electromagnetic response elements (EMRES) have also been identified on the c-myc promoter and are also responsive to EMF

GENE EXPRESSION VARIATIONS IN CCRF-CEM CELLS DURING THE EMF 900 MHZ EXPOSURE 2- 48 hours

J. Cellular Physiology, 198:324-332 (2004)

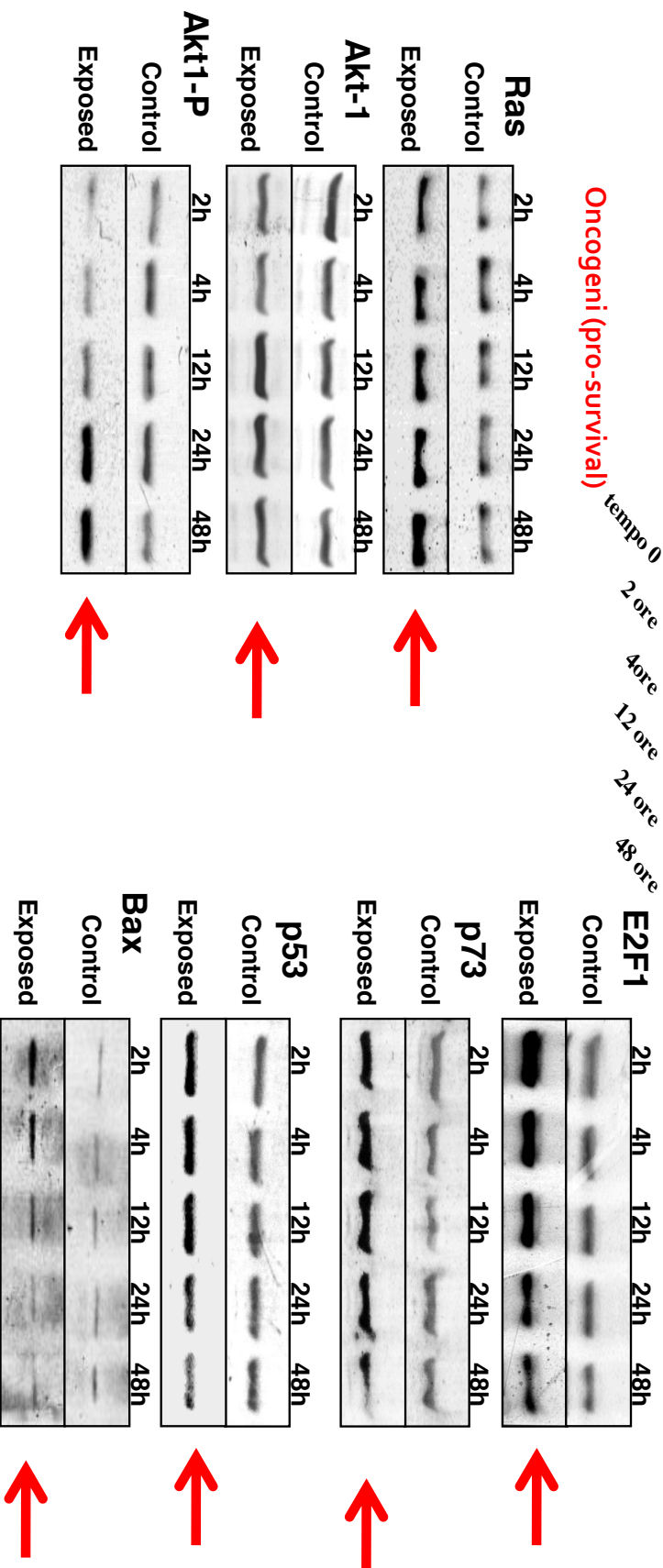
Dr. Fiorenzo Marinelli
Istituto di Genetica Molecolare
IGM-CNR Bologna



pro-survival
pro-apoptotic

Oncosuppressors (pro-apoptotic)

Oncogeni (pro-survival)



Exposure to 900 MHz Electromagnetic Field Induces an Unbalance Between Pro-Apoptotic and Pro-Survival Signals in T-Lymphoblastoid Leukemia CCRF-CEM Cells

F. MARINELLI,¹ D. LASALA,¹ G. CICCIOOTTI,¹ L. CATTINI,² C. TRIMARCHI,³ S. PUTTI,⁴ A. ZAMPARELLI,¹ L. GIULIANI,⁵ G. TOMASSETTI,⁶ AND CATERINA CINTI^{1,7*}

It has been recently established that low-frequency electromagnetic field (ELF) exposure induces biological changes and could be associated with increased incidence of cancer, while the issue remains unresolved as to whether high-frequency EMFs can have hazardous effect on health. Epidemiological studies on association between childhood cancers, particularly leukemia and brain cancer, and exposure to low- and high-frequency EMF suggested an etiological role of EMFs in inducing adverse health effects. To investigate whether exposure to high-frequency EMF could affect *in vitro* cell survival, we cultured acute T-lymphoblastoid leukemia cells (CCRF-CEM) in the presence of unmodulated 900 MHz EMF, generated by a transverse electromagnetic (TEM) cell, at various exposure times. We evaluated effects of high-frequency EMF on cell growth rate and apoptosis induction, by viability (MTT) test, FACS analysis and DNA ladder, and we investigated pro-apoptotic and pro-survival signaling pathways possibly involved as a function of exposure time by Western blot analysis. At short exposure times (2–12 h), unmodulated 900 MHz EMF induced DNA breaks and early activation of both p53-dependent and -independent apoptotic pathways while longer continuous exposure (24–48 h) determined silencing of pro-apoptotic signals and activation of genes involved in both intracellular (Bcl-2) and extracellular (Ras and Akt1) pro-survival signaling. Overall our results indicate that exposure to 900 MHz continuous wave, after inducing an early self-defense response triggered by DNA damage, could confer to the survivor CCRF-CEM cells a further advantage to survive and proliferate. *J. Cell. Physiol.* 198: 324–332, 2004. © 2003 Wiley-Liss, Inc.

At short exposure times (2–12 h), unmodulated 900 MHz EMF induced DNA breaks and early activation of both p53-dependent and -independent apoptotic pathways while longer continuous exposure (24–48 h) determined silencing of pro-apoptotic signals and activation of genes involved in both intracellular (Bcl-2) and extracellular (Ras and Akt1) pro-survival signaling

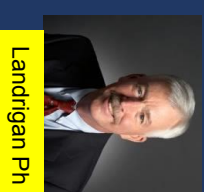
A Silent Pandemic

Industrial Chemicals Are Impairing The Brain Development of Children Worldwide

For immediate release: Tuesday, November 7, 2006



Grandjean P.



Landrigan Ph

THE LANCET

Volume 368, Issue 9553, 16 December 2006-22 December 2006, Pages 2167-2178

Developmental neurotoxicity of industrial chemicals

P Grandjean, P Landrigan

* **

Neurodevelopmental disorders such as autism, attention deficit disorder, mental retardation, and cerebral palsy are common, costly, and can cause lifelong disability. Their causes are mostly unknown. A few industrial chemicals (eg, lead, methylmercury, polychlorinated biphenyls [PCBs], arsenic, and toluene) are recognised causes of neurodevelopmental disorders and subclinical brain dysfunction. Exposure to these chemicals during early fetal development can cause brain injury at doses much lower than those affecting adult brain function. Recognition of these risks has led to evidence-based programmes of prevention, such as elimination of lead additives in petrol. Although these prevention campaigns are highly successful, most were initiated only after substantial delays. Another 200 chemicals are known to cause clinical neurotoxic effects in adults. Despite an absence of systematic testing, many additional chemicals have been shown to be neurotoxic in laboratory models. The toxic effects of such chemicals in the developing human brain are not known and they are not regulated to protect children. The two main impediments to prevention of neurodevelopmental deficits of chemical origin are the great gaps in testing chemicals for developmental neurotoxicity and the high level of proof required for regulation. New precautionary approaches that recognise the unique vulnerability of the developing brain are needed for testing and control of chemicals.

A few industrial chemicals (eg, **lead, methylmercury, polychlorinated biphenyls [PCBs], arsenic, and toluene**) are recognised causes of neurodevelopmental disorders and subclinical brain dysfunction.

...

Seven years ago two well known experts in Environmental Health, a pediatrician and an epidemiologist, launched an alarm from the pages of the Lancet, saying that a *silent pandemic* of ADHD, autism and other neurodevelopmental disorders was spreading also due to the *shortage of funds in this area of research*



autism the great modern health concern



Autism spectrum disorders (ASDs) are a group of developmental disabilities that can cause significant social, communication and behavioral challenges. People with **ASDs** handle information in their brain differently than other people. **ASDs** are "spectrum disorders." That means **ASDs** affect each person in different ways, and can range from very mild to severe. There are three different types of **ASD**: **Autistic Disorder** (also called "classic" autism), **Asperger Syndrome** and **Pervasive Developmental Disorder** – Not Otherwise Specified (PDD-NOS; also called "atypical autism")

Autistic Disorder

What most people think of when hearing the word "autism." People with autistic disorder usually have significant language delays, social and communication challenges and unusual behaviors and interests.

Asperger Syndrome

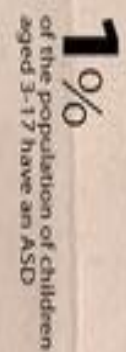
Usually have some milder symptoms of autistic disorder. They might have social challenges and unusual behaviors and interests. However, typically do not have problems with language or intellectual disability.

Pervasive Developmental Disorder

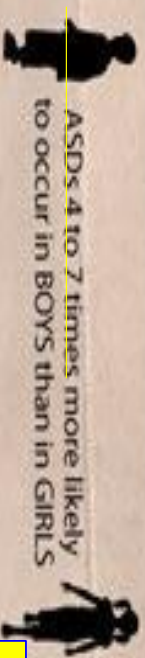
The symptoms might cause only social and communication challenges. People with PDD-NOS usually have fewer and milder symptoms than those with autistic disorder.



2014 1 : 68



with



2006 1 : 110

There is no medical test to diagnose ASDs, doctors look at the child's behavior and development to make a diagnosis.



A person with an ASD might: Not respond to their name by 12 months | Avoid eye contact and want to be alone | Have delayed speech and language skills Repeat words or phrases over and over (echolalia) | Give unrelated answers to questions | Get upset by minor changes



about four-fifths notice by age 24 months

ASDs are the fastest-growing developmental disability 1,148% growth rate

with 10-17% annual growth



Lifetime cost to care for an individual with an ASD \$3.2m

with \$4,110-\$6,200 per year

of medical expenditures for an individual with an ASD than one without

2014 1 : 68

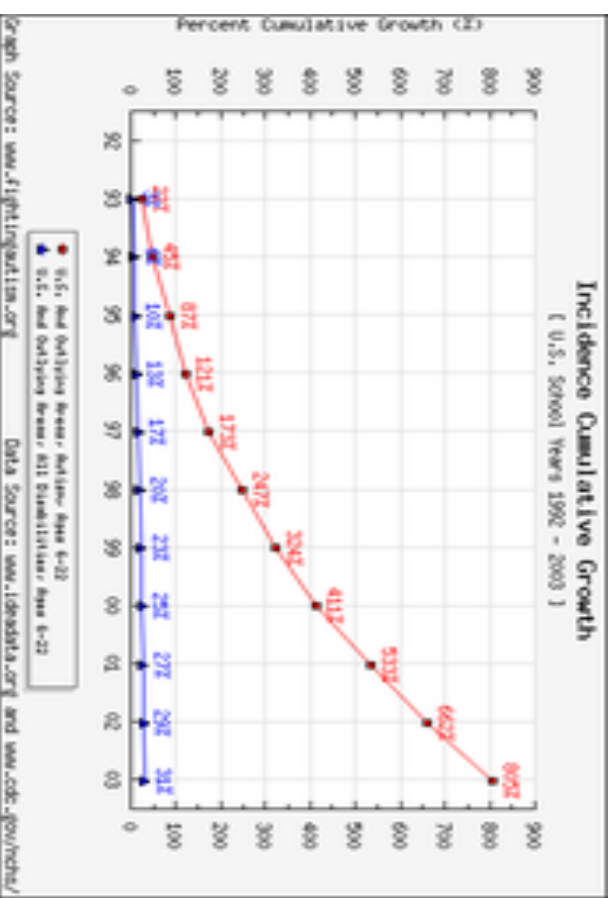


AUTISM (ASD :Autism Spectrum Disorders)

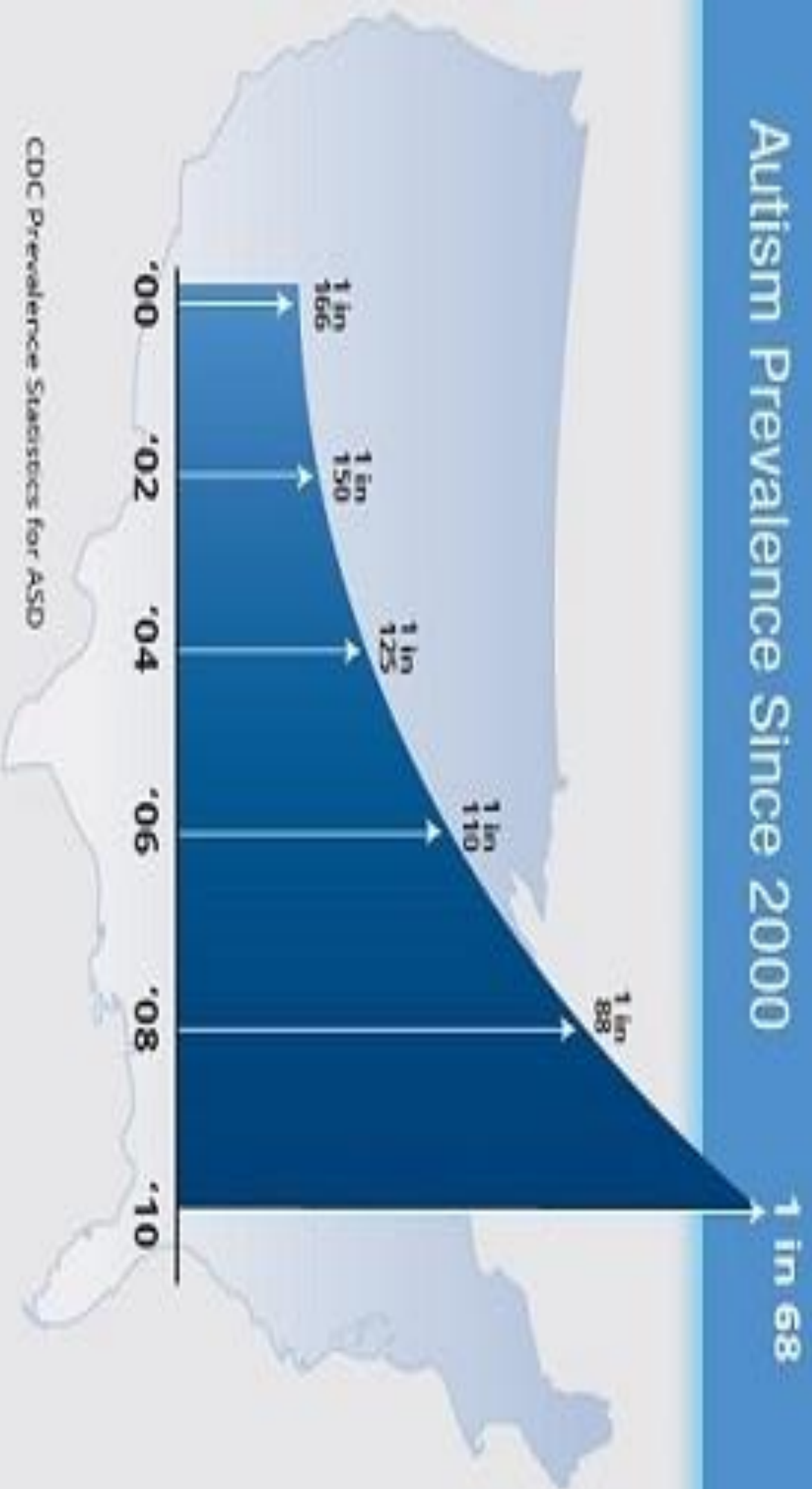
ASD is the fastest-growing developmental disorder in the world,
the prevalence of diagnosis having increased by 600% over
the last 20 years

New diagnosed cases (incidence) in US increased from 15,580 in 1992
to 163.773 in 2003

The estimated prevalence is
of 8-12 cases/1000
children (2012)



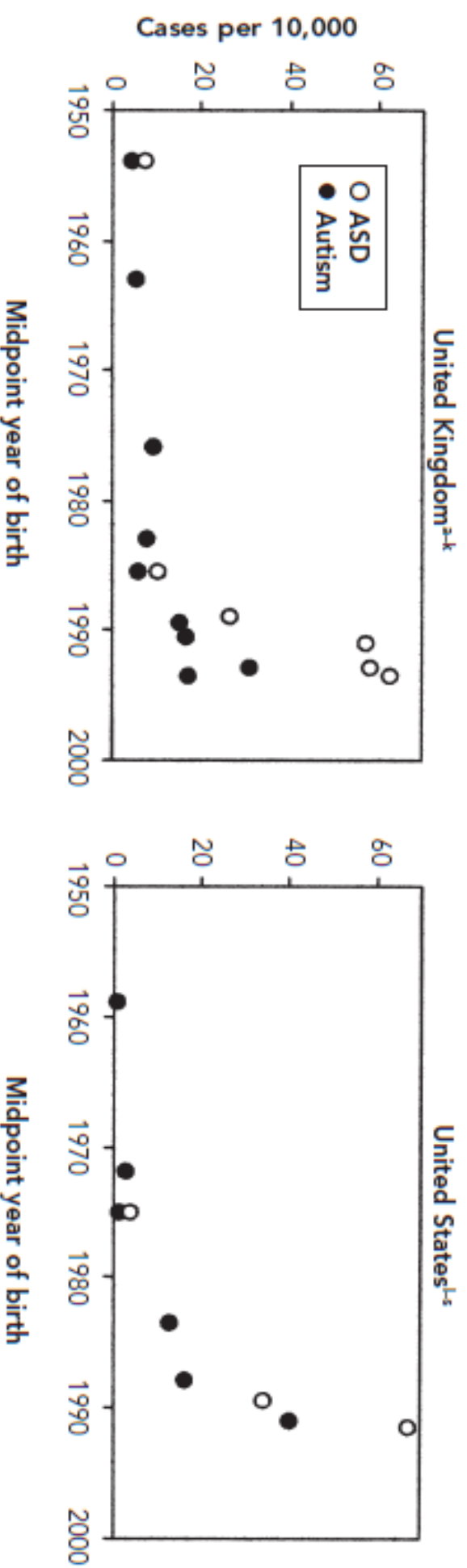
Autism Prevalence Since 2000



CDC Prevalence Statistics for ASD

Many scientists and researchers claim that Autism is the fastest-growing developmental disorder

Figure 1. Reported prevalence of autism and autistic spectrum disorders (ASDs), by midpoint year of birth, United Kingdom and United States, 1954–1994



NOTE: These graphs show prevalence estimates from 11 U.K. and 8 U.S. studies. For studies with survey populations spanning a range of birth years, the midpoint of the birth year range is used.

^aLotter 1966³⁵

^bWing and Gould 1979⁴²

^cDeb and Prasad 1994⁴⁷

^dWebb et al. 1997⁸⁹

^eTaylor et al. 1999²⁰

^kBaird et al. 2000⁷⁸

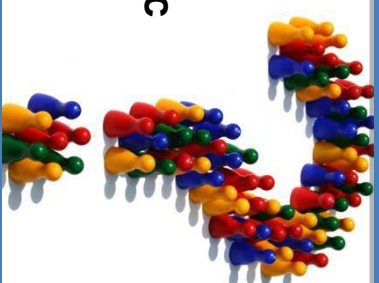
^lTreffert 1970³⁶

^mRitvo et al. 1989⁵³

ⁿBurd et al. 1987⁴⁵

^oCalifornia Department of Developmental Services 2003²

Centre for Disease Control (CDC)
Autism and Developmental Disabilities Monitoring Network 2014



1 of 68

children aged 8 years had been diagnosed as autistic

Prevalence of Autism Spectrum Disorders in EU **0,62 - 0,7%**

Autism. Lai MC, Lombardo MV, Baron-Cohen S. Lancet. 2014 Mar.

1:119 Finlandia

Mattia et al., 2011

1:87 Svezia

Idring et al., 2012

1:59 Gran Bretagna

Russel et al., 2014

Community Report on Autism 2018

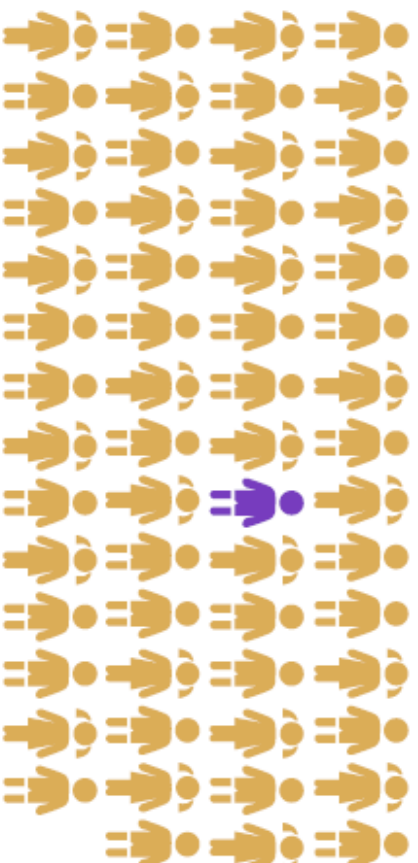
Centers for Disease Control and Prevention



Community Report from the
**Autism and Developmental Disabilities
Monitoring (ADDM) Network**



1.7%
is the average
percentage
identified with ASD



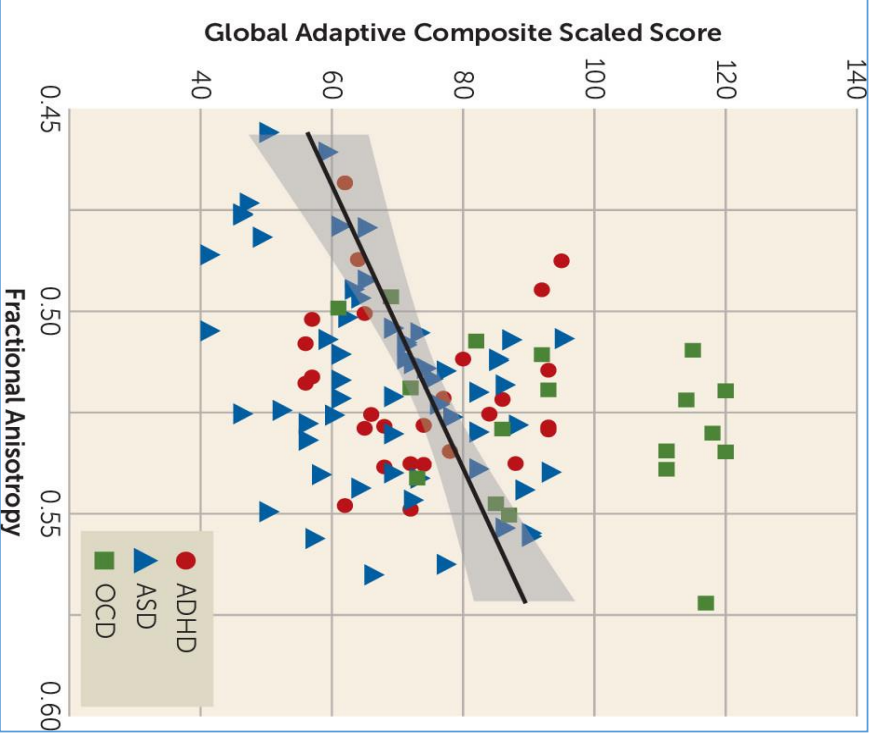
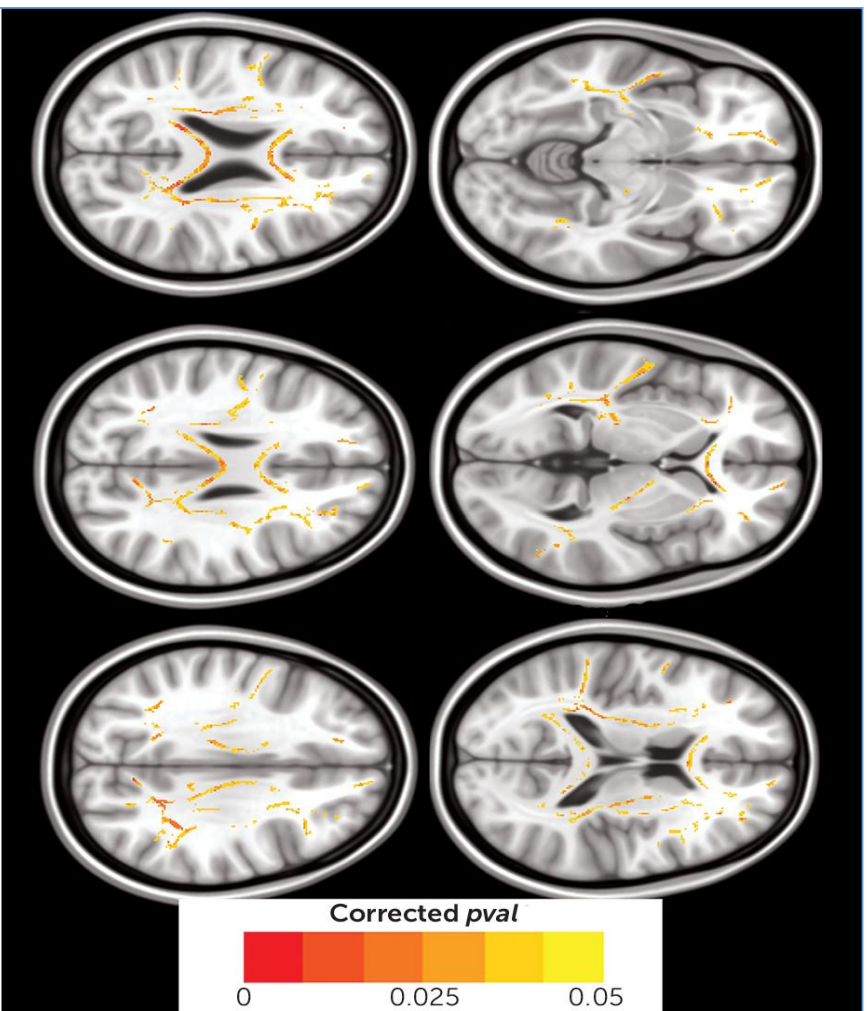
1 in 59
8-year-old children
were identified with ASD
by ADDM in 2014

Why is this information important and how can it be used?

1. Lower the age of first evaluation by community providers; and
2. Increase awareness of ASD among black and Hispanic families, and identify and address barriers in order to ensure that all children with ASD are evaluated, diagnosed, and connected to services.

Autism, ADHD and OCD have common symptoms and are linked by some of the same genes.

Yet they have always been considered as separate disorders



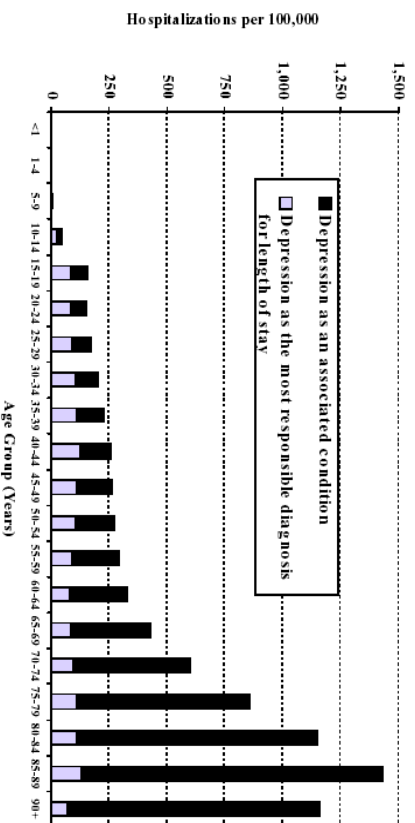
Children with autism and ADHD showed more severe impairments affecting more of the brain's white matter than those with OCD. This finding may reflect the fact that both autism and ADHD typically have an onset at a much younger age than OCD, and at a time when a number of different white matter tracts are going through rapid development,



FACT

An estimated one in ten Americans suffer from depression, an illness that affects both physical and mental well-being. Often from depression, depression can be chronic in nature, depression circumstances or triggered by adverse life circumstances, a chronic in nature, depression circumstances or triggered by adverse life circumstances, a combination of genetic, psychological and environmental factors contribute to the onset of depression.

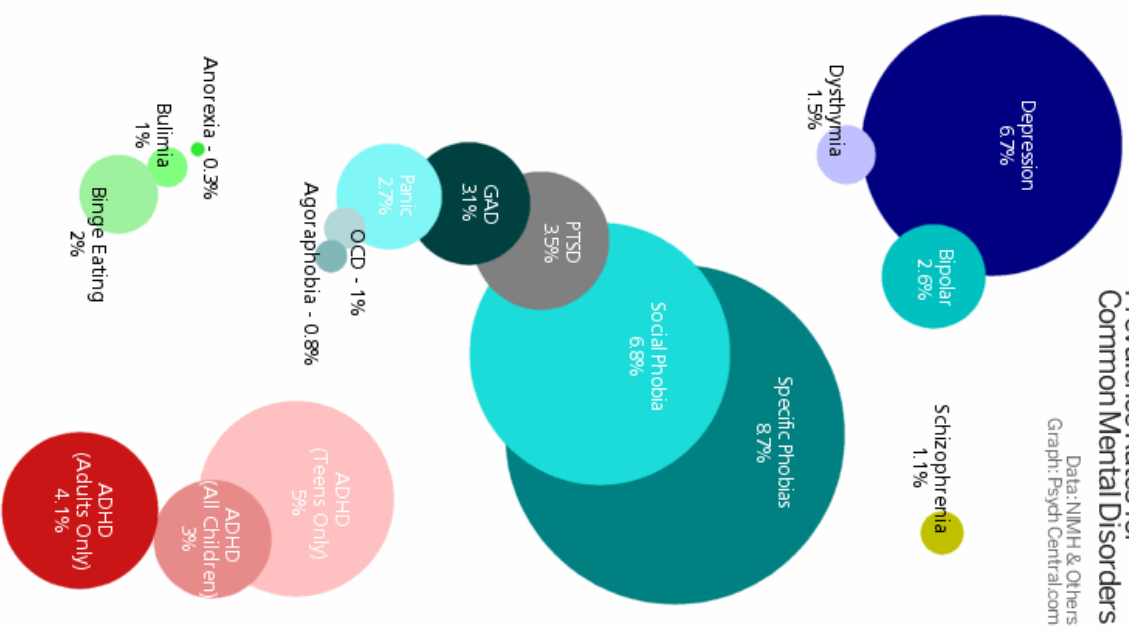
Figure 2-3 Hospitalizations for major depressive disorder in general hospitals per 100,000 by contribution to length of stay and age group, Canada, 1999/2000



Source: Centre for Chronic Disease Prevention and Control, Health Canada using data from Hospital Morbidity File, Canadian Institute for Health Information

Prevalence Rates for Common Mental Disorders

Data: NIMH & Others
Graph: Psych Central.com



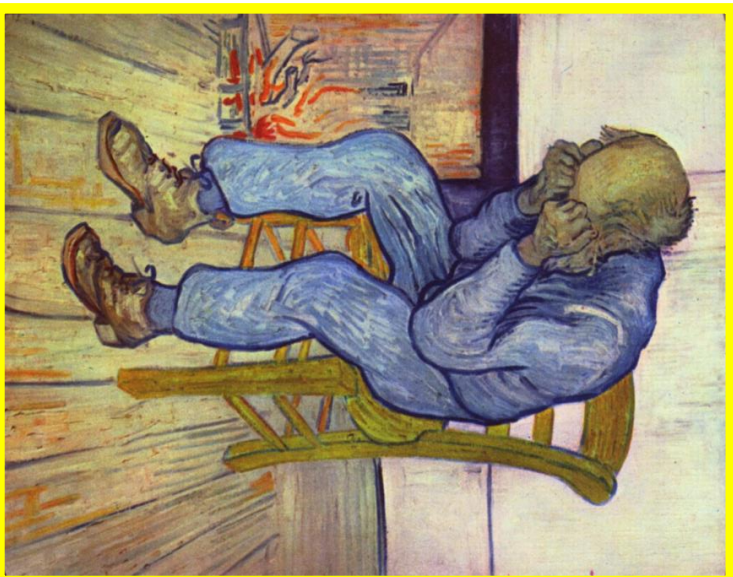
Depressione Major

Major depressive disorder

Fattori
psicologici,
psicosociali,
ambientali,
ereditari,
evolutivi



Biologici
(genetici-epigenetici
metagenomici)
(psico-neuro-immuno-
endocrini)



Persistente tristezza, ansia, o **sens**o di "vuoto"

Sens

o di disperazione, pessimismo

Sensi di colpa, **inutilità**, **bassa autostima**

Anedonia (perdita di interesse o piacere nelle
attività normalmente piacevoli)

Calo di energia, affaticabilità

Irritabilità, nervosismo

Movimenti e linguaggio rallentati

Sens

o di **irrequietezza**, difficoltà a rimanere seduti

Difficoltà a **concentrarsi, ricordare, prendere decisioni**

Disturbi del sonno, di risveglio, ipersonnia

Cambiamenti nell'**appetito, alimentazione/peso**

Pensieri di **morte o suicidio**, o tentativi di suicidio

Dolori, mal di testa, crampi, problemi digestivi o senza una chiara
causa fisica e senza sollievo con il trattamento

Il decorso è molto **variabile**: da un episodio **unico** della durata di alcune settimane
fino ad un **disordine perdurante per tutta la vita** con ricorrenti episodi di depressione maggiore.



Pathophysiology. 2013 Jun;20(3):191-209.

www.elsevier.com/locate/pathophys

ISFP
PATHOPHYSIOLOGY

Autism and EMF? Plausibility of a pathophysiological link – Part I

Martha R. Herbert^{a,*}, Cindy Sage^b

^a TRANSCEND Research Program Neurology, Massachusetts General Hospital, Harvard Medical School, Boston, MA 02129, USA

^b Sage Associates, Santa Barbara, CA, USA

Received 10 February 2013; received in revised form 6 May 2013; accepted 15 July 2013

of EMF/RFER exposures that contribute to chronically disrupted homeostasis. Many studies of people with ASCs have identified oxidative stress and evidence of free radical damage, cellular stress proteins, and deficiencies of antioxidants such as glutathione. Elevated intracellular calcium in ASCs may be due to genetics or may be downstream of inflammation or environmental exposures. Cell membrane lipids may be peroxidized, mitochondria may be dysfunctional, and various kinds of immune system disturbances are common. Brain oxidative stress and inflammation as well as measures consistent with blood–brain barrier and brain perfusion compromise have been documented. Part II of this paper will review how behaviors in ASCs may emerge from alterations of electrophysiological oscillatory synchronization, how EMF/RFER could contribute to these by de-tuning the organism, and policy implications of these vulnerabilities. Changes in brain and autonomic nervous system electrophysiological function and sensory processing predominate, seizures are common, and sleep disruption is close to universal.

All of these phenomena also occur with EMF/RFER exposure that can add to system overload ('allostatic load') in ASCs by increasing risk and worsening challenging biological obstruction of physiological repair agents, various genes associated with time with the deployment of wire

... gli effetti dell'**esposizione a EMF/RFER** e tutta una serie di fenomeni fiso-patologici ormai ben documentati nei **disturbi del neurosviluppo** e in particolare dello **spettro autistico** hanno **somiglianze** notevoli:
dallo **stress cellulare e ossidativo** all'alterazione di **membrane, canali e barriere**;
dalla **genotossicità** alla **disfunzione mitocondriale**;
dalle **anomalie immunologiche** ai **problemi infiammatori**;
dalla **disregolazione elettrofisiologica** ai **disturbi neurologici**..
In sintesi: gli **EMFs potrebbero essere cofattori di disregolazione psico-neuro-endocrina**



ELSEVIER

ISFP
PATHOPHYSIOLOGY

Pathophysiology 20 (2013) 211–234

www.elsevier.com/locate/pathophys

Autism and EMF? Plausibility of a pathophysiological link part II

Martha R. Herbert^{a,*}, Cindy Sage^b

^a Massachusetts General Hospital Harvard Medical School Boston, TRANSCEND Research Program Neurology, Boston, MA, USA

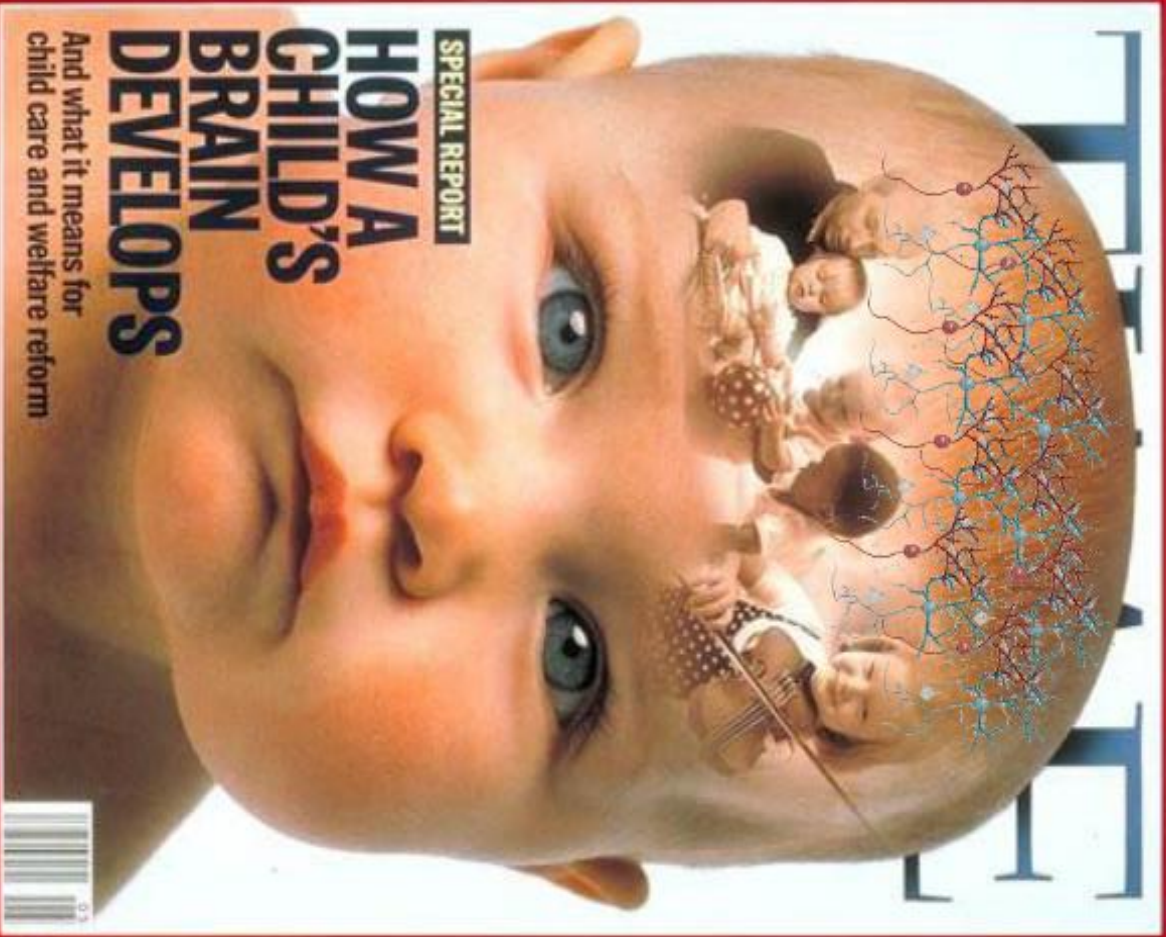
^b Sage Associates, Santa Barbara, CA, USA

Abstract

Autism spectrum conditions (ASCs) are defined behaviorally, but they also involve multileveled disturbances of underlying biology that find striking parallels in the physiological impacts of electromagnetic frequency and radiofrequency radiation exposures (EMF/RFER). Part I (Vol 776) of this paper reviewed the critical contributions pathophysiology may make to the etiology, pathogenesis and ongoing generation of behaviors currently defined as being core features of ASCs. We reviewed pathophysiological damage to core cellular processes that are associated both with ASCs and with biological effects of EMF/RFER exposures that contribute to chronically disrupted homeostasis. Many studies of people with ASCs have identified oxidative stress and evidence of free radical damage, cellular stress proteins, and deficiencies of antioxidants such as glutathione. Elevated intracellular calcium in ASCs may be due to genetics or may be downstream of inflammation or environmental exposures. Cell membrane lipids may be peroxidized, mitochondria may be dysfunctional, and various kinds of immune system disturbances are common. Brain oxidative stress and inflammation as well as measures consistent with blood–brain barrier and brain perfusion compromise have been documented. Part II of this paper documents how behaviors in ASCs may emerge from alterations of electrophysiological oscillatory synchronization, how EMF/RFER could contribute to these by de-tuning the organism, and policy implications of these vulnerabilities. It details evidence for mitochondrial dysfunction, immune system dysregulation, neuroinflammation and brain blood flow alterations, altered electrophysiology, disruption of electromagnetic signaling, synchrony, and sensory processing, de-tuning of the brain and organism, with autistic behaviors as emergent properties emanating from this pathophysiology. Changes in brain and autonomic nervous system electrophysiological function and sensory processing predominate, seizures are common, and sleep disruption is close to universal. All of these phenomena also occur with EMF/RFER exposure that can add to system overload (“allostatic load”) in ASCs by increasing risk, and can trigger phenotypic behavioral problems and symptoms: commoner behavioral/autistic symptoms of ASCs by radiation.

In questa parte II, esamineremo come i comportamenti autistici possano emergere **da alterazioni della sincronizzazione oscillatoria elettrofisiologica** (le convulsioni sono comuni, e i disturbi del sonno quasi universali..)

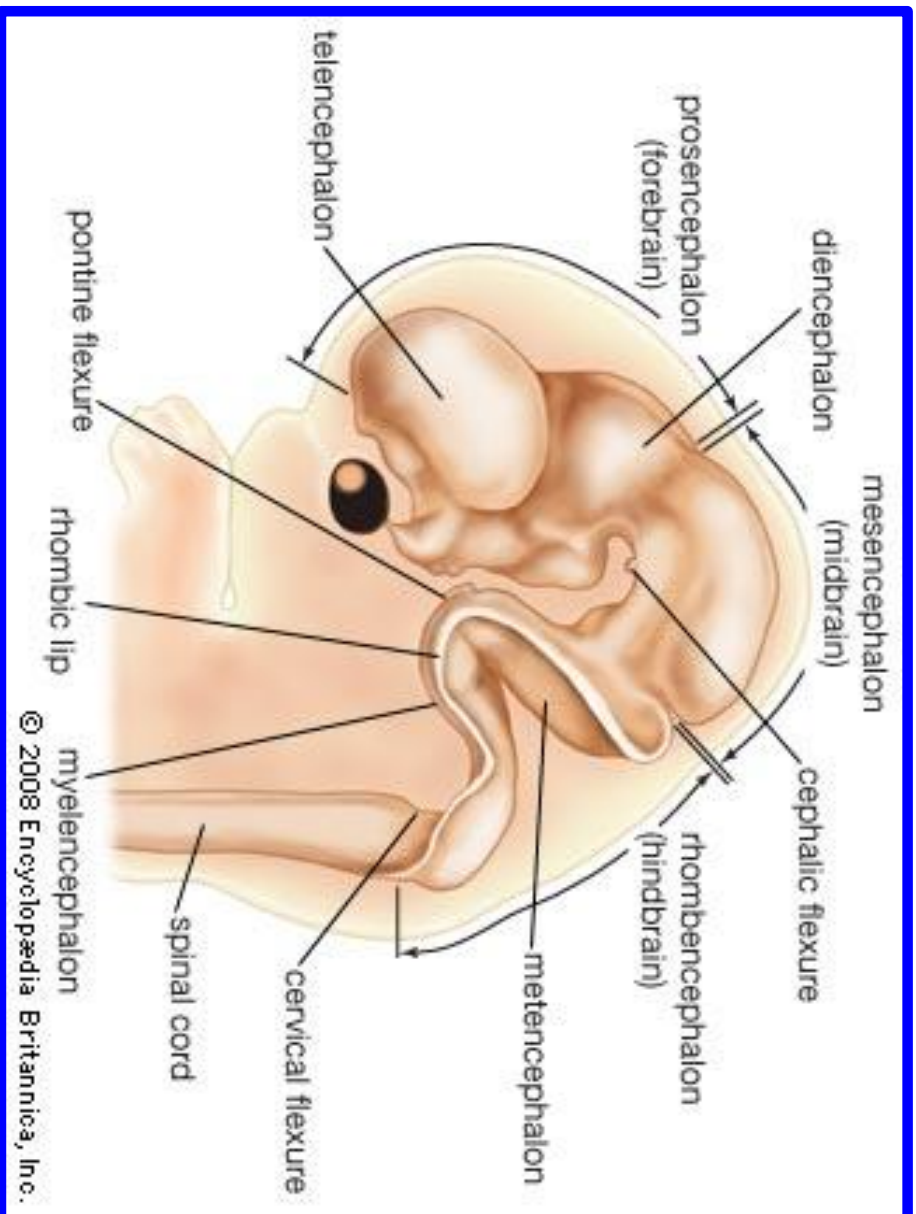
e come, d'altro canto, gli **EMF/RFER** possano indurre **cambiamenti nella funzione elettrofisiologica del cervello, del sistema nervoso autonomo e dell'elaborazione sensoriale...** da **sovraccarico del sistema ("carico allostatico")** aumentando il rischio di **DSAs** e/o peggiorandone il quadro sintomatologico



Adolescenza, Stili di Vita, Psicopatologia

Giovanni Biggio

Centro di Eccellenza per la "Neurologia delle Dipendenze",
Università degli Studi di Cagliari

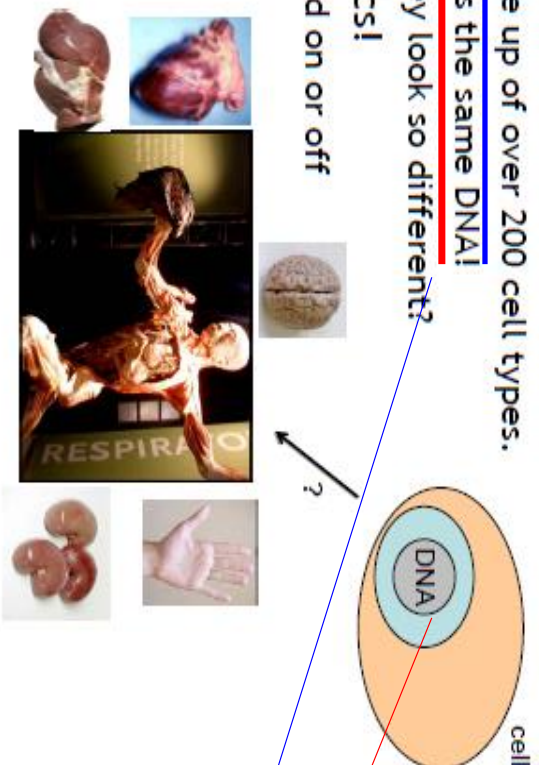


Profile of the [brain](#) of a human fetus at [10 weeks](#)

The fourth keyword is *developmental plasticity*

Same DNA, Different Look

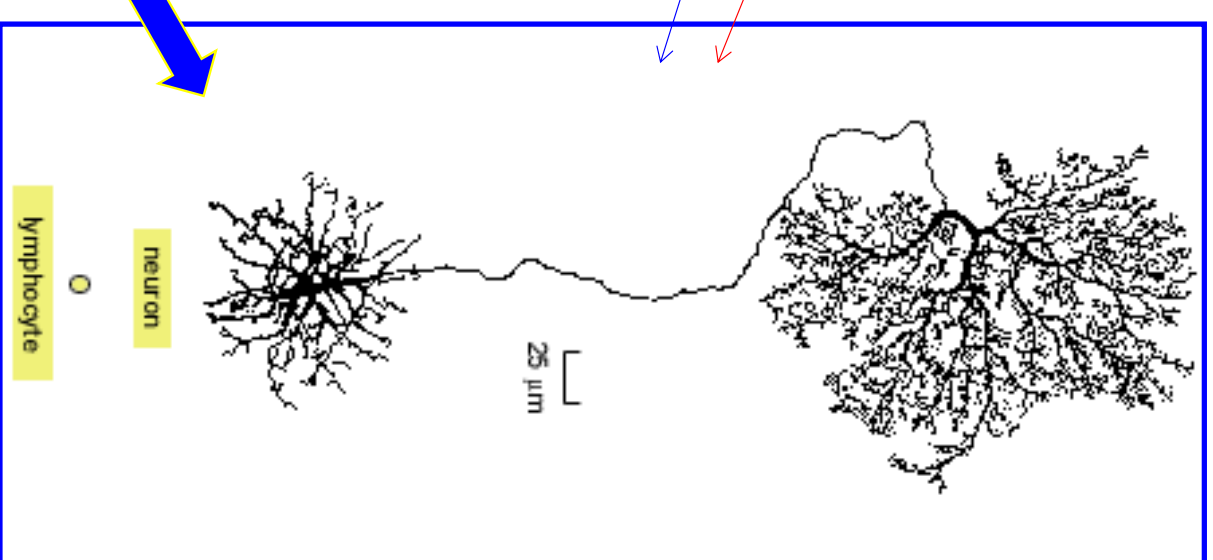
- We are made up of over 200 cell types.
 - Each cell has the same DNA!
 - How can they look so different?
- Epigenetics!
- Genes turned on or off

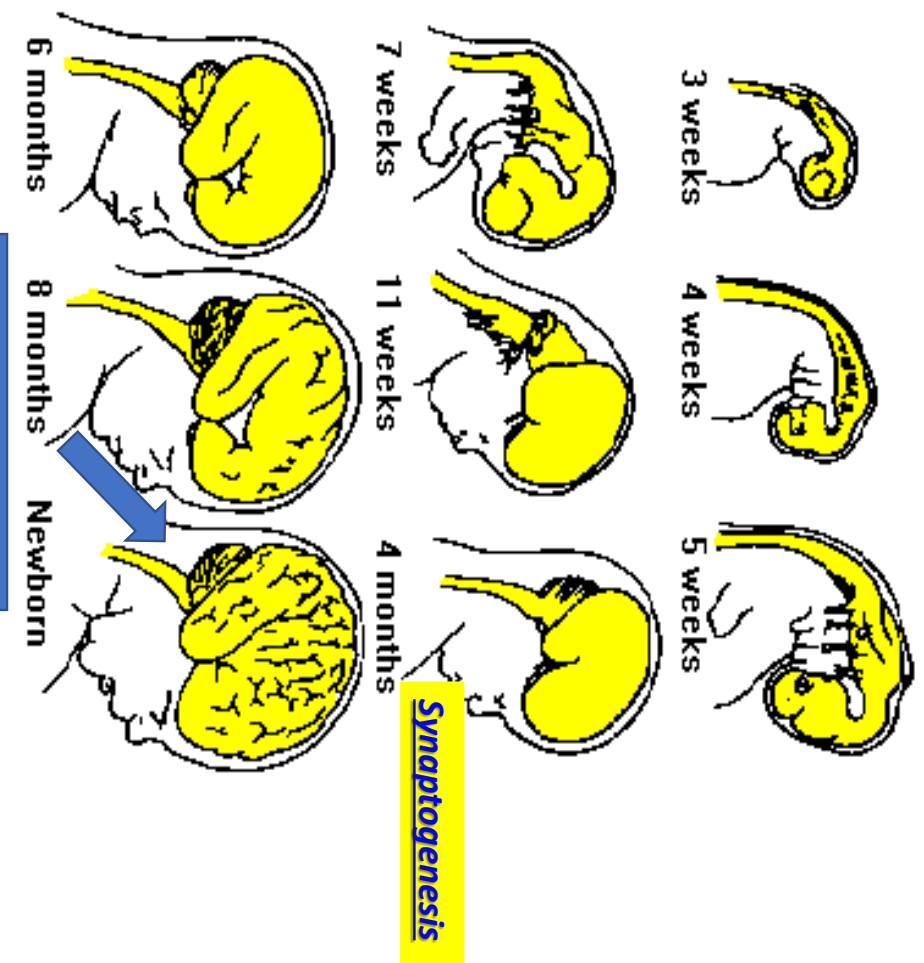


Wikimedia Commons, ORNL.gov, Flickr: richdelux

HARVARD
MEDICAL SCHOOL

This image clearly shows the "power" of the epigenome and the predominant role of environmental information in the phenotypic shaping of cells, tissues, organisms... the huge phenotypic (morpho- functional) difference between a lymphocyte and a neuron is not due to DNA, which is virtually identical in the two cells, but to the manner in which the same genome has been utilized by the two cells, on the basis of the information (positional and environmental) received during the first months of life (for neuron in the first 2 years) and processed by the epigenetic networks





A stegosaurus dinosaur weighed approximately 1,600 kg but had a brain that weighed only **approximately 70 grams (0.07 kg)**. Therefore, **the brain was only 0.004% of its total body weight**. In contrast, an adult human weighs approximately 70 kg and has a brain that weighs approximately 1.4 kg. Therefore, **the human brain is about 2% of the total body weight**. This makes the brain to body ratio of the human **500 times greater than that of the stegosaurus**



The brain grows at an amazing rate during development.

At times during brain development,

250,000 neurons are added every minute!

At birth, **almost all the neurons** that the brain will ever have are present.

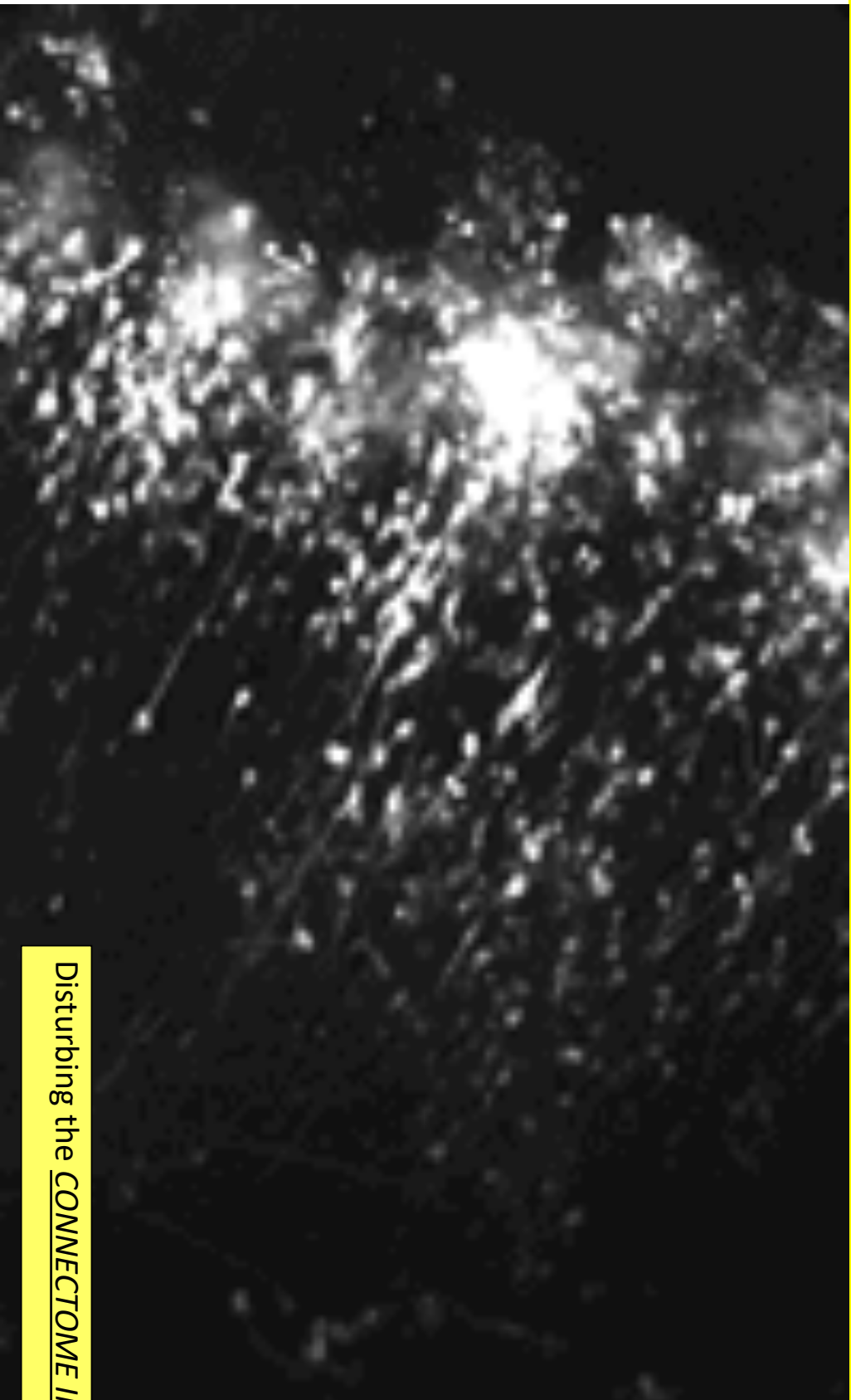
However, **the brain continues to grow for many years after birth.**

By the age of 2 years old, the brain is about **80% of the adult size**

Brain plasticity and modulation of its structure and its functions

The Individual wiring

Motility of neurons and in particular the formation of new connections (synapses) can be modified (perturbed) by exposure to environmental stressors



Disturbing the CONNECTOME INSTRUCTION

Wingate *Imagining the brain cell: the neuron in visual culture*. Nature Rev Neuroscience 2006; 7: 745-752.

FETAL AND NEONATAL EFFECTS OF EMF

Fetal (*in-utero*) and early childhood exposures to cell phone radiation and wireless technologies in general may be a risk factor for hyperactivity, learning disorders and behavioral problems in school.

Fetal Development Studies: Effects on the developing fetus from *in-utero* exposure to cell phone radiation have been observed in both human and animal studies since 2006. Divan et al (2008) found that children born of mothers who used cell phones during pregnancy develop more behavioral problems by the time they have reached school age than children whose mothers did not use cell phones during pregnancy. Children whose mothers used cell phones during pregnancy had 25% more emotional problems, 35% more hyperactivity, 49% more conduct problems and 34% more peer problems (Divan et al., 2008).

Sources of fetal and neonatal exposures of concern include cell phone radiation (both paternal use of wireless devices worn on the body and maternal use of wireless phones during pregnancy). Exposure to whole-body RFR from base stations and WI-FI use of wireless laptops, use of incubators for newborns with excessively high ELF-EMF levels resulting in altered heart rate variability and reduced melatonin levels in newborns, fetal exposures to MRI of the pregnant mother, and greater susceptibility to leukemia and asthma in the child where there have been maternal exposures to ELF-EMF

A precautionary approach may provide the frame for decision-making where remediation actions have to be realized to prevent high exposures of children and pregnant woman

(Bellieni and Pinto, 2012 – Section 19)

Trimester	Gestational Weeks	First												Second				Third	
		1	2	3	4	5	6	7	8	9	16	20	22	28	38				
Brain pathology	Neurogenesis ^{145,151,152}	Weeks 1-20																	
	Neuronal migration ^{145, 153}	Weeks 1-16																	
	Neuronal maturation ^{145,154}	Weeks 1-24																	
	Exposure																	3 rd trimester	
Freeway proximity ⁹²																			
Traffic-related Air Pollution ⁹³																			
Pesticides ^{109,110}													Days 26-81						
Prenatal vitamins ¹³⁵	1 st month and 3 months before																		
Folic acid ^{27,29}	1 st Month ^a																		
Rubella infection ^{144, 156}	Weeks 1-8																		
Fever ^{142,157}	Weeks 1-8												1 st and 2 nd trimesters						
Thalidomide ¹⁵⁸													Days 20-24						
Valproic Acid ^{8,159}													Day 22-28						
SSRI ^{84,160}	1 st trimester ^b																		
Prenatal stressors ¹⁶¹																	Weeks 25-28		

?

Neuropathology (autopsy and imaging) studies of brains of individuals with autism found evidence of **dysregulated neurogenesis, neuronal migration and neuronal maturation ... in pregnancy**. Figure shows **windows of critical periods indicated by evidence from epidemiological studies of environmental factors demonstrating an association with ASDs**. [Int J Epidemiol. 2014 Apr; 43\(2\): 443–464.](#)

Among women exposed to microwaves
47% had miscarriages before the 7th week of pregnancy

"Parmi les femmes exposées à des micro-ondes, 47,7% ont eu des fausses couches avant la 7e semaine de grossesse."... (1)

Professor John R Goldsmith, International / Advisor Consultant for R.F. Communication, Epidemiology and Communications Sciences Advisor to the World Health Organisation, Military and University Advisor, Researcher; wrote concerning the low level exposure of microwave irradiation (below thermal level) incident upon women:

"Of the microwave-exposed women, 47.7% had miscarriages prior to the 7th week of pregnancy..." (1)

The level of irradiation incident upon the women was stated, as from, five microwatts per centimetre squared. This level of irradiation may seem meaningless to a non-scientist; however, when I say that it is below what most schoolgirls will receive in a classroom of wi-fi transmitters, from the age of approximately five years upwards, this level becomes more meaningful.

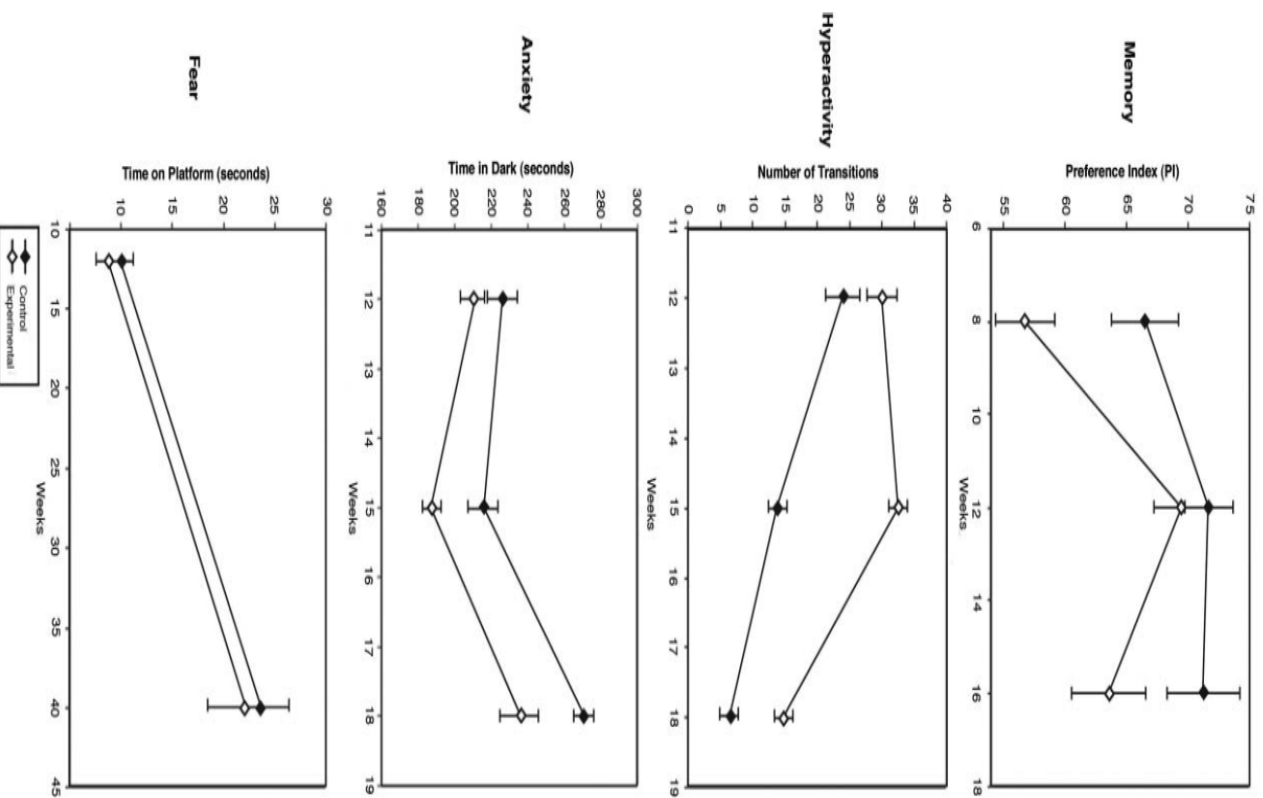


<https://grossessequebec.wordpress.com/>

Fetal Radiofrequency Radiation Exposure From 800-1900 Mhz-Rated Cellular Telephones Affects Neurodevelopment and Behavior in Mice

Tamir S. Aldad^{1,2}, Geliang Gan², Xiao-Bing Gao^{2,3} & Hugh S. Taylor^{1,2,4}

..a growing overload of electromagnetic radiations is adding to chemical toxic burden: here we demonstrate that the fetal exposure to 800–1900 Mhz-rated radio-frequency radiation from cellular telephones leads to behavioral and neurophysiological alterations that persist into adulthood.



Mice exposed during pregnancy had **impaired memory, were hyperactive,** and had increasing **anxiety**, indicating that **in-utero exposure to radiofrequency** is a potential cause of **neurobehavioral disorders.**

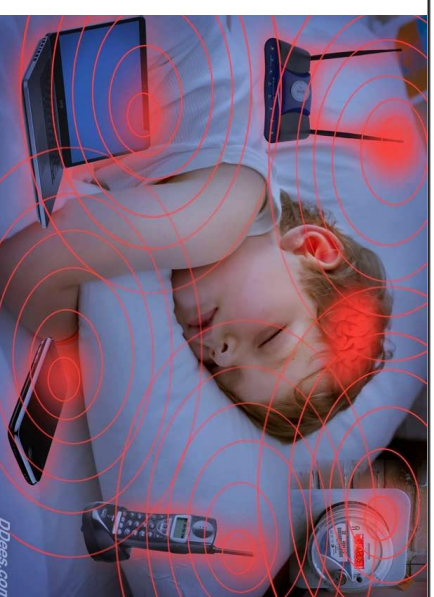
We further demonstrated **impairment of glutamatergic synaptic transmission onto pyramidal cells in the prefrontal cortex** associated with these behavioral changes **supporting a mechanism by which in-utero cellular telephone radiation exposure may lead to the increased prevalence of neurobehavioral disorders.**

Most of the real signals that are in use in mobile communication have not been tested so far. Very little research has been done with real signals and for durations and intermitences of exposure that are relevant to chronic exposures from mobile communication. In some studies, so-called “mobile communication-like” signals were investigated that in fact were different from the real exposures in such important aspects as intensity, carrier frequency, modulation, polarization, duration and intermittence.

The Precautionary Principle should be implemented while new standards are in progress.

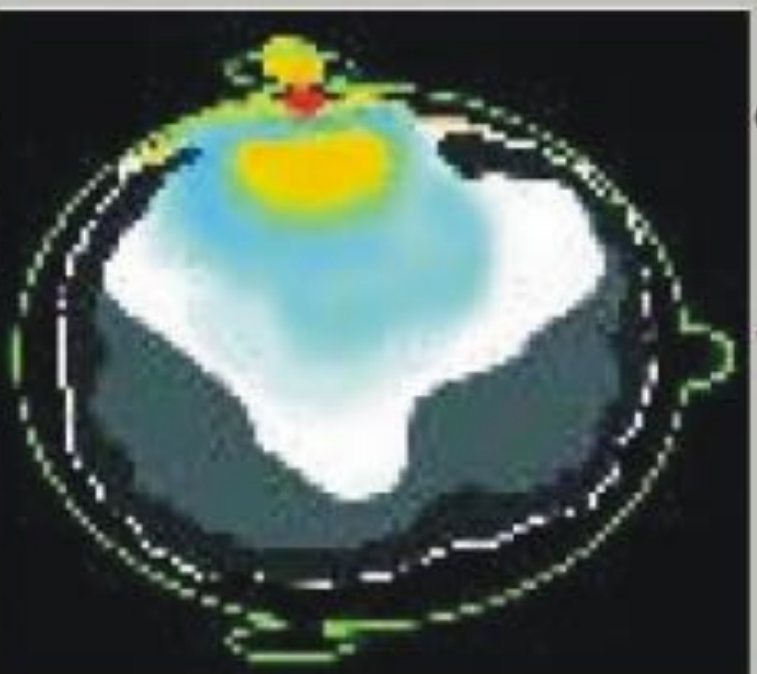
It should be anticipated that some part of the human population, such as children, pregnant women and groups of hypersensitive persons could be especially sensitive to the non-thermal microwave exposures.

(Belyaev, 2012 – Section 15)



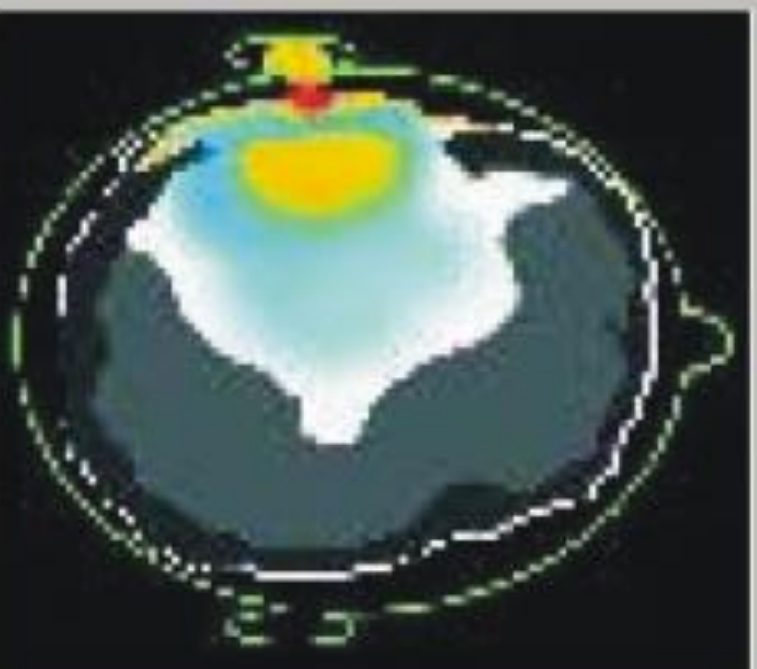
Gandhi O.P., Lazzi G., Furse C.M. (1996 vol.44, p1884-1897) :
Absorption des rayonnements électromagnétiques dans la tête et
le cou humain pour les téléphones mobiles de 835MHz /1900MHz

Degré de pénétration des Radiations du Portable dans le Cerveau



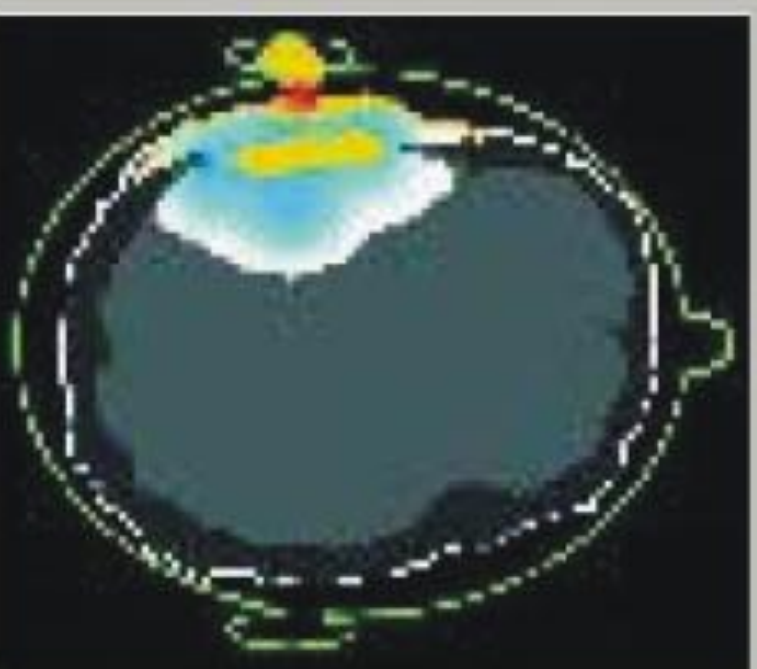
Enfant de 5 ans

Taux d'absorption: 4,49W/kg



Enfant de 10 ans

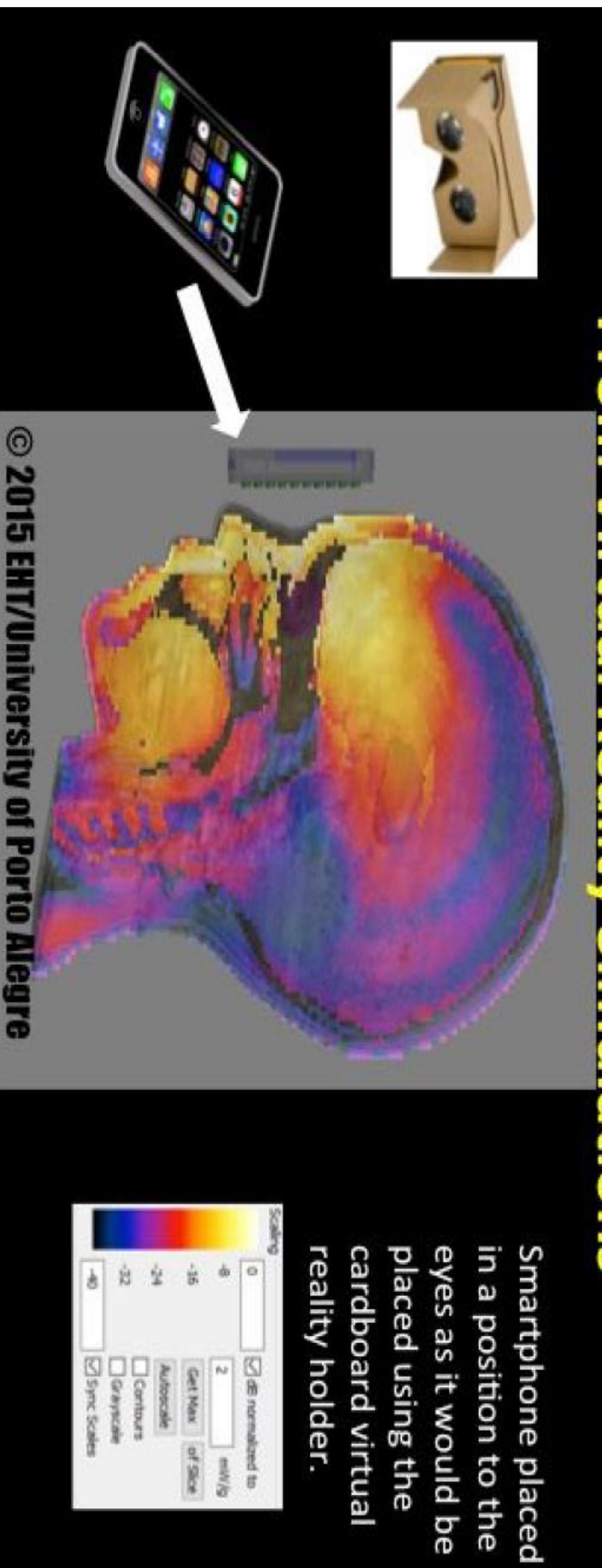
Taux d'absorption: 3,21W/kg



Adulte

Taux d'absorption: 2,93W/kg

Microwave Radiation into the 6 Year Old Child From Virtual Reality Simulations



children absorb proportionately more radiation than adults. "When electrical properties are considered, a child's head's absorption can be over two times greater, and absorption of the skull's bone marrow can be ten times greater than adults "

Om P. Gandhi, L. Lloyd Morgan, Alvaro Augusto de Salles, Yueh-Ying Han, Ronald B. Herberman & Devra Lee Davis Exposure Limits: The underestimation of absorbed cell phone radiation, especially in children [Electromagnetic Biology and Medicine](https://www.tandfonline.com/doi/abs/10.3109/15368378.2011.622827) Volume 31, 2012 - [Issue](https://www.tandfonline.com/doi/abs/10.3109/15368378.2011.622827)



[Child Dev.](#) 2018 Jan;89(1):129-136. doi: 10.1111/cdev.12824

Electromagnetic Fields, Pulsed Radiofrequency Radiation, and Epigenetics: How Wireless Technologies May Affect Childhood Development

Cindy Sage

Sage Associates

Ernesto Burgio

*International Society of Doctors for Environment (ISDE)
Scientific Office*

Mobile phones and other wireless devices that produce electromagnetic fields (EMF) and pulsed radiofrequency radiation (RFR) are widely documented to cause potentially harmful health impacts that can be detrimental to young people. New epigenetic studies are profiled in this review to account for some neurodevelopmental and neurobehavioral changes due to exposure to wireless technologies. Symptoms of retarded memory, learning, cognition, attention, and behavioral problems have been reported in numerous studies and are similarly manifested in autism and attention deficit hyperactivity disorders, as a result of EMF and RFR exposures where both epigenetic drivers and genetic (DNA) damage are likely contributors. Technology benefits can be realized by adopting wired devices for education to avoid health risk and promote academic achievement.

EVIDENCE FOR NEUROLOGICAL EFFECTS (Updated March 2014)

<http://www.bioinitiative.org/>



Two hundred eleven (211) new papers that report on neurological effects of RFR published between 2007 and early 2014 are profiled. Of these, 144 (68%) showed effects and 67 (32%) showed no effects.

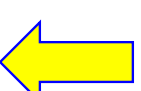
One hundred five (105) new ELF-EMF papers (including two static field papers) that report on neurological effects of ELF-EMF published between 2007 and early 2014 are profiled. Of these, 95 (90%) show effects and 10 (10%) show no effect. (Lai, 2014 – Section 9)

..many studies indicate a relationship between NT MW exposure and permeability of the brain–blood barrier (Nittby et al. 2008), cerebral blood flow (Huber et al. 2005), stress response (Blank and Goodman 2004), neuronal damage (Salford et al. 2003)

Nittby H, et al. *Radiofrequency and extremely low-frequency electromagnetic field effects on the blood-brain barrier*. Electromagn Biol Med. 2008;27(2):103–126

Huber R, et al. *Exposure to pulse-modulated radio frequency electromagnetic fields affects regional cerebral blood flow*. Eur J Neurosci. 2005;21(4):1000–1006

Salford LG, et al. *Nerve cell damage in mammalian brain after exposure to microwaves from GSM mobile phones*. Environ Health Perspect. 2003;111:881–883



THE BLOOD-BRAIN BARRIER IS AT RISK

The BBB is a protective barrier that prevents the flow of toxins into sensitive brain tissue. Increased permeability of the BBB caused by cell phone RFR may result in neuronal damage. Many research studies show that very low intensity exposures to RFR can affect the blood-brain barrier (BBB) (mostly animal studies). Summing up the research, it is more probable than unlikely that non-thermal EMF from cell phones and base stations do have effects upon biology. A single 2-hr exposure to cell phone radiation can result in increased leakage of the BBB, and 50 days after exposure, neuronal damage can be seen, and at the later time point also albumin leakage is demonstrated. The levels of RFR needed to affect the BBB have been shown to be as low as 0.001 W/kg, or less than holding a mobile phone at arm's length. The US FCC standard is 1.6 W/kg; the ICNIRP standard is 2 W/kg of energy (SAR) into brain tissue from cell/cordless phone use. Thus, BBB effects occur at about 1000 times lower RFR exposure levels than the US and ICNIRP limits allow.

(Salford et al, 2012 - Section 10)



If the blood-brain barrier is vulnerable to serious and on-going damage from wireless exposures, then we should perhaps also be looking at the blood-ocular barrier (that protects the eyes), the blood-placenta barrier (that protects the developing fetus) and the blood-gut barrier (that protects proper digestion and nutrition), and the blood-testes barrier (that protects developing sperm) to see if they too can be damaged by RFR.

<http://www.bioinitiative.org/>

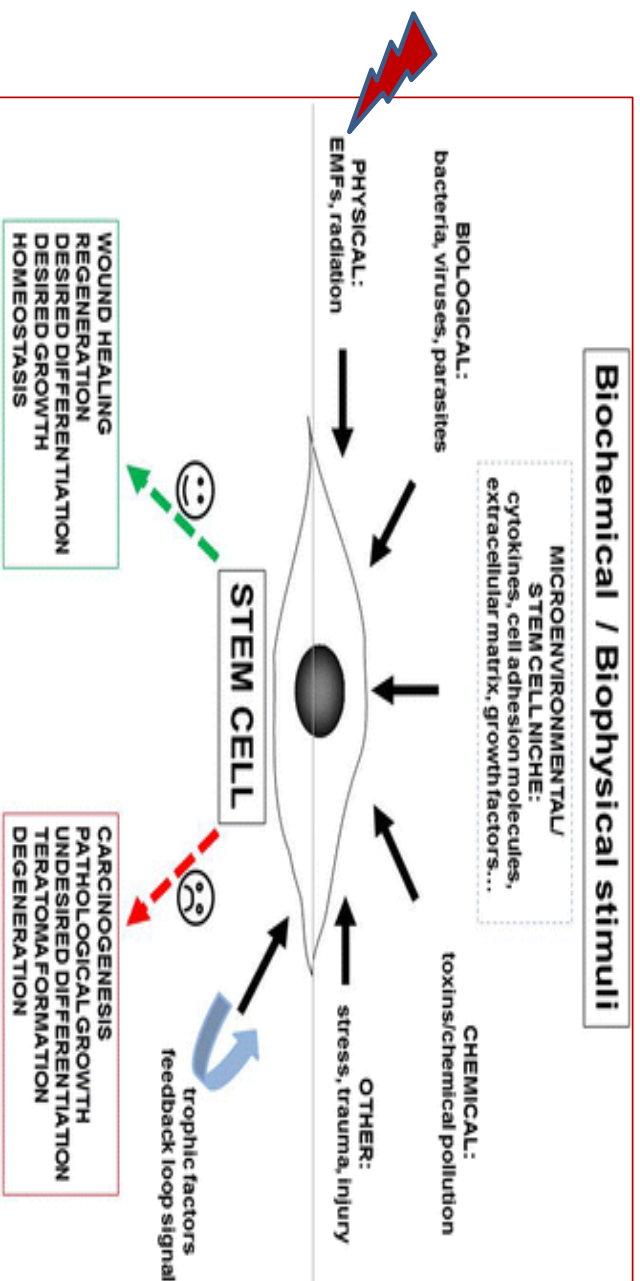


Belyaev et al [2010] reported that **915 MHz microwave exposure** significantly affects human **stem cells**

“The strongest microwave effects were always observed in stem cells. This result may suggest both **significant imbalance in DSB repair, and severe stress response.**

Our findings that **stem cells are the most sensitive to microwave exposure, and react to more frequencies than do differentiated cells** may be important for **cancer risk assessment** and indicate that **stem cells are the most relevant cellular model for validating safe mobile communication signals.**”

Belyaev I, Markova E, Malmgren L. [2010] *Microwaves from Mobile Phones Inhibit 53BP1 Focus Formation in Human Stem Cells Stronger than in Differentiated Cells: Possible Mechanistic Link to Cancer Risk.* Environ Health Perspect. 118(3): 394–399



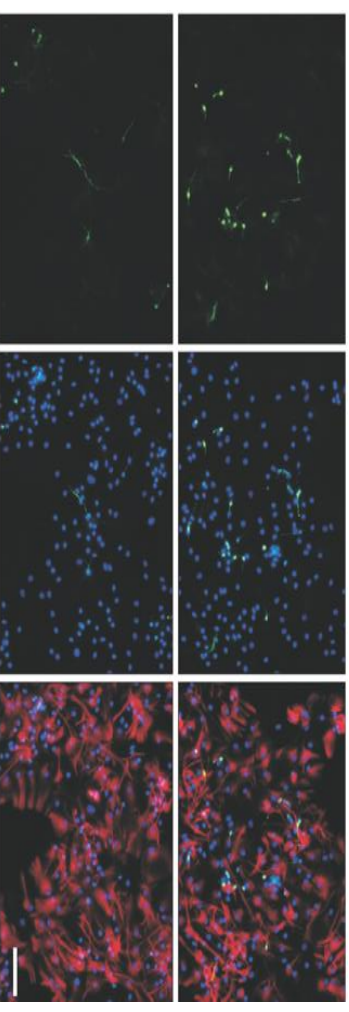
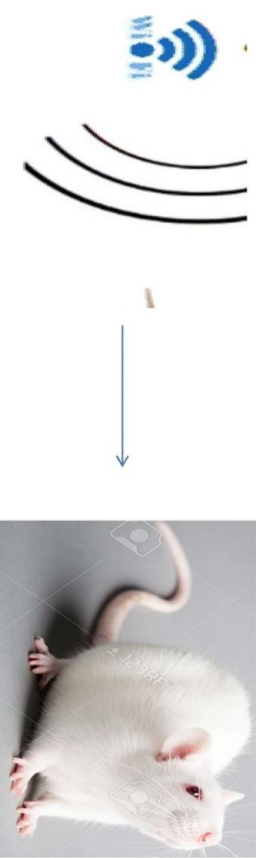
Possible biochemical/biophysical stimuli affecting adult stem cells within the body that lead to physiological or pathological processes. The stimuli may lead towards **positive, life-supporting processes (wound healing, regeneration, homeostasis)** or **negative, life-suppressing processes (carcinogenesis, degeneration).**

Effetti sullo sviluppo del sistema nervoso

In uno studio su **cellule nervose embrionali e staminali murine**, l'esposizione a 1800 MHz RF-EMF a 4 W / kg per 3 giorni (SAR) ha determinato **espressione ridotta dei geni pro-neuronali Ngn1 e NeuroD** **inibendo lo sviluppo dei neuriti** in neuroni differenziati...

In un modello murino di cellule staminali neurali, l'esposizione prolungata a GSM 900-MHz RF-EMF ha marcatamente **diminuito la proliferazione delle cellule staminali e la differenziazione cellulare in neuroni, con effetti "devastanti" sulla neurogenesi** (secondo gli stessi autori dello studio)

C. Chen, Q. Ma, C. Liu, P. Deng, G. Zhu, L. Zhang, M. He, Y. Lu, W. Duan, L. Pei, M. Li, Z. Yu, Z. Zhou
Exposure to 1800 MHz radiofrequency radiation impairs neurite outgrowth of embryonic neural stem cells
Sci. Rep., 4 (2014), p. 5103

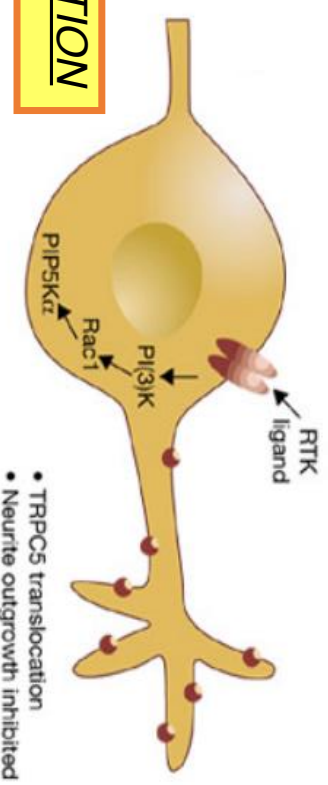


M. Eghlidospour, A. Ghanbari, S.M.J. Mortazavi, H. Azari
Effects of radiofrequency exposure emitted from a GSM mobile phone on proliferation, differentiation, and apoptosis of neural stem cells
Anat. Cell Biol., 50 (2017), pp. 115-123

Chen C, Ma Q, Liu C, Deng P, Zhu G, Zhang L, He M, Lu Y, Duan W, Pei L, Li M, Yu Z, Zhou Z **Exposure to 1800 MHz radiofrequency radiation impairs neurite outgrowth of Embryonic neural stem cells.** Sci Rep. 2014 May 29;4:5103

A radiofrequency electromagnetic field (RF-EMF) of 1800 MHz is widely used in mobile communications. However, the effects of RF-EMFs on cell biology are unclear. Embryonic neural stem cells (eNSCs) play a critical role in brain development. Thus, detecting the effects of RF-EMF on eNSCs is important for exploring the effects of RF-EMF on brain development. We exposed eNSCs to 1800 MHz RF-EMF at specific absorption rate (SAR) values of 1, 2, and 4 W/kg for 1, 2, and 3 days. We found that 1800 MHz RF-EMF exposure did not influence eNSC apoptosis, proliferation, cell cycle or the mRNA expressions of related genes. RF-EMF exposure also did not alter the ratio of eNSC differentiated neurons and astrocytes. However, **neurite outgrowth of eNSC differentiated neurons was inhibited after 4 W/kg RF-EMF exposure for 3 days. Additionally, the mRNA and protein expression of the proneural genes Ngn1 and NeuroD, which are crucial for neurite outgrowth, were decreased after RF-EMF exposure.** The expression of their inhibitor Hes1 was upregulated by RF-EMF exposure. These results together suggested that **1800 MHz RF-EMF exposure impairs neurite outgrowth of eNSCs. More attention should be given to the potential adverse effects of**

RF Disturbing the CONNECTOME INSTRUCTION



Ma Q, Deng P, Zhu G, Liu C, Zhang L, Zhou Z, Luo X, Li M, Zhong M, Yu Z, Chen C, Zhang Y

Extremely low-frequency electromagnetic fields affect transcript levels of

Neuronal differentiation-related genes in embryonic neural stem cells.

PLoS One 2014 Mar 3;9(3):e90041. doi: 10.1371/journal.pone.0090041. eCollection 2014.

Previous studies have reported that extremely low-frequency electromagnetic fields (ELF-EMF) can affect the processes of brain development, but the underlying mechanism is largely unknown. The proliferation and differentiation of embryonic neural stem cells (eNSCs) is essential for brain development during the gestation period. To date, there is no report about the effects of ELF-EMF on eNSCs. In this paper, we studied the effects of ELF-EMF on the proliferation and differentiation of eNSCs. Primary cultured eNSCs were treated with 50 Hz ELF EMF; various magnetic intensities and exposure times were applied.

Our data showed that there was no sign

Disturbing the *CONNECTOME INSTRUCTION*

viability (CCK-8 assay), DNA synthesis (Ed

distribution (flow cytometry) and transcript levels of cell cycle related genes (P53, P21 and GADD45

detected by real-time PCR). **When eNSCs were induced to differentiation, real-time PCR results showed a down regulation of Sox2 and up-regulation of Math1, Math3, Ngn1 and Tuj1 mRNA levels after 50 Hz ELF EMF exposure (2 mT for 3 days),** but the percentages of neurons (Tuj1 positive cells) and astrocytes (GFAP

positive cells) were not altered when detected by immunofluorescence assay.

Although cell proliferation and the percentages of neurons and astrocytes

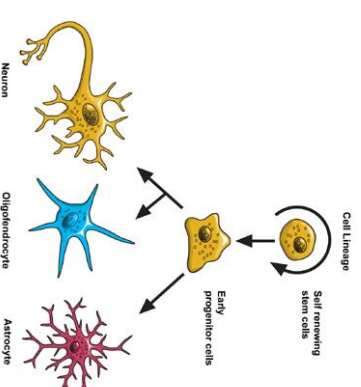
differentiated from eNSCs were not affected by 50 Hz ELF-EMF, **the expression**

of genes regulating neuronal differentiation was altered.

In conclusion, our results support that 50 Hz ELF-EMF induce molecular

changes during eNSCs differentiation, which might be compensated

by post-transcriptional mechanisms to support cellular homeostasis.



Deshmukh PS¹, Nasare N², Megha K¹, Banerjee BD³, Ahmed RS¹, Singh D¹, Abegaonkar MP⁴, Tripathi AK¹, Mediratta PK⁵. **Cognitive Impairment and Neurogenotoxic Effects in Rats Exposed to Low-Intensity Microwave Radiation** Int J Toxicol. 2015 Mar 5. pii: 1091581815574348

The health hazard of microwave radiation (MWR) has become a recent subject of interest as a result of the enormous increase in mobile phone usage. The present study aimed **to investigate the effects of chronic low-intensity microwave exposure** on cognitive function, heat shock protein 70 (HSP70), and DNA damage in rat brain. Experiments were performed on male Fischer rats **exposed to MWR for 180 days at 3 different frequencies, namely, 900, 1800 MHz, and 2450 MHz.** Animals were divided into 4 groups: group I: sham exposed; group II: exposed to MWR at 900 MHz, specific absorption rate (SAR) 5.953×10^{-4} W/kg; group III: exposed to 1800 MHz, SAR 5.835×10^{-4} W/kg; and group IV: exposed to 2450 MHz, SAR 6.672×10^{-4} W/kg. **All the rats were tested for cognitive function at the end of the exposure period and were subsequently sacrificed to collect brain.** Level of HSP70 was estimated by enzyme-linked immunotarget assay and DNA damage was assessed using alkaline comet assay in all the groups.

The results showed **declined cognitive function, elevated HSP70 level, and DNA damage in the brain of microwave-exposed animals.** The results indicated that, **chronic low-intensity microwave exposure in the frequency range of 900 to 2450 MHz** may cause hazardous effects on the brain.



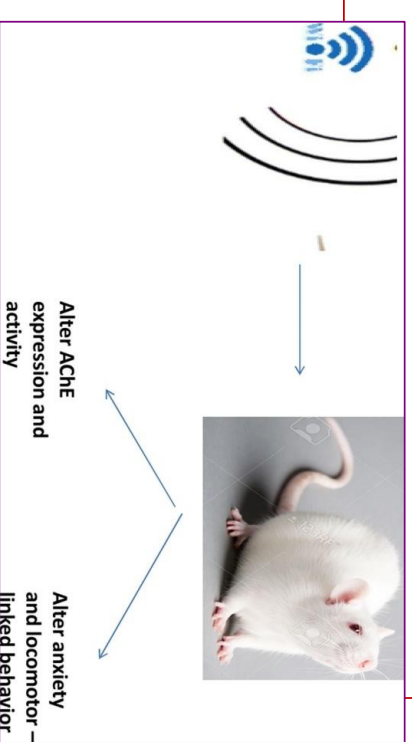
Li HJ et al. **Alterations of cognitive function and 5HT system in rats after long term microwave exposure** Physiol Behav. 2015 Mar 1;140:236-46

The increased use of microwaves raises concerns about its impact on health including cognitive function in which neurotransmitter system plays an important role...

We demonstrated that **chronic exposure to microwave (2.856GHz, with the average power density of 5, 10, 20 and 30mW/cm²) could induce close-dependent deficit of spatial learning and memory in rats accompanied with inhibition of brain electrical activity, the degeneration of hippocampus neurons, and the disturbance of neurotransmitters, among which the increase of 5-HT** occurred as the main long-term change that the decrease of its metabolism partly contributed to.

Besides, the variations of 5-HT1AR and 5-HT2CR expressions were also indicated.

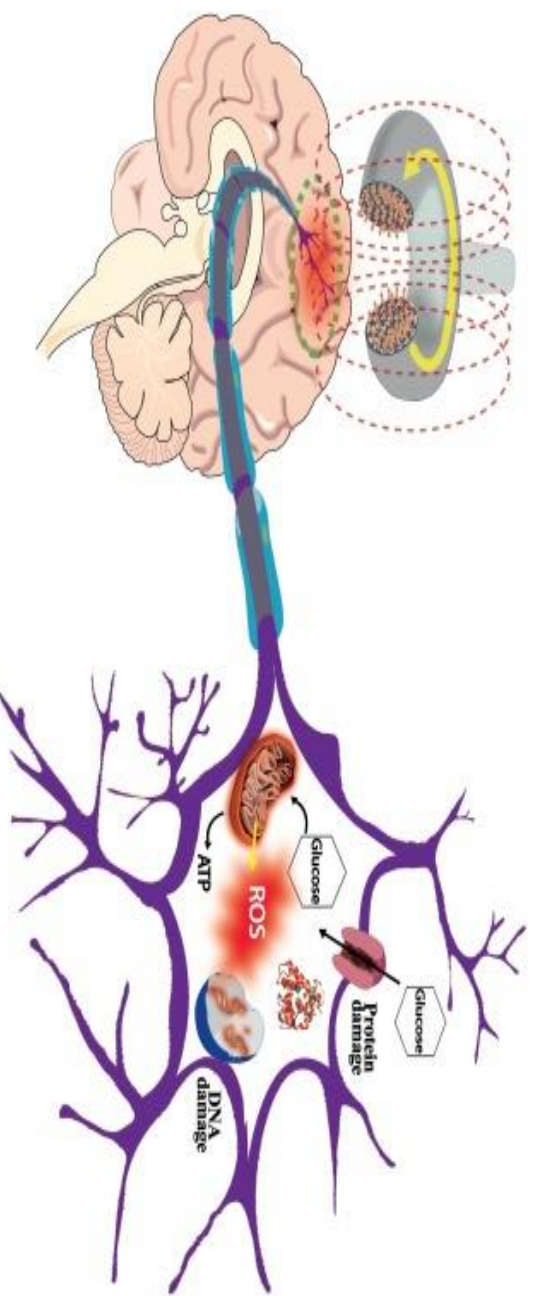
The results suggested that **in the long-term way, chronic microwave exposure could induce cognitive deficit and 5-HT system may be involved in it**



Effects of electromagnetic fields exposure on the antioxidant defense system

Elifde Gizem Kivrak *, Kiyimet Kübra Yurt, Arife Ahsen Kaplan, Işınsu Alkan, Gamze Altun

Reactive oxygen species (ROS) generated by the effects of exposure to EMF can damage various cellular structures in neurons of the central nervous system



Le specie reattive dell'ossigeno generate dall'esposizione ai campi elettromagnetici possono **danneggiare varie strutture cellulari nei neuroni** del sistema nervoso centrale



Disturbi del sonno

Sleep Disturbances

- **Disrupted sleep is one common result of frequent smartphone use**
– especially later in the day.
- Looking at your phone at night is terrible for your brain. **Smartphone screens emit bright blue light.** At night, your brain gets confused by that light, because it mimics the brightness of the sun.
- This causes your brain to **stop producing melatonin**, a hormone that gives your body the “time to sleep” signal. **Smartphone light can disrupt your sleep cycle**, making it harder to fall and stay asleep.



- **Il sonno interrotto è un risultato comune dell'uso frequente di *smartphone* in specie nelle ore tarde della giornata.**
- **Ma soprattutto, guardare il telefonino di notte è molto dannoso per il cervello.**
Gli schermi degli *smartphone* emettono una luce blu brillante.
- Di notte, il cervello viene confuso da quella luce, perché imita la luminosità del sole, per cui smette di produrre melatonina, un ormone che dà al tuo corpo i segnali del "tempo di dormire". Così la luce dello *smartphone* **disturba il ciclo del sonno.**

How exposure to blue light affects your brain and body

BY DISRUPTING MELATONIN, SMARTPHONE LIGHT RUINS SLEEP SCHEDULES. THIS LEADS TO ALL KINDS OF HEALTH PROBLEMS:

The disruption to your sleep schedule might leave you distracted and impair your **MEMORY** the next day.



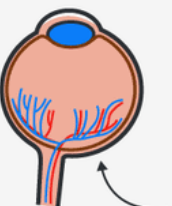
A poor night's sleep caused by smartphone light can make it **HARDER TO LEARN.**



Over the long term, not getting enough sleep can lead to **NEUROTOXIN** buildup that makes it even harder for you to get good sleep.



There's some evidence that blue light could damage our vision by harming the **RETINA** over time – though more research is needed.



Researchers are investigating whether or not blue light could lead to **CATARACTS.**



There's a connection between light exposure at night and the disturbed sleep that come with it and an increased risk of breast and prostate **CANCERS.**



People whose melatonin levels are suppressed and whose body clocks are thrown off by light exposure are more prone to **DEPRESSION.**



By disrupting melatonin and sleep, smartphone light can also mess with the hormones that control hunger, potentially increasing **OBESITY RISK.**



SOURCES: Nature Neuroscience; Harvard Health Publications; ACS; Sleep Med Rev; American Macular Degeneration Foundation; European Society of Cataract and Refractive Surgeons; JAMA Neurology

TECH INSIDER

Adolescents' Electronic Media Use at Night, Sleep Disturbance, and Depressive Symptoms in the Smartphone Age

Sakari Lemola · Nadine Perkinson-Gloor ·
Serge Brand · Julia F. Dewald-Kaufmann ·
Alexander Grob

Adolescence is a time of increasing vulnerability for poor mental health, including depression.

Sleep disturbance is an important risk factor for the development of depression during adolescence.

Excessive electronic media use at night is a risk factor for both adolescents' sleep disturbance and depression.



Ridotte attenzione e produttività

Reduced Productivity and Attention

- Another downside of smartphones is that they can negatively affect your productivity and attention span at work or school. Experiments found that people performed more poorly on tasks requiring focus when they received a text notification or a phone call during the task – even if they didn't interact with their phone. Researchers determined:
- When the notifications broke their concentration, the subjects had more incorrect answers and were more likely to make rapid guesses. Subjects who received notification of a call — even if they didn't pick it up — were three times likelier to make mistakes.”
- Other research has even found that medium to heavy multiple and simultaneous media users have less grey matter in an area of the brain responsible for attention control. These users also had higher anxiety, depression, insomnia, and impulsivity.

- Un altro aspetto negativo degli smartphone è che **possono influenzare negativamente la produttività e l'attenzione al lavoro o a scuola.**

- I soggetti che hanno ricevuto la notifica di una **chiamata - anche se non l'hanno raccolta - sono stati tre volte più propensi a commettere errori.**

- Altre ricerche hanno persino scoperto che gli utenti eccessivi di più *media* hanno **meno materia grigia in un'area del cervello responsabile del controllo dell'attenzione e presentano ansia, depressione, insonnia e impulsività.**

Stress relazionale

Relationship Stress

- We may think that our phones are bringing us closer to our dear ones, but they can actually have the opposite effect.
- Checking your phone when you are eating dinner with your family or on a date with your partner, takes your attention away from being present with them.
- When you are overly attached to your phone, your relationships and friendships can suffer. A cell phone habit can cause conflict, negativity and social isolation leading to mental stress.
- Excessive smartphone usage can put your personal and professional relationships at risk.

- Potremmo pensare che i nostri telefoni ci possano avvicinare ai nostri cari, ma in realtà possono avere l'effetto opposto: **controllare il telefono quando si cena con la famiglia o nel corso di un appuntamento con il proprio partner, distoglie dall'essere presenti con loro.** Quando sei **troppo attaccato al telefono, i tuoi rapporti e le amicizie possono soffrirne.** L'abitudine al cellulare può causare **conflitti, negatività e isolamento sociale** che portano allo **stress mentale.**
- Così l'uso eccessivo di smartphone può mettere a **rischio i tuoi rapporti personali e professionali.**

Ansia

- Anxiety
- Research is showing that your mobile phone can cause anxiety.
- Some people experience intense anxiety when separated from their phones. Some even exhibit withdrawal-like symptoms if they can't check it.
- One study determined that:
 - Overuse of wireless mobile devices (WMDs) may be associated with a form of psychological dependency, of which a prominent feature may be anxiety arising from separation from these devices. College students, who are among the most avid consumers of WMDs, might be susceptible to the negative effects of WMD overuse



- La ricerca dimostra che alcuni provano **un'intensa ansia se separati dai loro telefoni**. Alcuni manifestano **sintomi simili all'astinenza** se non possono controllare il telefonino.
- Uno studio ha dimostrato che l'uso eccessivo di dispositivi mobili wireless può essere associato a una forma di **dipendenza psicologica**, di cui una caratteristica importante potrebbe essere l'**ansia derivante dalla separazione** da questi dispositivi.
- Gli **studenti universitari, che sono tra i più accaniti consumatori**, potrebbero essere i più suscettibili agli effetti negativi dell'uso eccessivo



Depressione

Depression

- The science is overwhelming linking *smartphone* use to rising **depression and suicide rates**, especially among teens.
- One study, found that **teenagers who are glued to their smartphones are significantly less happy**. Researchers determined that teenagers who excessively used on-screen devices exhibited lower levels of happiness than teenagers who spent more time engaging in non-screen activities.
- However, **having no interaction with digital screen devices didn't lead to happiness either**. **The happiest teenagers found a sweet spot of using digital media for about an hour per day.**

- Gli studi che collegano **l'uso degli smartphone all'aumento della depressione** e dei tassi di suicidio, specialmente tra gli adolescenti, sono ormai strabordanti.
- Uno studio, ha rilevato che gli adolescenti che sono incollati ai loro smartphone sono molto meno felici.
- Tuttavia, **non avere alcuna interazione con i dispositivi dello schermo digitale non rende di per sé felici**: sembra anzi che **gli adolescenti più felici sono quelli che hanno livelli intermedi di utilizzo dei media digitali (intorno a un'ora al giorno)**.



ELSEVIER



Review

Microwave frequency electromagnetic fields (EMFs) produce widespread neuropsychiatric effects including depression

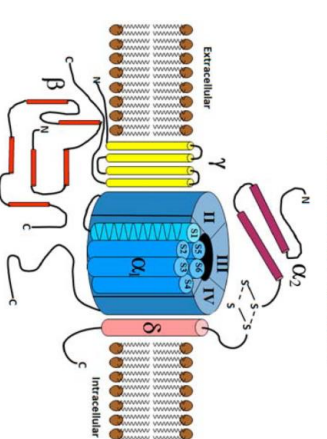
Martin L. Pall

Professor Emeritus of Biochemistry and Basic Medical Sciences, Washington State University, 638 NE 41st Avenue, Portland, OR 97232-3312, USA

- Microwave **EMFs activate voltage-gated Ca₂₊ channels (VGCCs) concentrated in the brain.**
- VGCC activity causes **widespread neuropsychiatric effects** in humans (genetic studies)
- **26 studies have EMFs assoc. with neuropsychiatric effects; 5 criteria show causality.**
- MWV EMFs cause at least 13 neuropsychiatric effects including depression in humans
- **Animal studies show such low level MWV EMFs have diverse high impacts in the brain.**



VOLTAGE-GATED CALCIUM CHANNELS



I CEM a microonde attivano i canali voltaggio-dipendenti del Ca₂₊ + (VGCC) concentrati nel cervello e possono avere effetti neuropsichiatrici nell'uomo (cfr.: studi genetici). 26 studi hanno associati i CEM a effetti neuropsichiatrici (5 di questi dimostrando rapporti di causalità) tra cui la depressione



The unmet needs in diagnosis and treatment of mood disorders in children and adolescents

Mood disorders in children and adolescents: an epidemiologic perspective

Ronald C Kessler ^{a, R}, Shelli Avenevoli ^b, Kathleen Ries Merikangas ^b

Adolescence is a time of increasing vulnerability for severe mental health disorders such as depression.

Epidemiological studies show that the **incidence of new cases of depression drastically increases with puberty..**

Importantly, there is growing evidence that **sleep disturbance in adolescence may predict the development of depression**.. In addition to the increase in the prevalence of depression with the transition from childhood to adolescence, **there is also a secular trend of an increasing incidence of depression during adolescence since the 1960s**

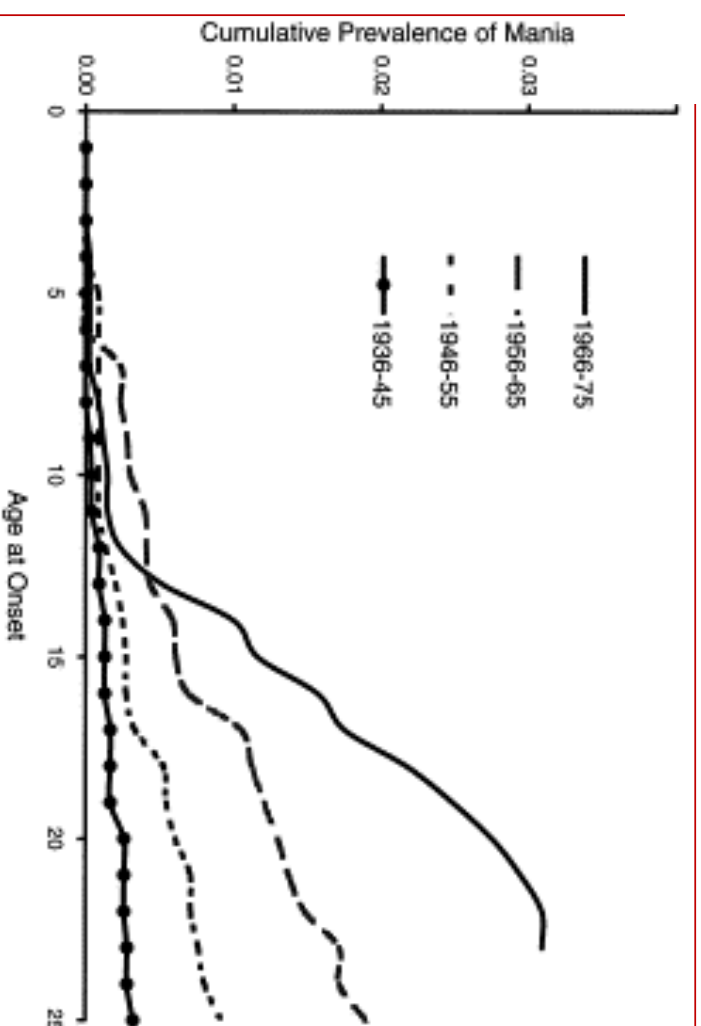




Image Credit: istockphoto.com/Wavebreakmedia

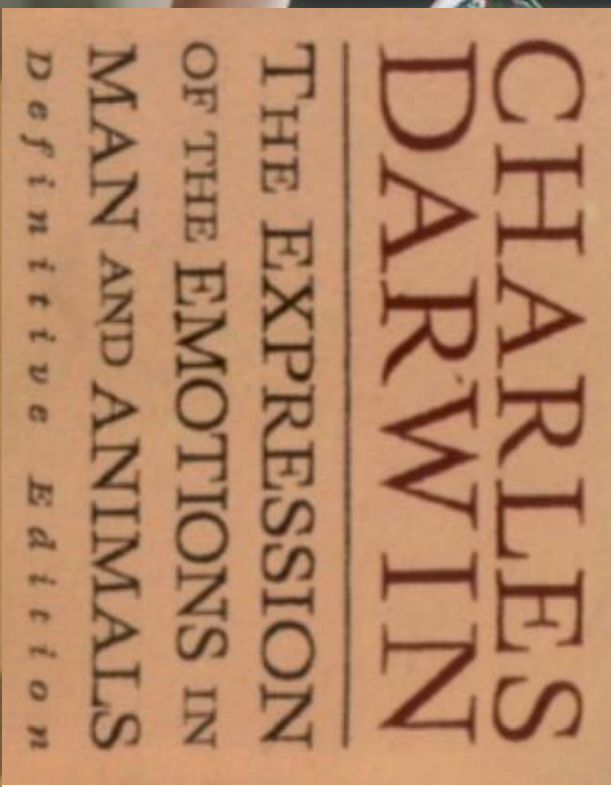
Apple says that iPhone users unlock their phones 80 times a day. Even worse, research firm Dscout found that we tap, type and swipe our smartphones more than 2,600 times a day, on average. The majority of us check in front of our kids, during meetings, while we eat and while we should be sleeping.

<https://www.thebestbrainpossible.com/phone-mental-health-depression-anxiety-addiction/>

Apple afferma che **gli utenti di iPhone sbloccano i loro telefoni 80 volte al giorno.**

Ancora peggio, la società di ricerca Dscout ha scoperto che, **in media, picchiettiamo, digitiamo e facciamo scorrere i nostri smartphone 2.600 volte al giorno.**

La maggior parte di noi li controlla **di fronte ai bambini, durante le riunioni, mentre mangiamo e mentre dovremmo dormire.**



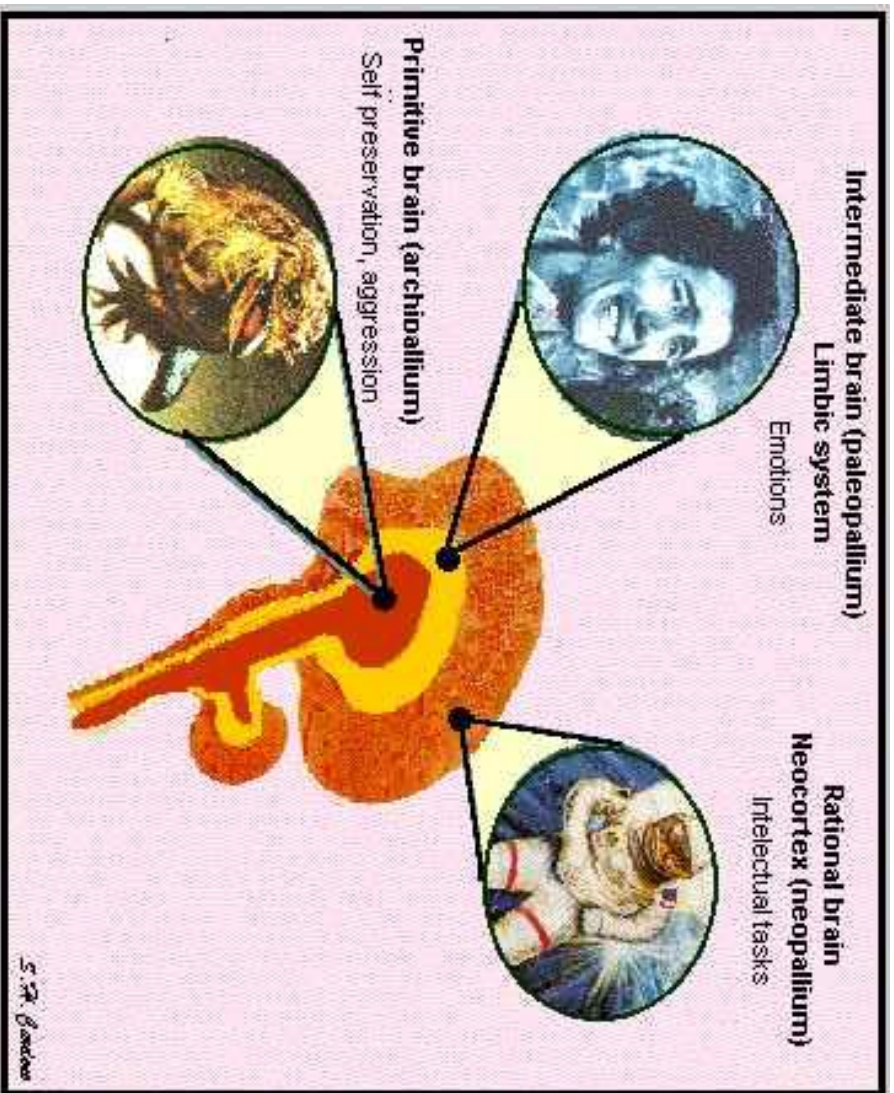
The emotion centre is the oldest part of the human brain: why is mood so important?

The emotion centre is the oldest part of the human brain: why is mood so important?

Genevieve Rayner, *Florey Institute of Neuroscience and Mental Health*

Many regions fundamental to mood are buried deep in the most primordial parts of the brain; that is, they are thought to have been among **the first to develop in the human species.** This is probably because mood is evolutionarily important. **The limbic system is the major primordial brain network underpinning mood. It's a network of regions that work together to process and make sense of the world.** Being so old, however, **the limbic system is rather primitive. In day-to-day life it's controlled by some newer networks that co-ordinate how we think and act,** so our behaviour is conducive to achieving longer-term goals, rather than always going wherever the mood takes us.

<http://yourbrainhealth.com.au/brain-process-emotions/>

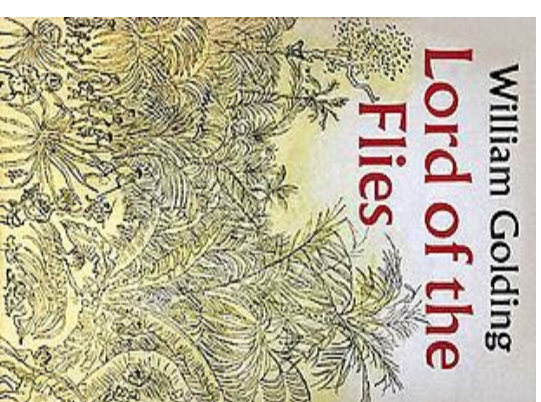


Nurture
Culture

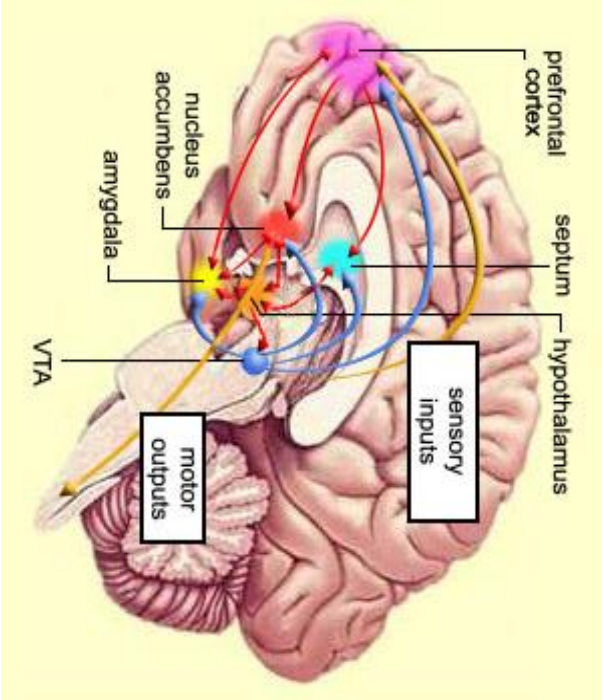
WAR
HOLOCAUST

The Ghost in the Machine is a book written by [Arthur Koestler](#) and published in 1967. One of the book's central concepts is that - as the human **trine brain** has evolved, it has retained and **built upon earlier, more primitive brain structures**. - The **head portion** of the "**ghost in the machine**" has, as a consequence of **poor, inadequate connections, a rich potential for conflict**

The Lucifer Principle is a book by [Howard Bloom](#). It sees a social group, not an individual, as a main subject of human evolution. It "explores the **intricate relationships among genetics, human behavior, and culture**" and argues that "**evil is a by-product of nature's strategies for creation and that it is woven into our most basic biological fabric**"

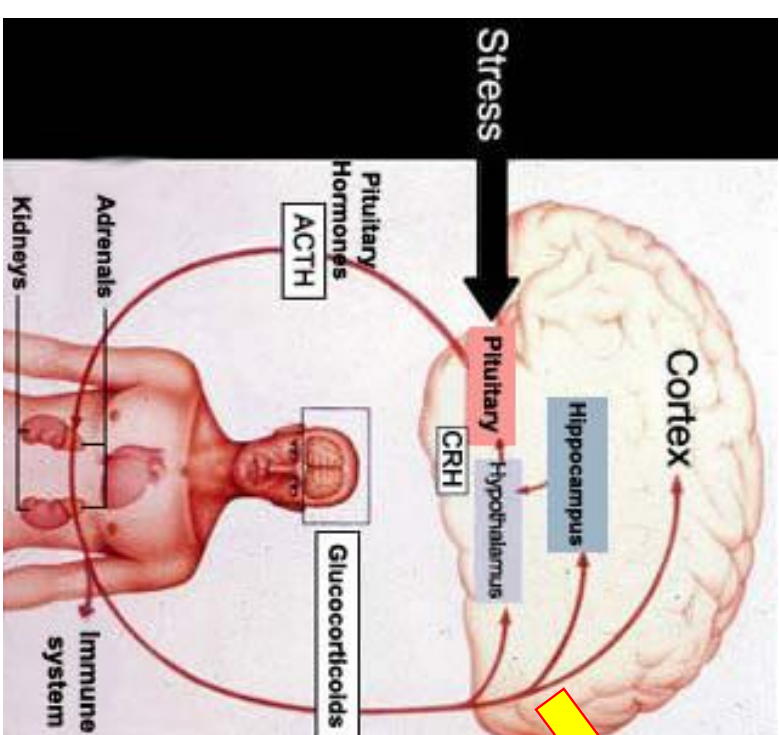


THE PLEASURE CENTRES



Ventral Tegmental Area

WHEN FEAR TAKES THE CONTROLS



DEPRESSION

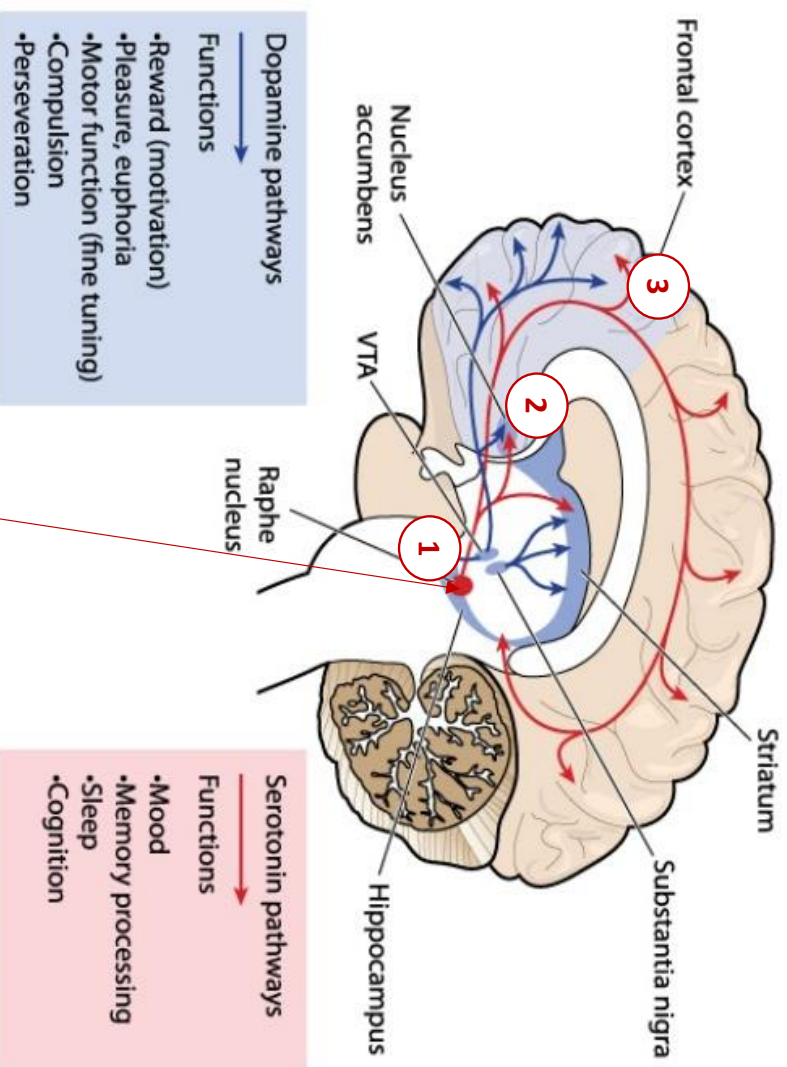


Inseguendo la Dopamina

Chasing Dopamine

- **La dipendenza e la smania** - per il telefonino o altro - dipendono da una complessa interazione di sostanze chimiche del cervello, *in primis* la **dopamina**, un neurotrasmettitore responsabile della **motivazione e del comportamento alla ricerca di ricompense**, ed **essenziale per il cambiamento neuroplastico** (che consente il **formarsi di un'abitudine o di una dipendenza**).
Ogni volta che il tuo telefono suona, e lo controlli per vedere un testo, un mi piace o un messaggio, il tuo cervello ti premia con una dose di dopamina.
- **Col passare del tempo, la dopamina viene rilasciata sempre più precocemente e ogni telefonata provoca un'impennata della dopamina.**
La dopamina che precede l'azione **motiva l'utente creando la necessità e l'urgenza di agire. Si determina così la necessità di controllare e utilizzare il telefono sempre di più per ottenere la stessa risposta cerebrale.** Questo comportamento di **ricerca della ricompensa** fa perdere interesse in altre attività...

Il Sistema di ricompensa del cervello (la via della dopamina)



1 Area tegmentale ventrale - nel mesencefalo: produce dopamina e fa parte di una delle quattro principali vie della dopamina nel cervello - **attivata da droghe tra cui nicotina, alcol e oppioidi** (es.: eroina).

2 Nucleo accumbens - Una piccola regione del proencefalo dalle antiche origini evolutive, che aiuta a regolare le **pulsioni di sopravvivenza come il cibo e la sete**, attivato da droghe come cocaina, anfetamina, cannabinoidi (es. Cannabis) e oppiacei

3 Corteccia prefrontale - Parte del lobo frontale che è **coinvolta in molte funzioni cognitive**, tra cui **memoria, linguaggio, pianificazione e processi decisionali**




REVIEW

Open Access



Radiations and male fertility

Kavindra Kumar Kesari¹, Ashok Agarwal^{2*}  and Ralf Henkel³

During recent years, an increasing percentage of male infertility has to be attributed to an array of environmental, health and lifestyle factors. Male infertility is likely to be affected by the intense exposure to heat and extreme exposure to pesticides, radiations, radioactivity and other hazardous substances. We are surrounded by several types of ionizing and non-ionizing radiations and both have recognized causative effects on spermatogenesis. Since it is impossible to cover all types of radiation sources and their biological effects under a single title, this review is focusing on radiation deriving from cell phones, laptops, Wi-Fi and microwave ovens, as these are the most common sources of non-ionizing radiations, which may contribute to the cause of infertility by exploring the effect of exposure to radiofrequency radiations on the male fertility pattern. From currently available studies it is clear that radiofrequency electromagnetic fields (RF-EMF) have deleterious effects on sperm parameters (like sperm count, morphology, motility), affects the role of kinases in cellular metabolism and the endocrine system, and produces genotoxicity, genomic instability and oxidative stress. This is followed with protective measures for these radiations and future level of research evidences

Dagli studi attualmente disponibili è chiaro che **i campi elettromagnetici a radiofrequenza (RF-EMF) hanno effetti deleteri sui parametri dello sperma (conta spermatica, morfologia, motilità)**, influenzano il ruolo delle chinasi nel metabolismo cellulare e nel sistema endocrino e producono **genotossicità, genomica instabilità e stress ossidativo**....

.. sulla base delle evidenze disponibili da studi *in vitro* e *in vivo* questo studio conclude che l'esposizione prolungata e frequente a RF-EMFs può indurre uno **stress ossidativo** che può portare alla **sterilità**.

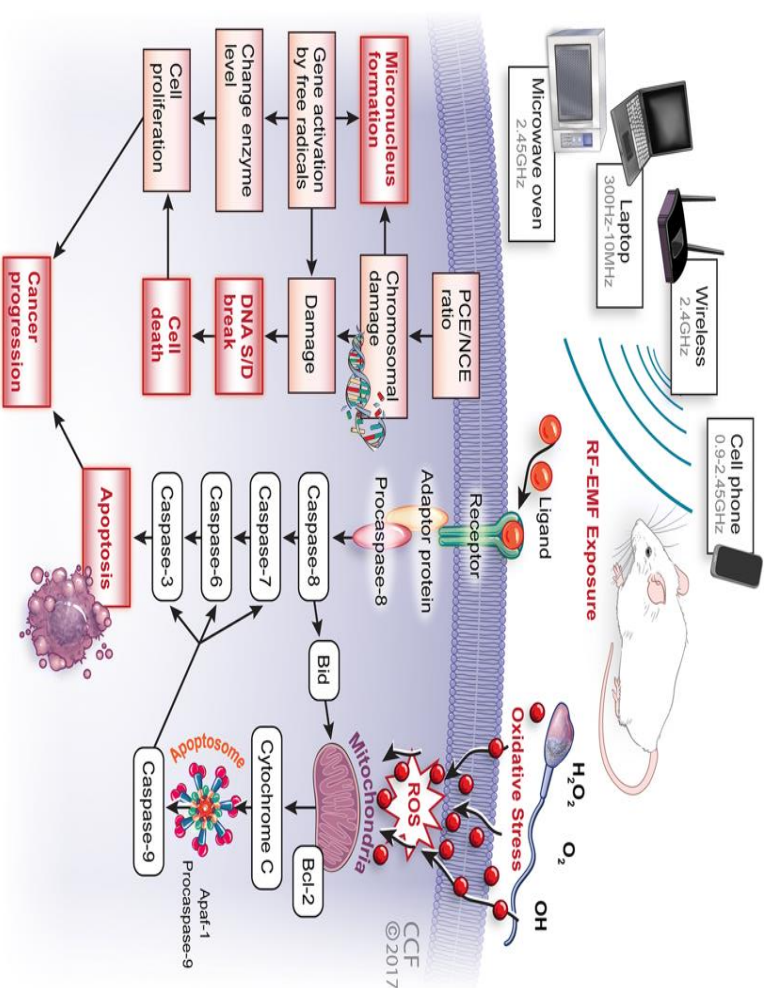
Una recente revisione ha identificato **21:27 studi che documentano gli effetti negativi dell'esposizione a RF-EMF sulla funzione spermatica (motilità degli spermatozoi, aumento della produzione di specie reattive dell'ossigeno, riduzione dei livelli di antiossidanti, danni al DNA)** (B.J. Houston, B. Nixon, B.V. King, G.N. De Lullis, R.J. Aitken The effects of radiofrequency electromagnetic radiation on sperm function Reproduction, 152 (2016), pp. R263-R276

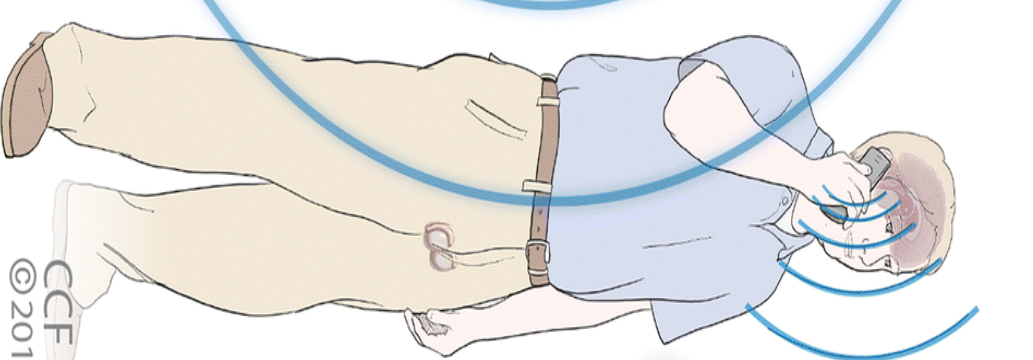
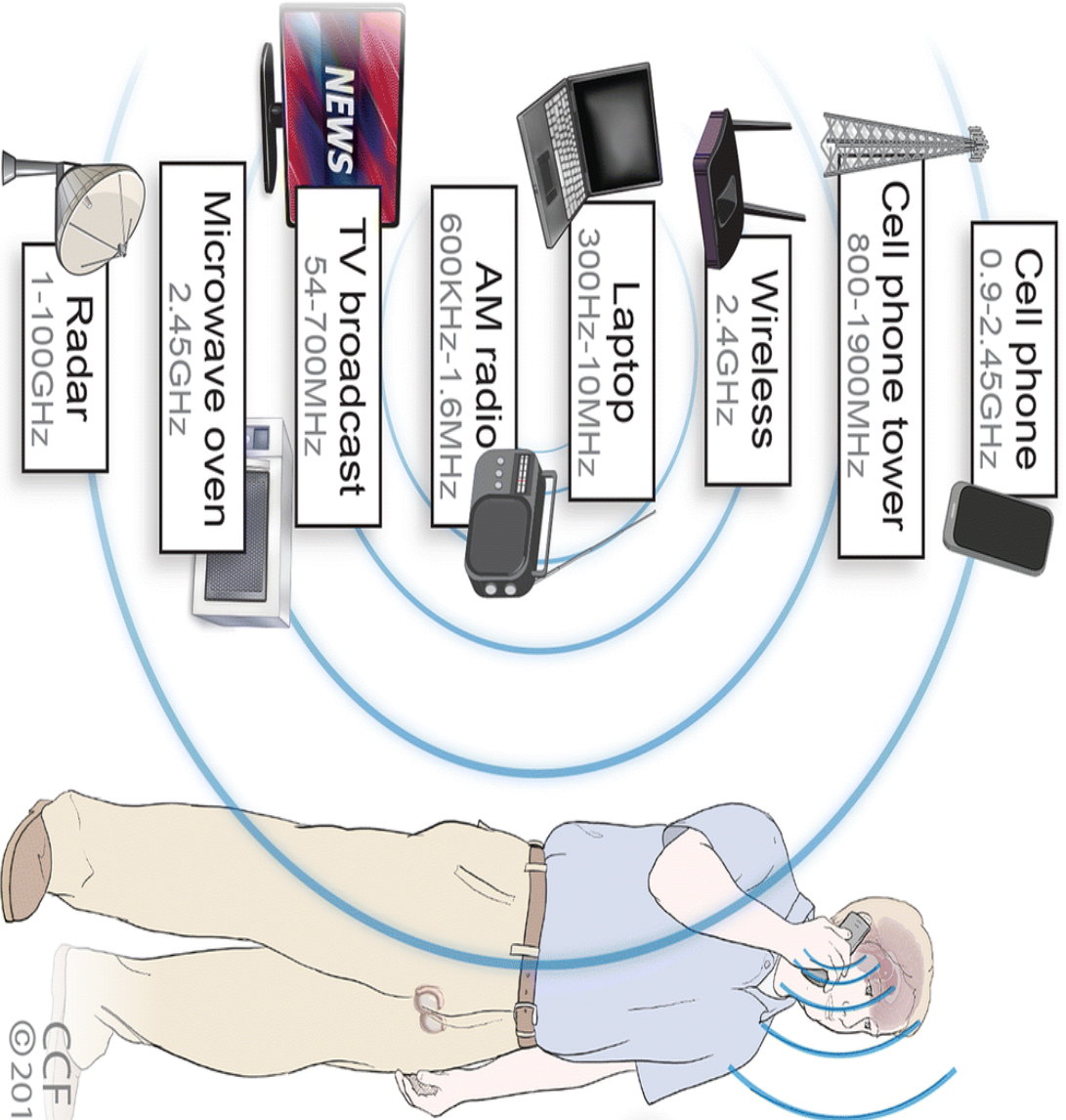
Gli stessi autori hanno recentemente dimostrato che l'esposizione a RF-EMR a 0,15 W / kg per 3 ore ha indotto una **significativa frammentazione del DNA negli spermatozoi** ... accompagnata da **danno ossidativo del DNA se gli spermatozoi erano esposti per 4 ore (con diminuzione della motilità spermatica (p < 0,05))**.

Probing the Origins of 1,800 MHz Radio Frequency Electromagnetic Radiation Induced Damage in Mouse Immortalized Germ Cells and Spermatozoa *in vitro*

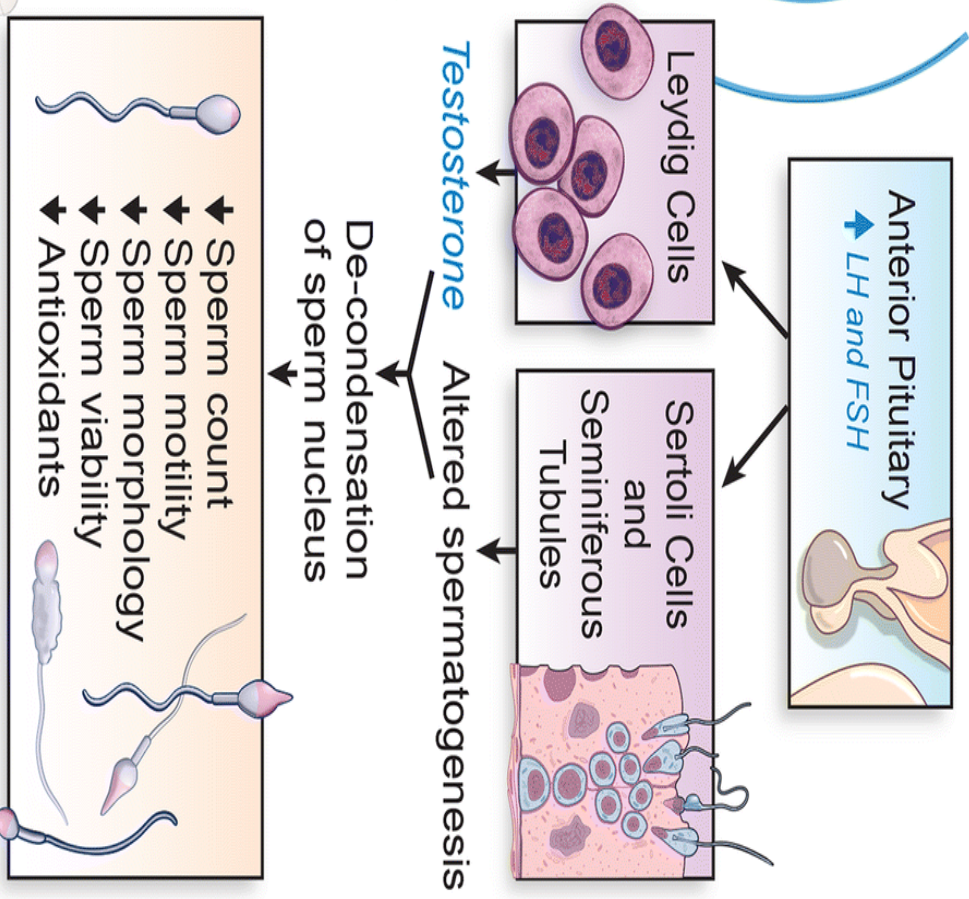
Brendan J. Houston¹, Brett Nixon¹, Bruce V. King², R. John Aitken¹ and Geoffrey N. De Lullis^{1*}

RF-EMR at 0.15 W/kg for 3 h did induce significant DNA fragmentation in spermatozoa (that was no longer significant after 4 h), assessed by the alkaline comet assay ($p < 0.05$). Furthermore, this fragmentation was accompanied by an induction of oxidative DNA damage in the form of 8-hydroxy-2'-deoxyguanosine, which was significant ($p < 0.05$) after spermatozoa were exposed to RF-EMR for 4 h. At this exposure time point, a decline in sperm motility ($p < 0.05$) was also observed. This study contributes new evidence toward elucidating a mechanism to account for the effects of RF-EMR on biological systems, proposing Complex III of the mitochondrial ETC as the key target of this radiation.





CCF
© 2017



Diagrammatic representation of **various source of RF EMF exposure effect on brain and testicular** organ and deleterious outcome

Effects of the Exposure to Mobile Phones on Male Reproduction: A Review of the Literature



SANDRO LA VIGNERA, ROSITA A. CONDORELLI, ENZO VICARI, ROSARIO D'AGATA, AND ALDO E. CALOGERO

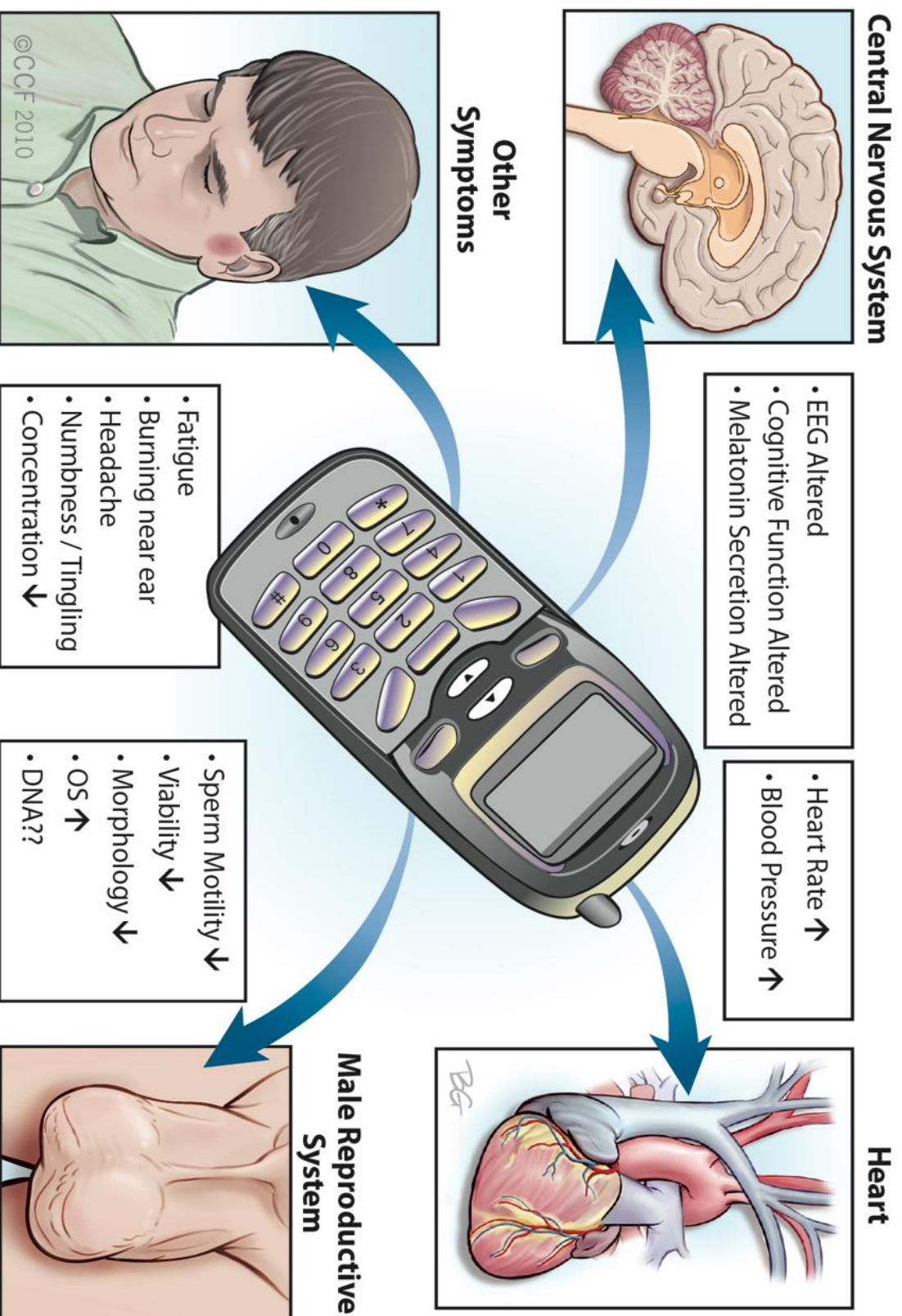
From the Section of Endocrinology, Andrology, and Internal Medicine and Master in Andrological, Human Reproduction, and Biotechnology Sciences, Department of Internal Medicine and Systemic Diseases, University of Catania, Catania, Italy;

ABSTRACT: The use of mobile phones is now widespread. A great debate exists about the possible damage that the radiofrequency electromagnetic radiation (RF-EMR) emitted by mobile phones exerts on different organs and apparatuses. The aim of this article was to review the existing literature exploring the effects of RF-EMR on the male reproductive function in experimental animals and humans. Studies have been conducted in rats, mice, and rabbits using a similar design based upon mobile phone RF exposure for variable lengths of time. Together, the results of these studies have shown that RF-EMR

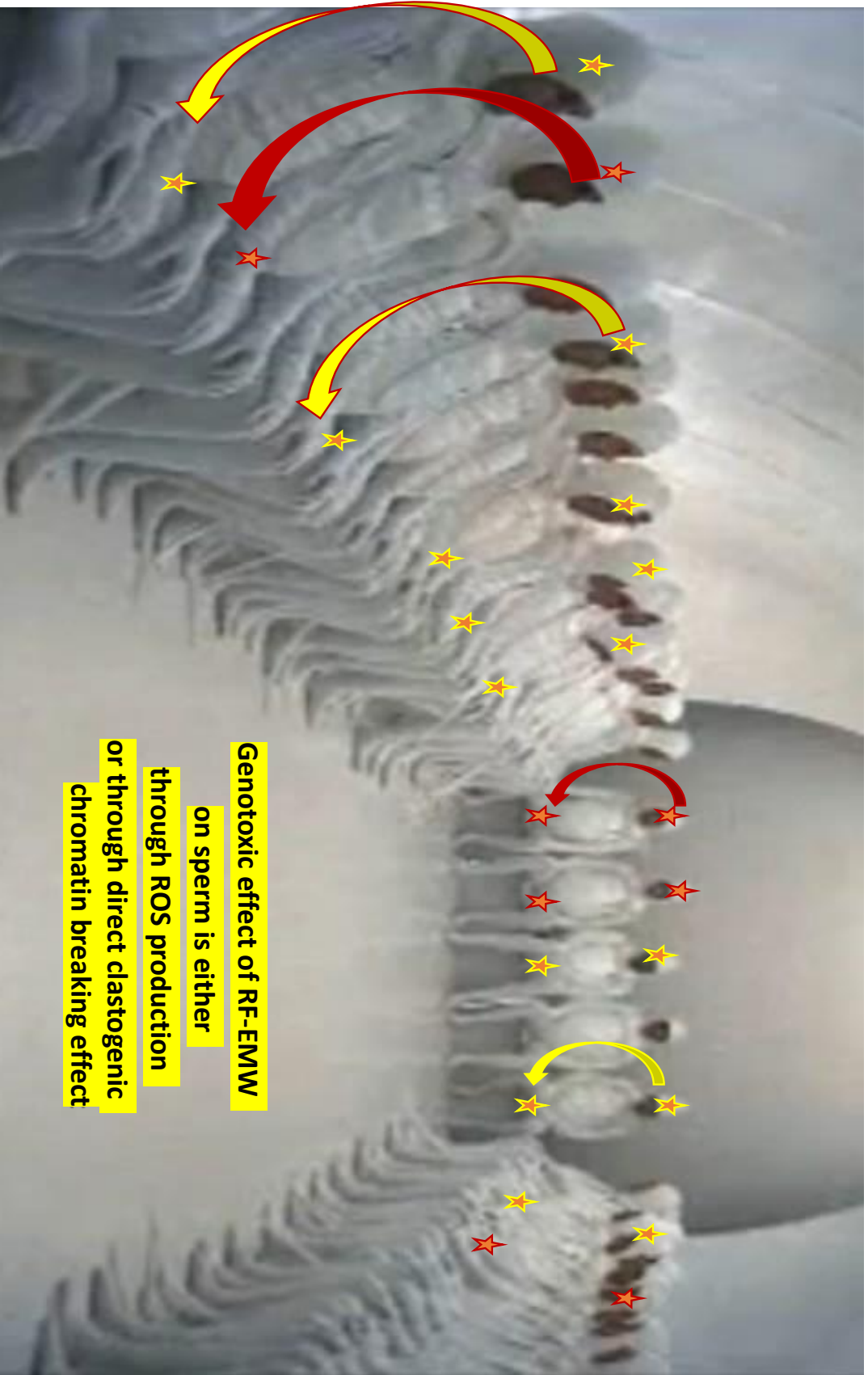
one has explored the effects of RF-EMR directly on spermatozoa and the other has evaluated the sperm parameters in men using or not using mobile phones. The results showed that human spermatozoa exposed to RF-EMR have decreased motility, morphometric abnormalities, and increased oxidative stress, whereas men using mobile phones have decreased sperm concentration, decreased motility (particularly rapid progressive motility), normal morphology, and decreased viability. These abnormalities seem to be directly related to the duration of mobile phone use.

The aim of this article was to review the existing literature exploring the effects of RF-EMR on the male reproductive function in experimental animals and humans.. 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) and decreased viability.

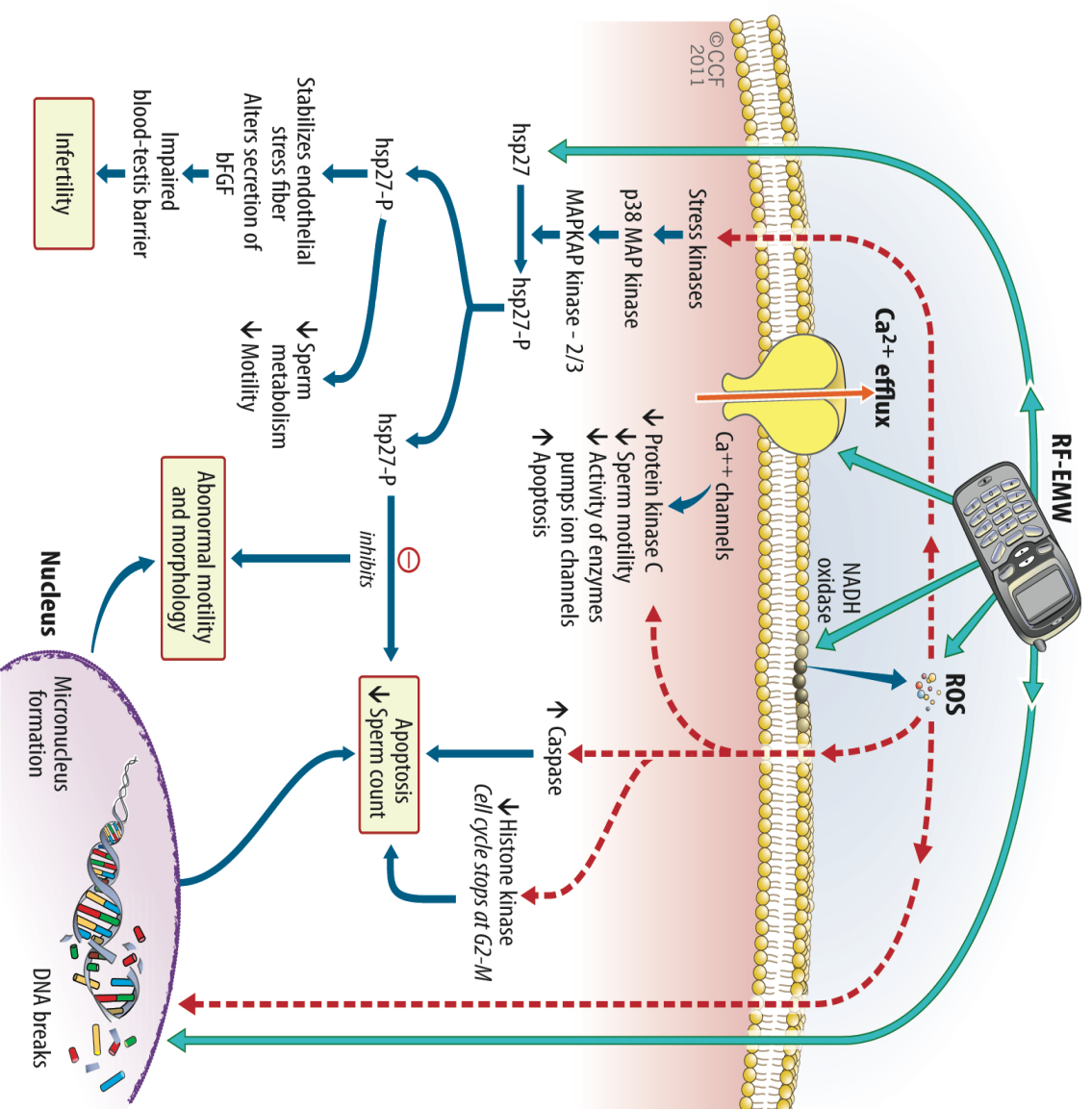
These abnormalities seem to be directly related to the duration of mobile phone use.



Hamada JL et al. **Cell Phones and their Impact on Male Fertility: Fact or Fiction**
 The Open Reproductive Science Journal, 2011, 5, 125-137



**Genotoxic effect of RF-EMW
on sperm is either
through ROS production
or through direct clastogenic
chromatin breaking effect**



Heat shock proteins (HSPs)

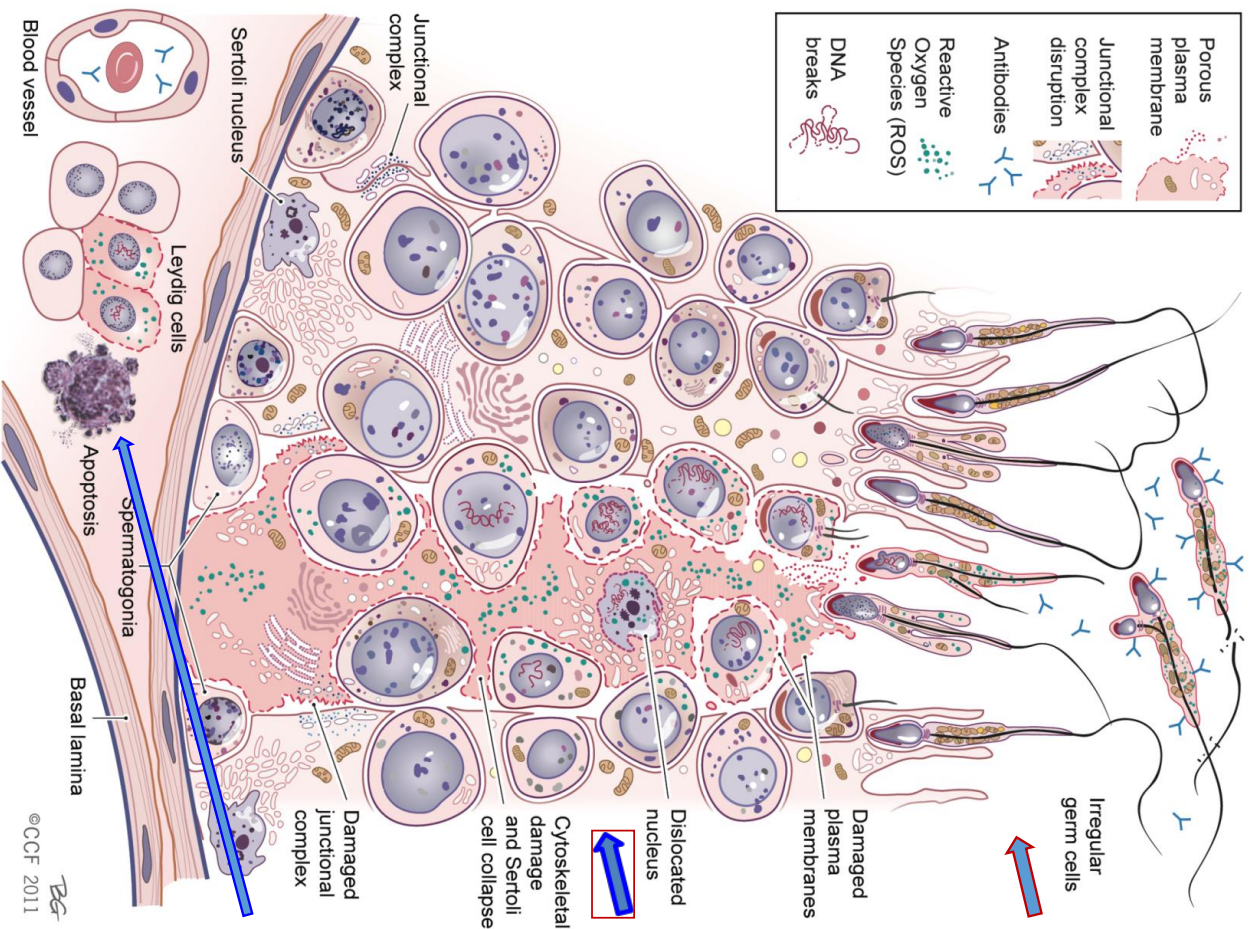
increase in response to electromagnetic radiation and ROS.

HSPs slows the metabolism of the sperm and impairs the blood testis barrier interfering with apoptosis of damaged and transformed sperm.

RF-EMW also induce ROS production through disturbance of the mitochondrial membrane bound NADH oxidase.

ROS has impact on PKC, histone kinase, heat shock protein, DNA and apoptosis.

Changed plasma membrane potential and calcium efflux with resultant calcium depletion leads to decrease in the activity of protein kinase C (PKC). This decrease leads to alteration in many enzymes, ion pumps, channels and proteins as well as inducing apoptosis



Cross sectional view of testicular tissue showing various effects of **cell phone RF-EMW** on cellular components of the testis.

In sperm: a) plasma membrane becomes leaky and porous due to EMW induced electroporation,

b) **cytoplasmic mitochondria generate excess ROS** resulting in **oxidative stress**

c) **nuclear DNA and chromatin undergo breaks and damage.**

In Sertoli cells: a) damage to plasma membrane tight junctional complexes compromises the integrity of BTB

(Blood testis Barrier) and increases its permeability resulting in exposure of sperm antigens to immune system and formation of **ASA (Antisperm ABS)**,

b) **damage to cytoskeleton** results in cell collapse with

c) production of excess **ROS**, and

d) **dislocation of nucleus** to a more central position.

In Leydig cells: a) plasma membrane sustains damage with

b) **++ cytoplasmic ROS generation**, and

c) **nuclear DNA damage resulting in apoptosis.**

EPIDEMIOLOGICAL STUDIES CONSISTENTLY SHOW ELEVATIONS IN RISK OF BRAIN CANCERS

Brain Tumors: There is a consistent pattern of increased risk of glioma and acoustic neuroma associated with use of mobile phones and cordless phones.

“Based on epidemiological studies there is a consistent pattern of increased risk for glioma and acoustic neuroma associated with use of mobile phones and cordless phones. The evidence comes mainly from two study centres, the Hardell group in Sweden and the Interphone Study Group. No consistent pattern of an increased risk is seen for meningioma. A systematic bias in the studies that explains the results would also have been the case for meningioma. The different risk pattern for tumor type strengthens the findings regarding glioma and acoustic neuroma. Meta-analyses of the Hardell group and Interphone studies show an increased risk for glioma and acoustic neuroma. Supportive evidence comes also from anatomical localisation of the tumor to the most exposed area of the brain, cumulative exposure in hours and latency time that all add to the biological relevance of an increased risk. In addition risk calculations based on estimated absorbed dose give strength to the findings.”



The Potential Impact of Mobile Phone Use on Trends in Brain and CNS Tumors

Örjan Hallberg^{1*} and L Lloyd Morgan²

¹Hallberg Independent Research, Brattforsgatan 3, 123 50 Farsta, Sweden

²Environmental Health Trust, 2022 Francisco Street, Berkeley, CA 94709, USA

DNA brain cell damage has an average latency time of over 30 years before increased brain cancer rates would be expected.

Mobile phone use may lead to a reduced DNA repair function resulting in about a 2-fold increase in brain cancer incidence, or with an increasing rate of initial DNA brain damage from mobile phone use.. **a 25-fold increase in brain cancer incidence may result.**

❖ **Hansson *et al.*: Every 100 hours of cell phone use increases risk of brain cancer by 5%; for every year of use, risk increases by 8%**

❖ **Hardell *et al.*: >10 years of cell phone use increases risk by 280%**

❖ **Interphone study: Cell phone use protects user from brain tumors**

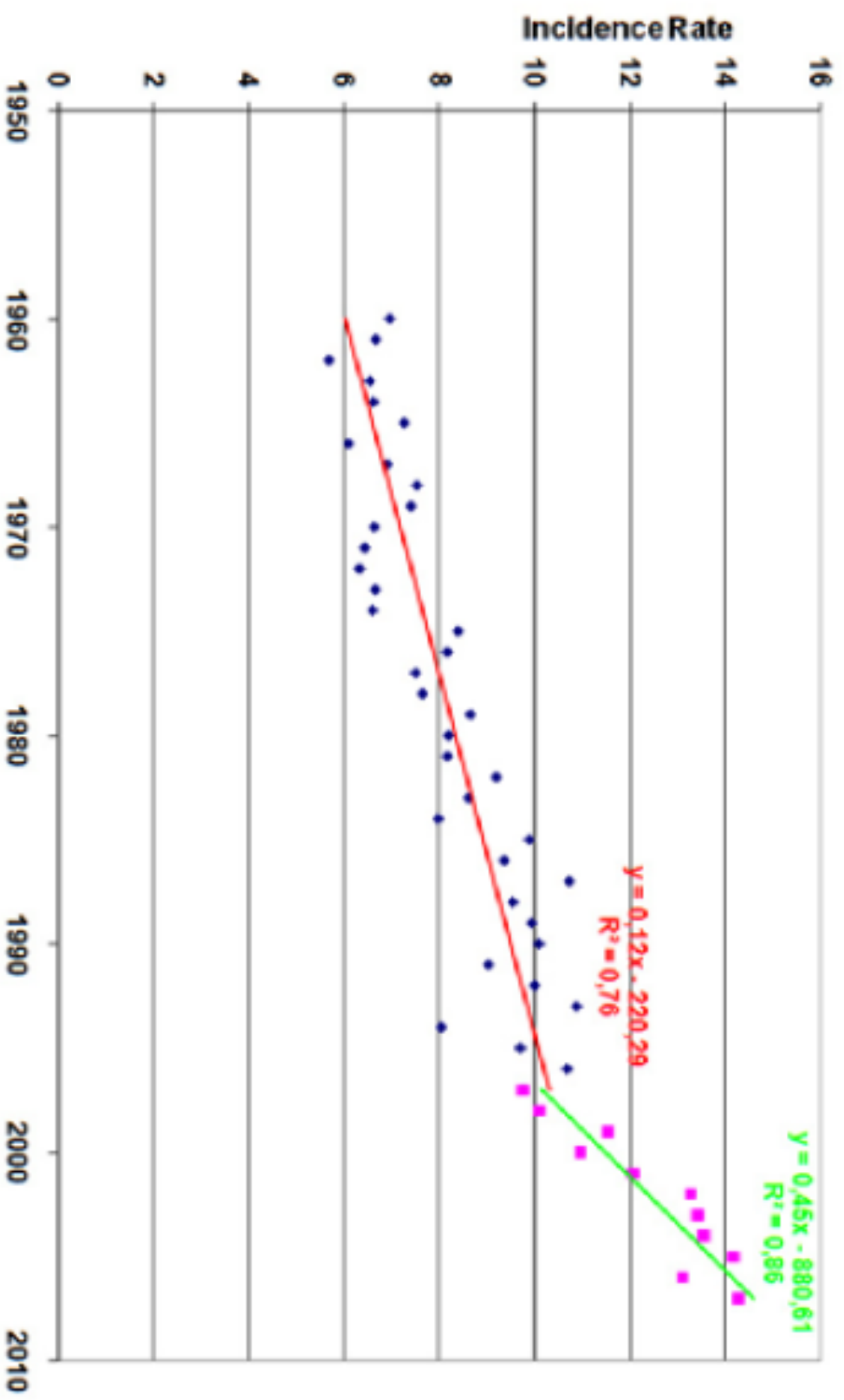


Figure 2: Norwegian age-adjusted brain tumor incidence rates, 1960-2007.

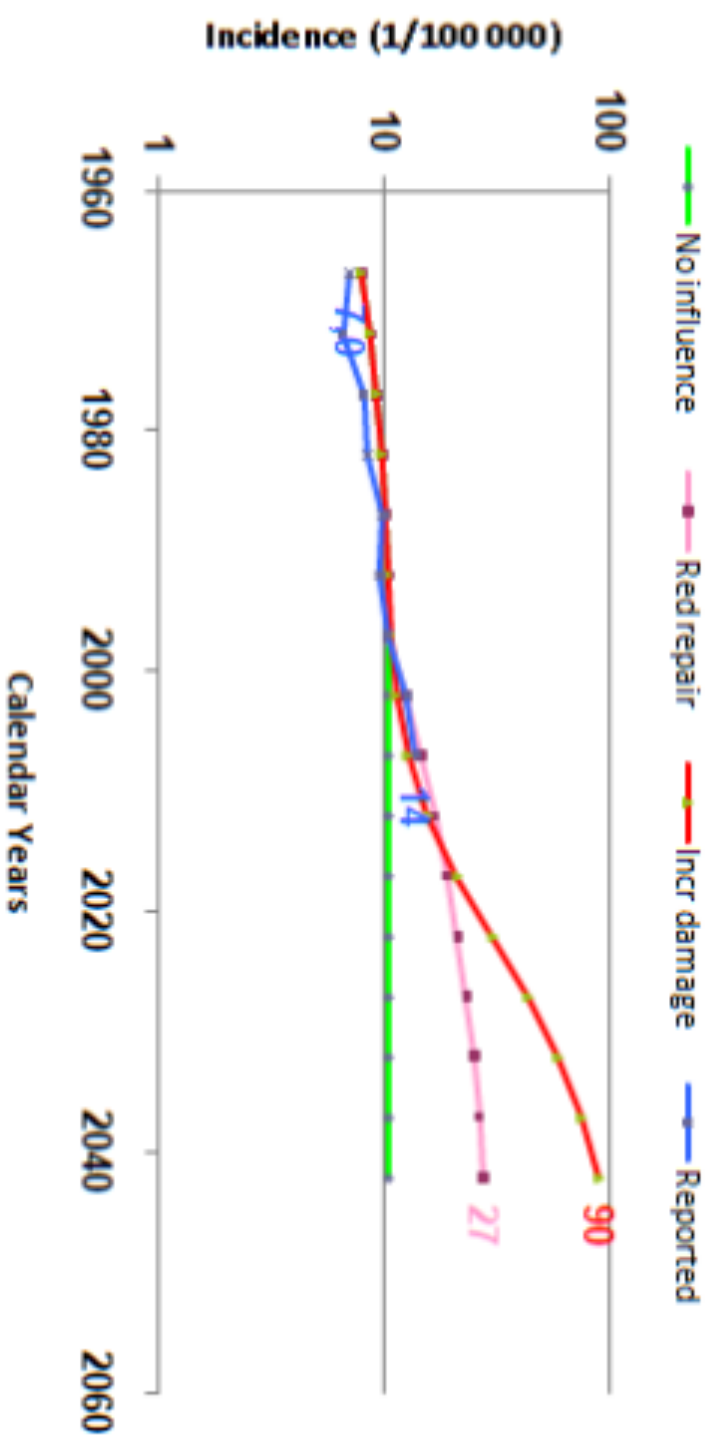


Figure 3: Norwegian brain tumor age-adjusted incidence rates per 100,000 person-year by calendar year for reported data with 3 results from mobile phone use: 1) increased DNA damage, 2) no DNA repair, and 3) has no affect.

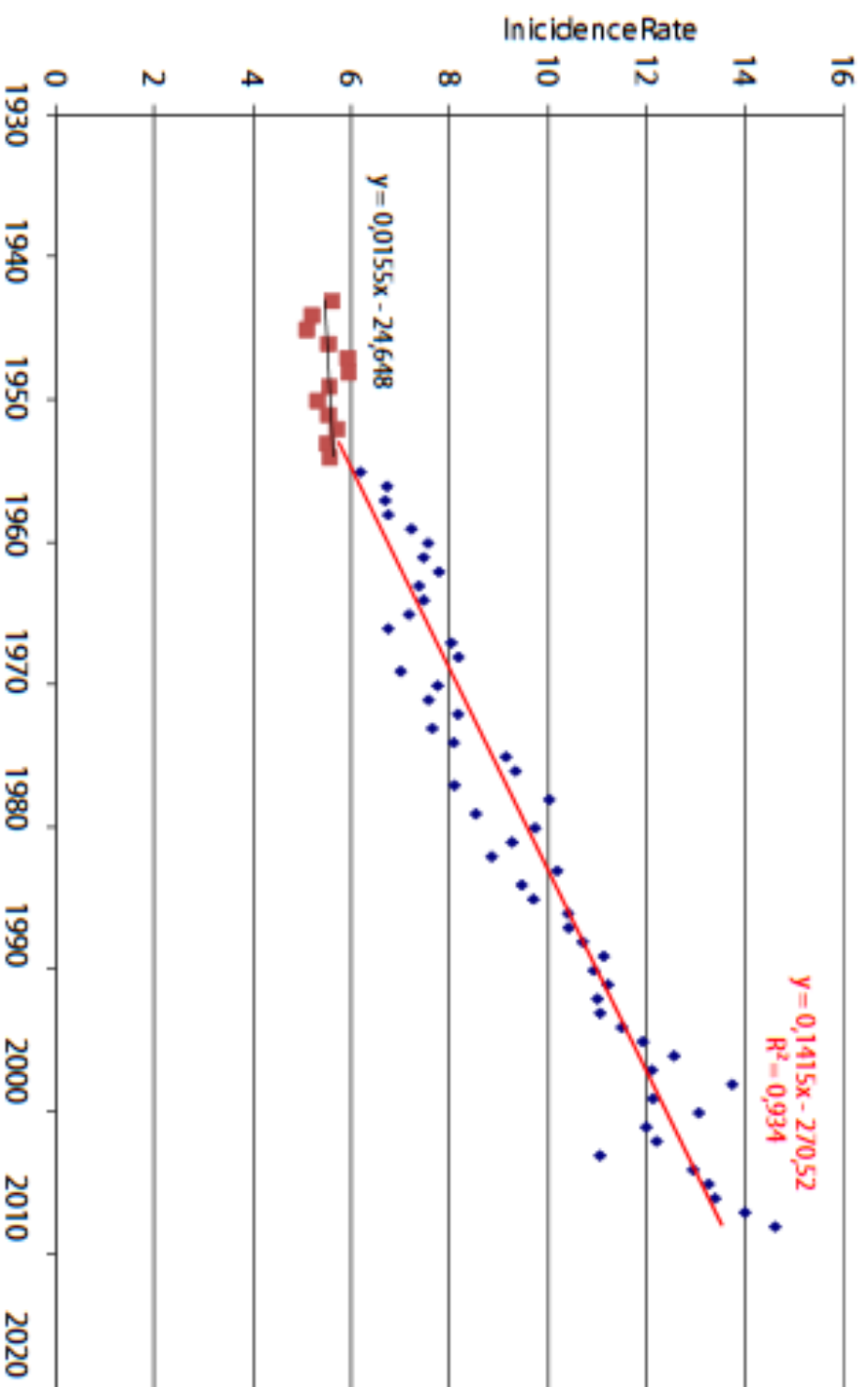


Figure 7: Reported Danish age-adjusted brain tumor incidence rate, 1943-2007.

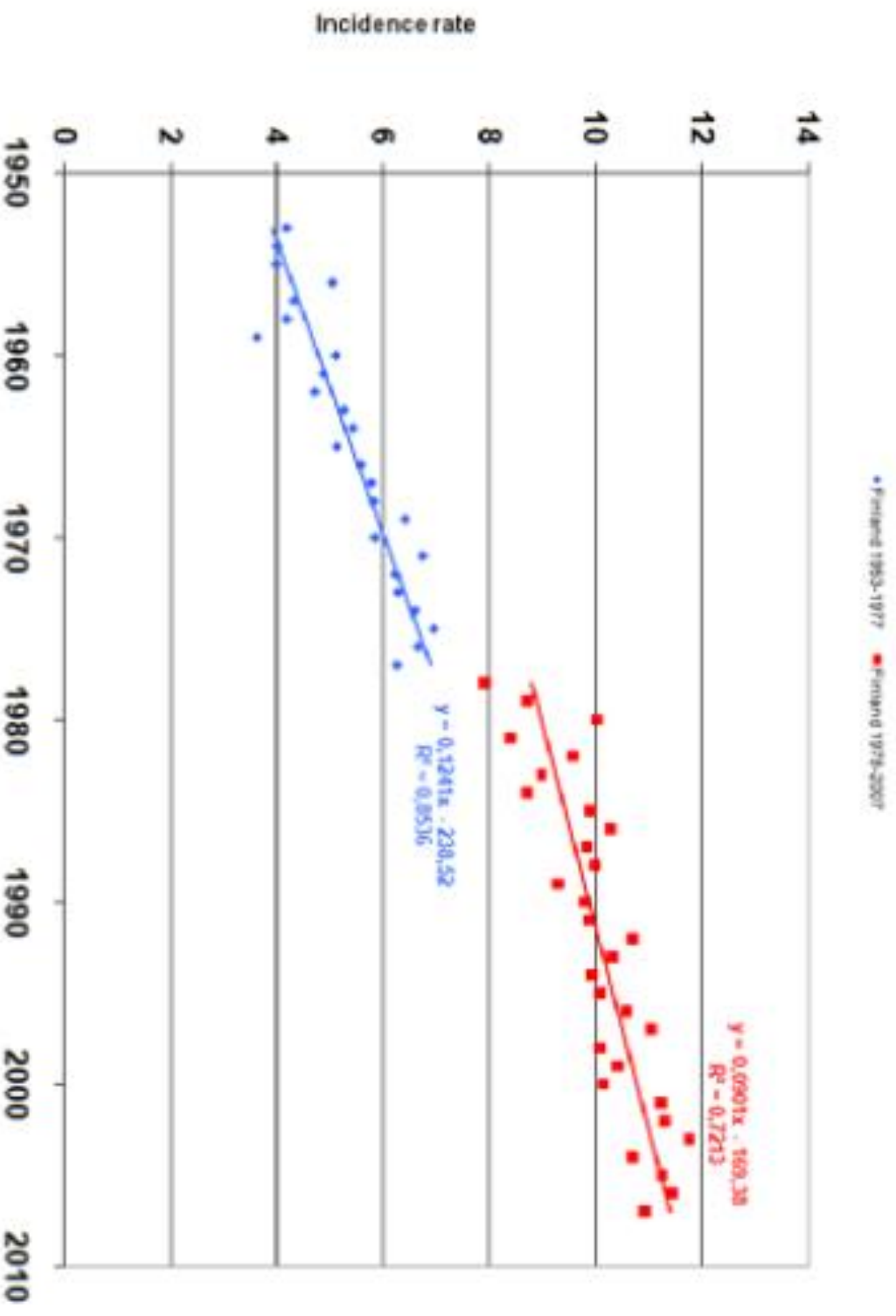


Figure 8: Reported Finnish age-adjusted brain tumor incidence rates, 1953-2007.

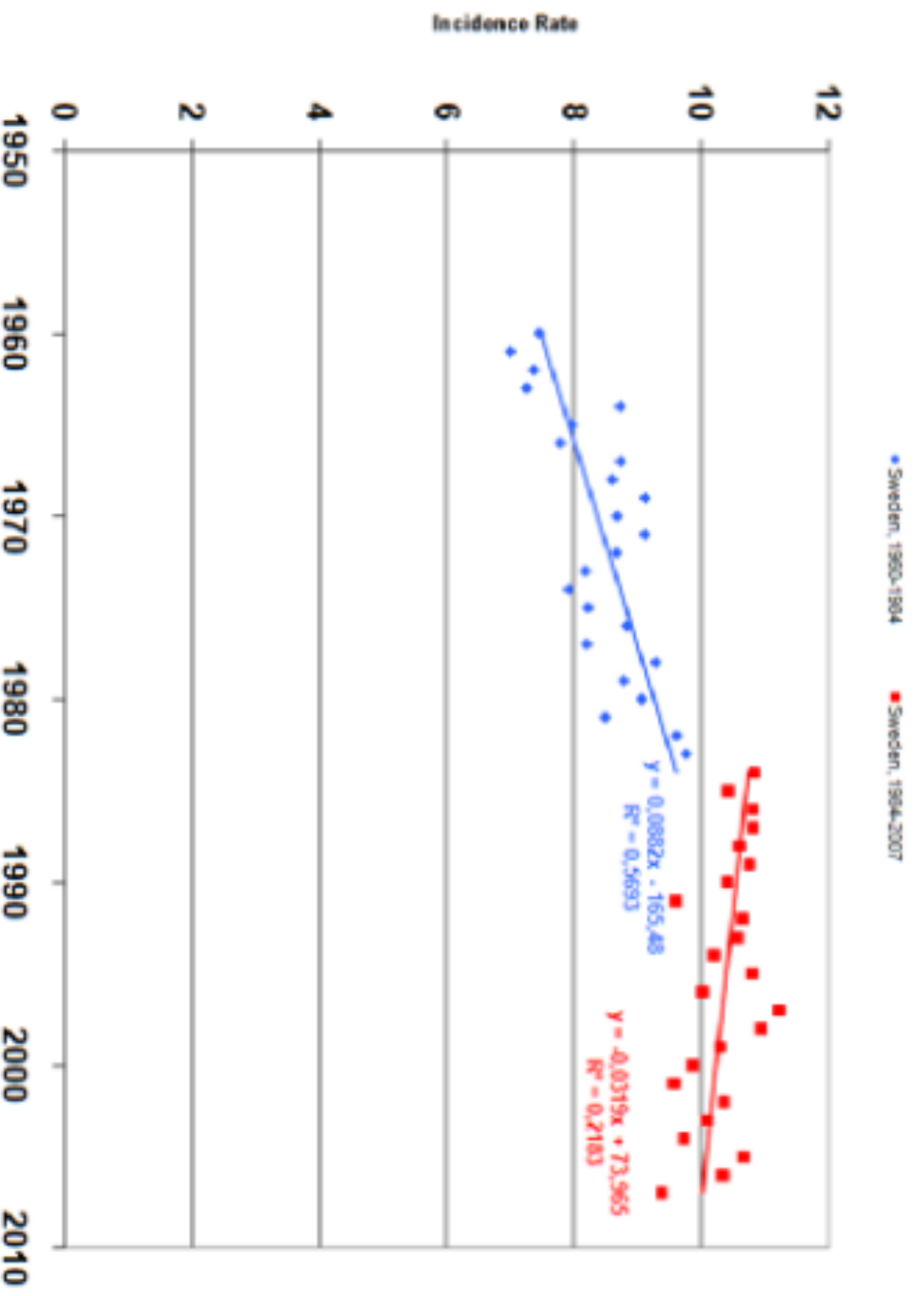


Figure 6: Reported Swedish age-adjusted brain tumor incidence rates, 1960-2007.

Lennart Hardell · Michael Carlberg
Kjell Hansson Mild

Pooled analysis of two case–control studies on use of cellular and cordless telephones and the risk for malignant brain tumours diagnosed in 1997–2003

Abstract Objectives: To study the use of cellular and cordless telephones and the risk for malignant brain tumours. **Methods:** Two case–control studies on malignant brain tumours diagnosed during 1997–2003 included answers from 905 (90%) cases and 2,162 (89%) controls aged 20–80 years. We present pooled analysis of the results in the two studies. **Results:** Cumulative lifetime use for >2,000 h yielded for analogue cellular phones odds ratio (OR)=5.9, 95% confidence interval (CI)=2.5–14, digital cellular phones OR=3.7, 95% CI=1.7–7.7, and for cordless phones OR=2.3, 95% CI=1.5–3.6. Ipsilateral exposure increased the risk for malignant brain tumours; analogue OR=2.1, 95% CI=1.5–2.9, digital OR=1.8, 95% CI=1.4–2.4, and cordless OR=1.7, 95% CI=1.3–2.2.

Pooled analysis of two case–control studies on use of cellular and cordless telephones and the risk for malignant brain tumours diagnosed in 1997–2003

Increased risk was obtained for both cellular and cordless phones, highest in the group with >10 years latency period.

For high-grade astrocytoma using >10 year latency period analogue phones yielded OR=2.7, 95% CI=1.8–4.2, digital phones OR=3.8, 95% CI=1.8–8.1, and cordless phones OR=2.2, 95% CI=1.3–3.9. In the multivariate analysis all phone types increased the risk. Regarding digital phones OR=3.7, 95% CI=1.5–9.1 and cordless phones OR=2.1, 95% CI=0.97–4.6 were calculated for malignant brain tumours for subjects with first use <20 years of age, higher than in older persons. **Conclusion:** Increased risk was obtained for both cellular and cordless phones, highest in the group with >10 years latency period.

International Journal of Oncology

Int J Oncol. **2008** May;32(5):1097-103

Search

Advanced Search

Journals

International Journal of
Molecular Medicine

International Journal of
Oncology

Molecular Medicine Reports

Oncology Reports

General Information

Manuscript Submission

Conferences

Subscription price list

Information for Librarians

Job Opportunities

Information for Advertisers



13th World Congress on Advances in Oncology
and
11th International Symposium on Molecular Medicine

Meta-analysis of long-term mobile phone use and the association with brain tumours

Authors: Lennart Hardell, Michael Carlberg, Fredrik Söderqvist, Kjell Hansson Mild

Department of Oncology, University Hospital, SE-701 85 Örebro, Sweden. lennart.hardell@orebroll.se

Pages: 1097-1103

Abstract:

We evaluated long-term use of mobile phones and the risk for brain tumours in case-control studies published so far on this issue. We identified ten studies on glioma and meta-analysis yielded OR = 0.9, 95% CI = 0.8-1.1. Latency period of ≥ 10 -years gave OR = 1.2, 95% CI = 0.8-1.9 based on six studies, for ipsilateral use (same side as tumour) OR = 2.0, 95% CI = 1.2-3.4 (four studies), but contralateral use did not increase the risk significantly, OR = 1.1, 95% CI = 0.6-2.0. Meta-analysis of nine studies on acoustic neuroma gave OR = 0.9, 95% CI = 0.7-1.1 increasing to OR = 1.3, 95% CI = 0.6-2.8 using ≥ 10 -years latency period (four studies). Ipsilateral use gave OR = 2.4, 95% CI = 1.1-5.3 and contra-lateral OR = 1.2, 95% CI = 0.7-2.2 in the ≥ 10 -years latency period group (three studies). Seven studies gave results for meningioma yielding overall OR = 0.8, 95% CI = 0.7-0.99. Using ≥ 10 -years latency period OR = 1.3, 95% CI = 0.9-1.8 was calculated (four studies) increasing to OR = 1.7, 95% CI = 0.99-3.1 for ipsilateral use and OR = 1.0, 95% CI = 0.3-3.1 for contralateral use (two studies). We conclude that this meta-analysis gave a consistent pattern of an association between mobile phone use and ipsilateral glioma and acoustic neuroma using ≥ 10 -years latency period.

[Download PDF](#)

..this meta-analysis gave a consistent pattern of an association between mobile phone use and ipsilateral glioma and acoustic neuroma using ≥ 10 -years latency period.

Mobile phone use and risk of brain tumours: a systematic review of association between study quality, source of funding, and research outcomes

Manya Prasad¹ · Prachi Kathuria² · Pallavi Nair² · Amit Kumar² · Kamshwar Prasad²

Received: 28 July 2016 / Accepted: 10 February 2017
© Springer-Verlag Italia 2017



Abstract Mobile phones emit electromagnetic radiations that are classified as possibly carcinogenic to humans. Evidence for increased risk for brain tumours accumulated in parallel by epidemiologic investigations remains controversial. **This paper aims to investigate whether methodological quality of studies and source of funding can explain the variation in results.** PubMed and Cochrane CENTRAL searches were conducted from 1966 to December 2016, which was supplemented with relevant articles identified in the references. Twenty-two case control studies were included for systematic review. Meta-analysis of 14 case-control studies showed practically no increase in risk of brain tumour [OR 1.03 (95% CI 0.92–1.14)]. However, for mobile phone use of 10 years or longer (or >1640 h), the overall result of the meta-analysis showed a significant 1.33

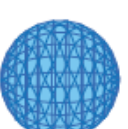
times increase in risk. The summary estimate of government funded as well as phone industry funded studies showed 1.07 times increase in odds which was not significant, while mixed funded studies did not show any increase in risk of brain tumour. Metaregression analysis indicated that the association was significantly associated with methodological study quality ($p < 0.019$, 95% CI 0.009–0.09). Relationship between source of funding and log OR for each study was not statistically significant ($p < 0.32$, 95% CI 0.036–0.010). We found evidence linking mobile phone use and risk of brain tumours especially in long-term users (≥ 10 years). Studies with higher quality showed a trend towards high risk of brain tumour, while lower quality showed a trend towards lower risk/protection.

INTERPHONE study includes more than 6600 cancers, and even a larger number of referents (controls), that were recruited between 1999 and 2004 in 13 countries (Australia, Canada, Denmark, Finland, France, Germany, Israel, Italy, Japan, New Zealand, Norway, United Kingdom of Great Britain and Northern Ireland, Sweden). This study has not yet revealed all the lessons we can take from it. The results concerning brain tumors (2708 gliomas and 2409 meningiomas), even if they do not show an overall increase in risk, nonetheless indicate clearly that those most exposed (at least 1640 hours of cumulative use) have a slightly increased risk of meningioma (OR of 1.15, not statistically significant) but mostly of glioma (OR of 1.40, statistically significant). This latter risk is greater in subjects who reported that their cancer had occurred on the side of head where they held their phones. We do not believe that this result just happened by chance and therefore can be ignored simply because it affects only a single group of individuals. On the contrary, the risk appears exactly in the group where it was most expected to be found, that is to say in heaviest, long-term (10 year) users, and on the temporal lobe nearest to the location where the phone is held.

-The Interphone Protocol defines "**exposed**" those who use the phone "**at least once a week for at least six months**" (which means almost never!). Therefore, even if a risk exists, it is "diluted" because of the dominance, in the sample of subjects exposed to little or nothing...

- **Less than 5% of the subjects had completed 10 years of latency or continued use of phones, which means that more than 95% had an exposure time of the totally inadequate,** since in the majority of tumors in test time estimated latency is much higher (in some cases up to 30 years)..

-**Failure to identify the homo-lateral tumors,** that have developed on the side of the head habitually used to call, which is the only significantly irradiated during the use of phones, with consequent further "dilution" of risk ...



RESEARCH

Open Access

Mobile phones and head tumours. The discrepancies in cause-effect relationships in the epidemiological studies - how do they arise?

Angelo G Levis¹, Nadia Minicuci², Paolo Ricci³, Valerio Gennaro⁴ and Spiridione Garbisa^{1*}

Results: Blind protocols, free from errors, bias, and financial conditioning factors, give positive results that reveal a cause-effect relationship between long-term mobile phone use or latency and statistically significant increase of ipsilateral head tumour risk, with biological plausibility. Non-blind protocols, which instead are affected by errors, bias, and financial conditioning factors, give negative results with systematic underestimate of such risk. However, also in these studies a statistically significant increase in risk of ipsilateral head tumours is quite common after more than 10 years of mobile phone use or latency. The meta-analyses, our included, examining only data on ipsilateral tumours in subjects using mobile phones since or for at least 10 years, show large and statistically significant increases in risk of ipsilateral brain gliomas and acoustic neuromas.

Table 4 Errors in negative Interphone studies [4,36-55,65,72], and reliability of positive Hardell studies [1-3,7-10,64,71,78]

study, design, methods	negative studies	positive studies
Mobile phone use	inadequate: 2-5 min/day	significant: 16-32 min/day
Latency time	<5% cases with latency ≥ 10 y	>18% cases with latency ≥ 10 y
Cordless phone users	considered unexposed	considered exposed
Ipsilateral tumour latency	≥ 10 y for only 2% cases	≥ 10 y for >16% cases
Head tumours identified	only gliomas, meningiomas, neuromas, parotid tumours	also other head tumours types
Deceased cases	not included	included: proxy interviews
Interviews	not blind	always double blind
Type of interviews	face-to-face	mailed questionnaires
Time of interviews	cases: during hospitalisation controls: at home	cases: after hospitalisation controls: at home
Exposure assessment	non blind interview	blind questionnaire
Data processing	not stated (not blind?)	Blind
Laterality attribution bias	present	Absent
Delayed interviews	for controls compared to cases	not delayed
Participation	reduced up to 40%	always near to 90%
Selection	exposed controls prevail	no selection bias
Documentation	positive data ignored	no documentation bias
Funding	co-funded by MP Companies	funded only by Public Bodies

Cellphone Biological Studies							
		Effect Found		No Effect Found			
		Studies	% All Studies	Studies	% All Studies	Studies	% All Studies
Industry Funded	No.	27	8.3%	69	21.2%	96	29.4%
	%	28.1%		71.9%			
Independently Funded	No.	104	47.5%	150	23.5%	230	70.6%
	%	67.0%		33.0%			
Totals		131	55.5%	149	44.5%	326	100.0%

Chi² =39.8 (p=2.3x10⁻⁹)

11 July 2006 (1)

Table 1: Industry-Funded and Independently-Funded Cellphone Biological Studies



ELSEVIER

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres



Wi-Fi is an important threat to human health ☆

Martin L. Pall

Washington State University, 638 NE 41st Avenue, Portland, OR 97232-3312, USA

- 7 effects have each been repeatedly reported following Wi-Fi & other EMF exposures.
- Established Wi-Fi effects, include apoptosis, oxidat. stress &:
- testis/sperm dysfunct; Neuropsych; DNA impact; hormone change; Ca2+ rise.
- Wi-Fi is thought to act via voltage-gated calcium channel activation.

Environmental Research 165 (2018) 484–495



ELSEVIER

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres



5 G wireless telecommunications expansion: Public health and environmental implications ☆

Cindy L. Russell

PO Box 7443, Menlo Park, CA 94026, USA





5G sta molto semplicemente per **quinta generazione** e si intende l'insieme dei requisiti per un certo standard comunicativo..

Per raggiungere velocità così elevate è necessario utilizzare uno spettro di frequenza finora mai utilizzato. Il **5G sfrutta le onde radio tra 30 e 300 GHz, lo spettro di frequenza più elevato possibile, che nessuno Stato ha ancora assegnato.**

Fino a qualche anno fa era impensabile utilizzare questo spettro per la comunicazione, mentre grazie alle ricerche in campo scientifico è stato dimostrato che le onde DI ALTISSIMA FREQUENZA possono essere utilizzate anche per la connessione.

Brussels, 14.9.2016
COM(2016) 588 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS

5G for Europe: An Action Plan

{SWD(2016) 306 final}



1. Timely deployment of 5G: a strategic opportunity for Europe

Twenty-four years after the successful introduction of the 2G (GSM) mobile networks Europe, another revolution is in sight with a **new generation of network technology** known as 5G, opening prospects for new digital economic and business models. 5G is a fully standardised yet but its key specifications and technological building blocks are already being developed and tested. 5G is seen as a game changer, enabling industrial transformations¹ through wireless broadband services provided at **gigabit speeds**,² in support of new types of applications connecting devices and objects (the Internet of Things) and versatility by way of software virtualisation allowing innovative business models across **multiple sectors** (e.g. transport, health, manufacturing, logistics, energy, media and entertainment). While these transformations have already started on the basis of existing networks, they will need 5G if they are to reach their full potential in the coming years.

The Commission strategy for the Digital Single Market (DSM strategy)³ and the Communication *Connectivity for a Competitive Digital Single Market: Towards a Europe Gigabit Society*⁴ underline the importance of very high capacity networks like 5G as a key asset for Europe to compete in the global market. Worldwide 5G revenues should reach the equivalent of €225 billion in 2025⁵. Another source indicates that the benefits of 5G introduction across four key industrial sectors may reach €114 billion/year⁶.

Ventiquattro anni dopo il successo dell'introduzione delle reti mobili 2G (GSM)

in Europa, un'altra rivoluzione è in vista con una nuova

generazione di tecnologie di rete, nota come 5G, che apre

prospettive per nuovi modelli economici e commerciali digitali...

La strategia della Commissione per il mercato unico digitale (strategia DSM) e la Connettività della comunicazione per un mercato unico digitale competitivo: verso una società europea Gigabit sottolineano l'importanza di reti ad altissima capacità come il 5G come **risorsa chiave per l'Europa per competere nel mercato globale mercato**.

Le entrate mondiali del 5G dovrebbero raggiungere l'equivalente di

225 miliardi di euro nel 2025.

Un'altra fonte indica che i **benefici dell'introduzione del 5G in quattro settori industriali chiave** potrebbero raggiungere i

114 miliardi di euro all'anno

5G, la gara record regala allo Stato 6,5 miliardi. Ecco tutti i vincitori


Si conclude l'asta per le frequenze del 5G in Italia. Incasso tre volte superiore alle aspettative. Telecom ha speso più di tutti i concorrenti



Dopo 14 giorni e 171 turni di rilancio arriva al traguardo l'asta per le frequenze 5G. Nelle casse dello Stato, entro il 2022, arriveranno 6 miliardi e 550,42 milioni di euro. Una cifra su cui neppure i migliori analisti avrebbero scommesso. Le previsioni iniziali più rosee erano di 4 miliardi

Il testa a testa che ha fatto impennare l'incasso ha riguardato le **frequenze 3.700 megahertz (Mhz)**... per sviluppare reti internet mobili in banda ultralarga.

Oltre 4,3 miliardi di € sono stati investiti su questa fascia del futuro 5G, che è disponibile subito e quindi permetterà alle compagnie telefoniche di mettere a reddito la spesa già dal 2020, quando è atteso il lancio commerciale degli smartphone 5G.. Si è chiusa oggi anche l'assegnazione dei **cinque lotti delle frequenze 5G, quelle dei 26 gigahertz (Ghz)**. Ciascuna delle cinque compagnie in gara – Telecom, Vodafone, Iliad, Wind Tre e Fastweb – ha ottenuto un lotto..

A cartoon illustration of a woman with brown hair tied back, wearing a green top. She is looking slightly to the right with a neutral expression. A large speech bubble originates from her mouth, containing the text 'I'M AFRAID MY BRAIN HAS LEFT FOR THE DAY'. The background is a light tan color with a subtle paper texture. The entire scene is enclosed in a black rectangular border.

I'M AFRAID MY
BRAIN HAS LEFT
FOR THE DAY

©PNTS

2

Privilegiare l'uso di auricolare con filo, del vivavoce o degli SMS.

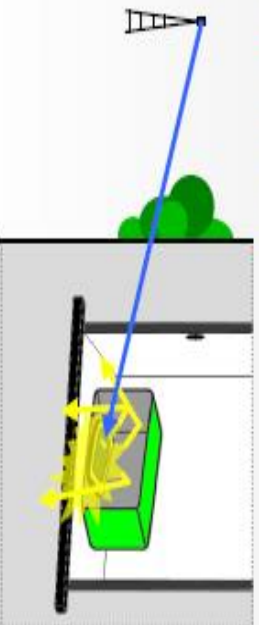
ed evitare le telefonate lunghe. E' meglio non avvicinare il cellulare alla testa, al cuore e alle zone genitali (rischio infertilità). Come evidenziato da Phonegate Alert, a contatto con il corpo la maggior parte dei cellulari più venduti e usati oggi è fuori norma. E quando il segnale è debole il cellulare emette di più.



5

Se il cellulare deve rimanere acceso **in casa, lo si metta dietro una scatola metallica**

vicino a una finestra, con l'apertura della scatola rivolta verso il vetro.



⁽¹⁾ <http://www.armor.ca/it/tech/Informazione-tech/moqul-til-gasas-1056258> ⁽²⁾ Gandhi O.P., Lazari G., Farnse C.M. (2007) *Radioscienze or Microwave Theory and Technology: the 44. a 70. Channel* (2007). Electromagnetic absorption in the human head and neck for mobile telephones at 835 and 1900 MHz.

3

Attenzione al cellulare in auto, in bici o sui mezzi di trasporto. Il movimento aumenta le emissioni. La carrozzeria metallica anche:

schermata e rimanda le onde. **Spegnere quando ci sono bambini o ragazzi in auto.** Attenzione: molti cellulari emettono anche in modalità "aereo".



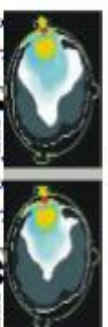
6

Precauzione massima per bambini, donne incinte e ragazzi.

I processi biologici della loro crescita sono delicati e la scatola cranica è più sottile. Inoltre nei feti il liquido amniotico conduce elettricità. **Per bambini e ragazzi niente cellulare o tablet** (salvo emergenze per gli adolescenti). **Fate come**

Bill Gates: ha dato un cellulare ai figli solo a 14 anni.⁽¹⁾ Il tablet può essere sostituito da un computer convertibile touch screen e un adattatore USB-Ethernet, per non usare la connessione wifi.

Grado di penetrazione delle Radiazioni del Cellulare nel Cervello⁽²⁾



Bambino di 5 anni Bambino di 10 anni



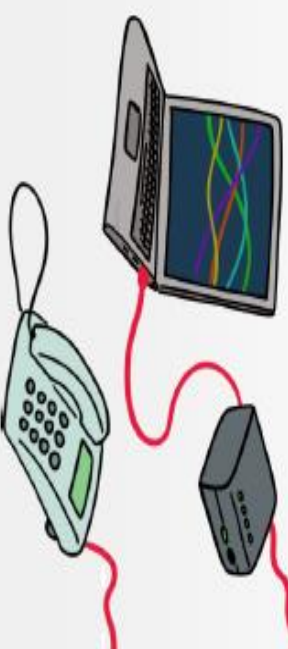
Adulto

4

A casa, spegnere il wifi, utilizzare un cavo per

Internet e un telefono fisso.

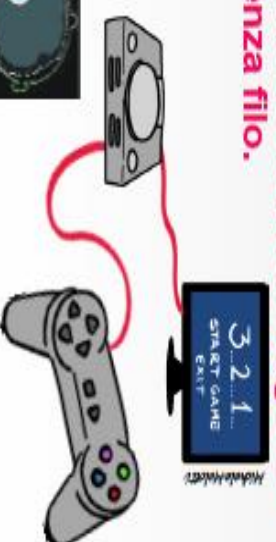
Se si vuole un cordless, che sia almeno un modello Eco Dect o Eco Plus (che non emette di continuo), e non lo usino bambini e ragazzi. Se possibile, fare altrettanto sul posto di lavoro.



7

Attenzione agli altri oggetti

connessi: stampanti, smart TV (staccare l'alimentazione elettrica quando non in uso, altrimenti continua a emettere), GPS (da usare solo se necessario), babyphone... **Evitare le console di gioco senza filo.**



3...2...1
START GAME
EXIT
Nintendo