

Telefonia Celular e Tumores Cerebrais

Porque se preocupar???

Júlio César Thomé de Souza, MD, MSc

Hospital Federal de Ipanema – MS

Unidade de Pesquisa Clínica – UFF/HFI

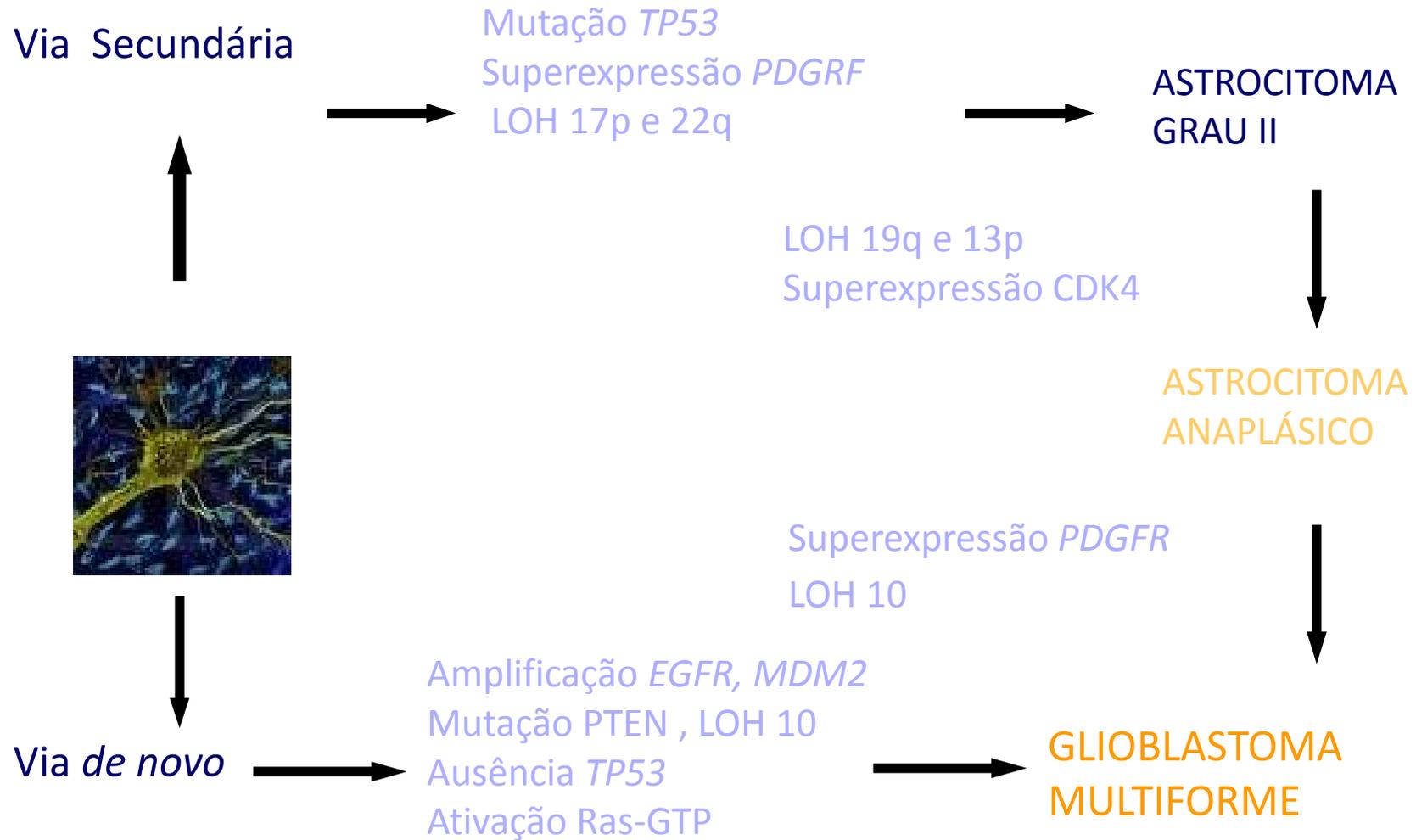
“Today, more than ever before, science holds the key to our survival as a planet and our security and prosperity as a nation. It’s time we once again put science at the top of our agenda and work to restore America’s place as the world leader in science and technology. It’s about listening to what our scientists have to say, even when it’s inconvenient — especially when it’s inconvenient.”

President Barack Obama

Porque o Tumor Cerebral???

- A maioria dos tumores cerebrais podem se espalhar através do tecido cerebral mas, raramente, se disseminam para outras áreas do corpo.
- Mesmo os chamados “tumores benignos” podem, ao crescer, comprimir o tecido cerebral normal, causando danos quase sempre incapacitantes e as vezes fatais.
- Por este motivo, fala-se geralmente de “tumores” do cérebro; um pouco mais do que o “câncer cerebral”.

Alterações Genéticas - GLIOMAS



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CELLULAR-TELEPHONE USE AND BRAIN TUMORS

PETER D. INSKIP, Sc.D., ROBERT E. TARONE, Ph.D., ELIZABETH E. HATCH, Ph.D., TIMOTHY C. WILCOSKY, Ph.D.,
WILLIAM R. SHAPIRO, M.D., ROBERT G. SELKER, M.D., HOWARD A. FINE, M.D., PETER M. BLACK, M.D.,
JAY S. LOEFFLER, M.D., AND MARTHA S. LINET, M.D.

CONCLUSIONS: These data do not support the hypothesis that the recent use of hand-held cellular telephones causes brain tumors, but they are not sufficient to evaluate the risks among long-term, heavy users and for potentially long induction periods.

Revisão Bibliográfica



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www.surgicalneurology-online.com

Neoplasm

Cell phones and brain tumors: a review including the long-term epidemiologic data[☆]

Vini G. Khurana, PhD, FRACS^{a,b,*}, Charles Teo, MBBS, FRACS^c, Michael Kundi, PhD^d,
Lennart Hardell, MD, PhD^e, Michael Carlberg, MSc^e

Methods: In order to be included in the present meta-analysis, studies were required to have met all of the following criteria: (i) publication in a peer-reviewed journal; (ii) inclusion of participants using cell phones for ≥ 10 years (ie, minimum 10-year “latency”); and (iii) incorporation of a “laterality” analysis of long-term users (ie, analysis of the side of the brain tumor relative to the side of the head preferred for cell phone usage). This is a meta-analysis incorporating all 11 long-term epidemiologic studies in this field.

Results: The results indicate that using a cell phone for ≥ 10 years approximately doubles the risk of being diagnosed with a brain tumor on the same (“ipsilateral”) side of the head as that preferred for cell phone use. The data achieve statistical significance for glioma and acoustic neuroma but not for meningioma.

Conclusion: The authors conclude that there is adequate epidemiologic evidence to suggest a link between prolonged cell phone usage and the development of an ipsilateral brain tumor.

Estatística Celular / ano

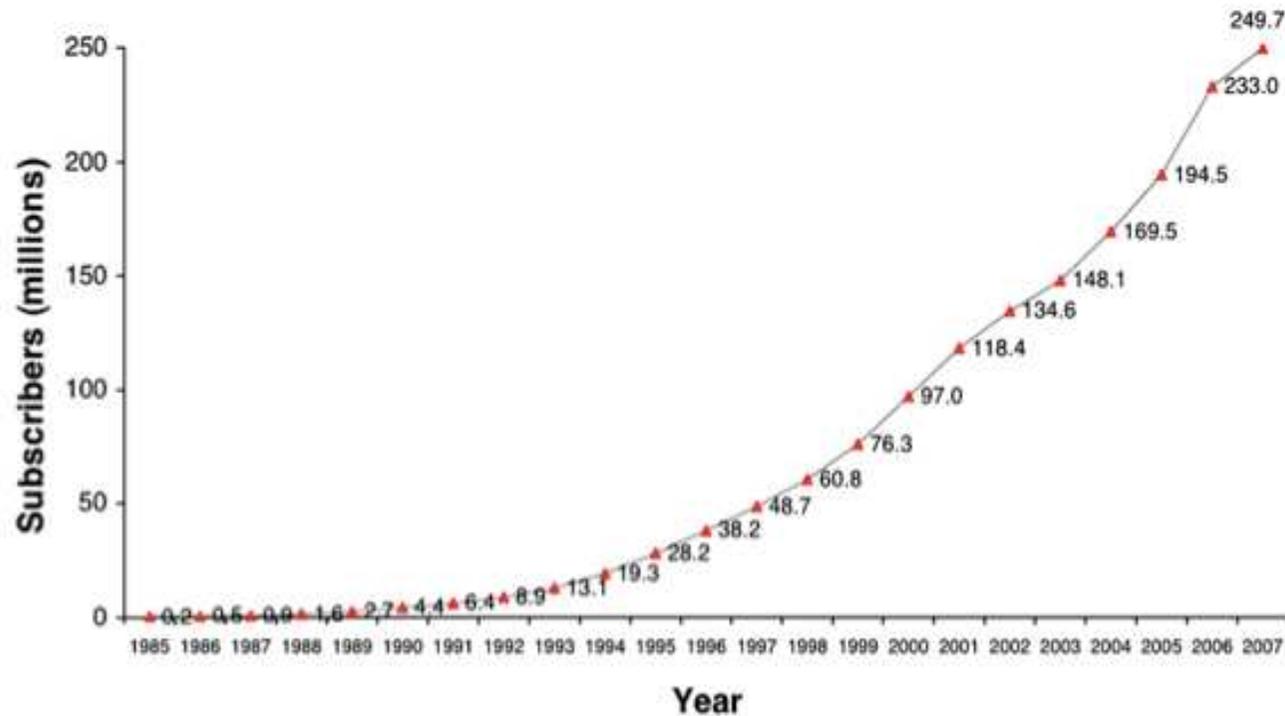


Fig. 2. Number of US cell phone subscribers by year (data source: Cellular Telecommunications Industry Association, 2007).

Incidência de Tumor primário no SNC

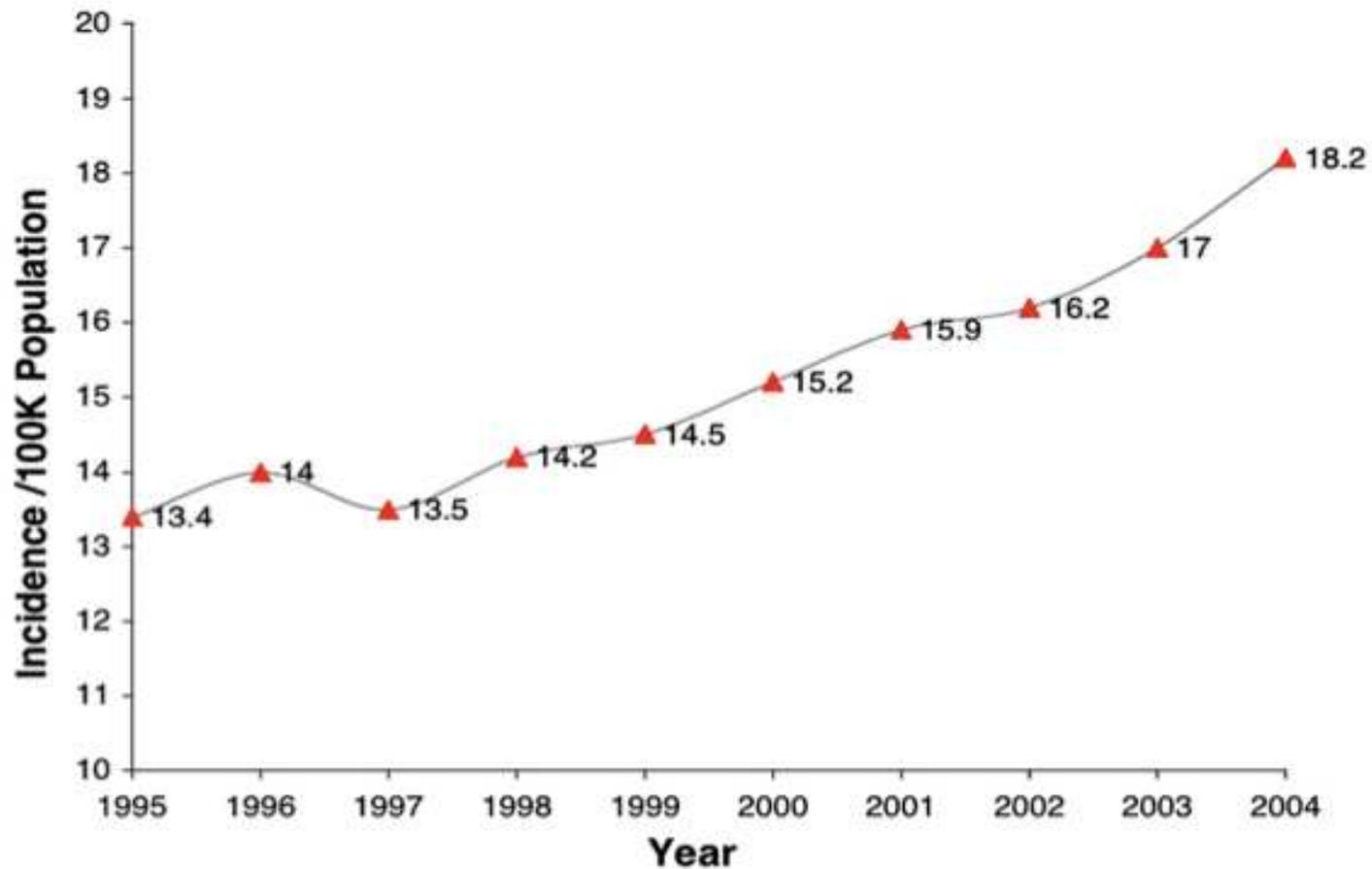


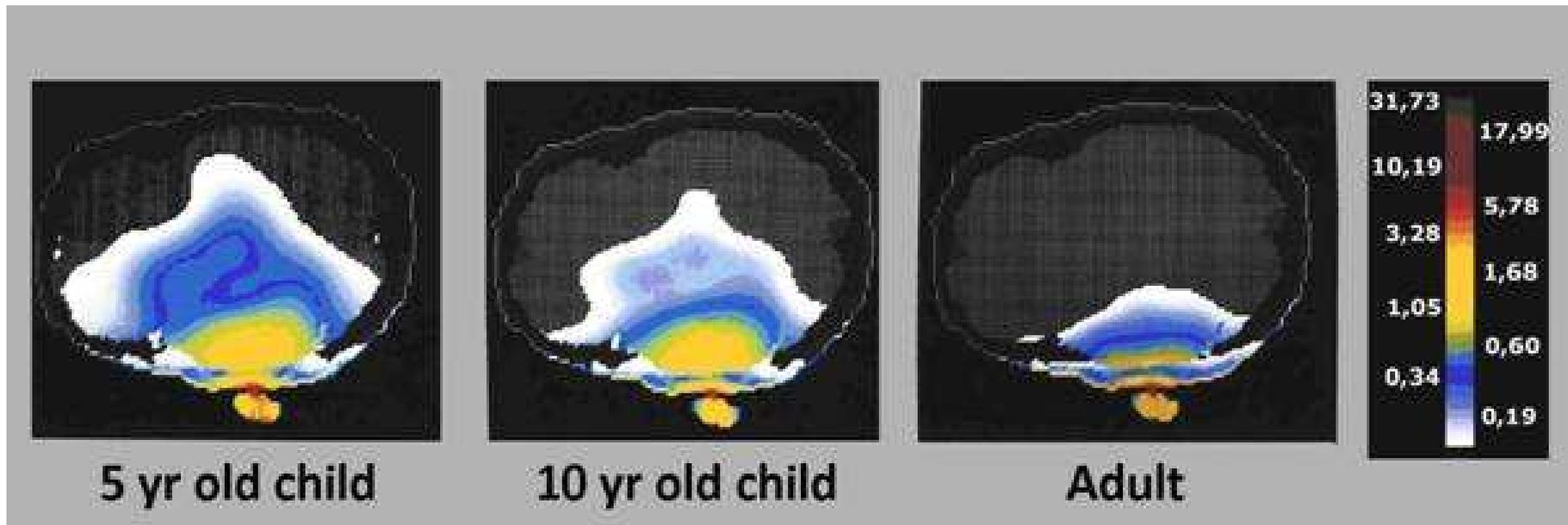
Fig. 3. Age-adjusted incidence of primary CNS tumors by year; US population 2000 standard (data source: CBTRUS 2008) [6].

Uso de Celular por longo tempo e Tumor Cerebral

Risco Sugestivo porém sem Dados Conclusivos

- Case-control study (Hardell et al Int. J of Oncology. 28:509-518, 2006)
 - Acoustic neuroma: **OR=2.9 (CI 2.0-4.3; analogue cell phone), OR=1.5 (CI 1.1-2.1; digital cell phone); OR=1.5-fold (CI 1.04-2.0, cordless phone)**
 - Acoustic neuroma \geq 15 years: **OR=3.8 (CI 1.4-10; analogue cell phone)**
- Review of 11 case-control published studies with \geq 10 years wireless cell phone use (Hardell et al. Occ Env Med. 64:626-632, 2007).
 - Increase in acoustic neuroma (4 studies statistically significant)
 - Increase in glioma (all gave increased odds ratios, 4 statistically significant)
 - Meta-analysis
 - Acoustic neuroma (ipsilateral) **OR=2.4 (CI 1.1- 5.3)**
 - Glioma (ipsilateral)) **OR 2.0 (CI 1.2-3.4)**
- Meta-analysis (Hardell et al. Int J of Oncology, 32:1097-1103, 2008)
 - 6 studies glioma: latency \geq 10 years, 4 studies ipsilateral **OR=2.0 (CI 1.2-3.4)**
 - 4 studies acoustic neuroma: latency \geq 10 years, ipsilateral **OR=2.4 (CI 1.1-5.3)**
- Meta-analysis (Kan et al. J Neurooncol 86:71-78, 2008, UTAH study)
 - 5 case control studies with cell phone use \geq 10 years: brain tumor **OR=1.25 (CI 1.01-1.54)**
- INTERPHONE (2008 update)
 - Glioma, ipsilateral **OR=1.39 (CI 1.01-1.92)**; Nordic study (Lahkola et al, 2007)

A Radiação do Telefone Celular é absorvida mais profundamente dentro de cérebros de crianças



Estimation of the absorption of electromagnetic radiation from a cell phone based on age (Frequency GSM 900 Mhz) (On the right, color scale showing the *Specific Absorption Rate* in W/kg)

Gandhi, O.P.G. Lazzi, and C.M. Furse, *Electromagnetic Absorption in the Human Head and Neck for Cell Telephones at 835 and 1900 MHz*. IEEE Transactions on Microwave Theory and Techniques, 1996. **44**(10): p. 1884-1897

INTERPHONE Study - 2010

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THEME: CANCER

Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case–control study

The INTERPHONE Study Group*

Corresponding author. Elisabeth Cardis; CREAL, Doctor Aiguader 88, 08003 Barcelona, Spain. E-mail: ecardis@creal.cat

*List of members of this study group is available in the Appendix.

Methods An interview-based case–control study with 2708 glioma and 2409 meningioma cases and matched controls was conducted in 13 countries using a common protocol.

Conclusions Overall, no increase in risk of glioma or meningioma was observed with use of mobile phones. There were suggestions of an increased risk of glioma at the highest exposure levels, but biases and error prevent a causal interpretation. The possible effects of long-term heavy use of mobile phones require further investigation.

O que a indústria diz???

- Não há associação entre a incidência de glioma e o nível de uso do telefone celular.
- A lateralidade do tumor não está relacionada com a lateralidade do uso do celular.
- As conclusões são similares para meningioma & neurinoma do acústico.

O que a indústria diz???

Uso de Celular e Risco de Glioma

Acumulativo

Uso (hr)	Controles	Casos	OR	IC 95%
Nunca/raro	625	398	1.0	
< 13	55	26	0.8	0.4 - 1.4
13 to 100	58	26	0.7	0.4 - 1.3
> 100	54	32	0.9	0.5 - 1.6
> 500	27	11	0.5	0.2 - 1.3

Uso de Celular e Risco de Glioma: Lateralidade do Tumor e Uso do Celular

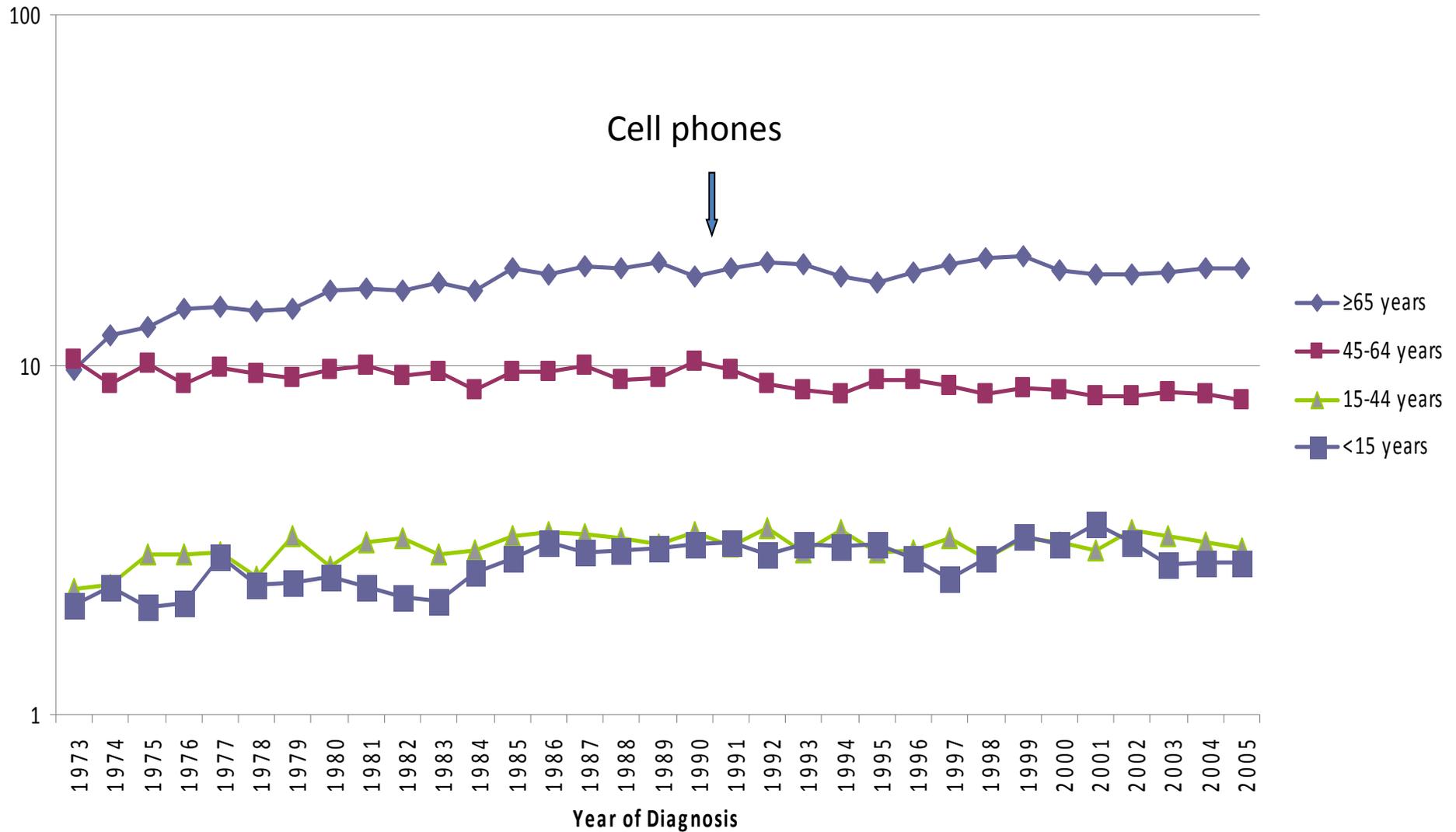
Uso do Celular*			
Tumor	Canhoto	Destro	P-valor**
Esquerdo	8	18	0.77
Direito	10	17	

* Uso \geq 6 meses antes do diagnóstico de tumor

** Teste para independência

Trends in Brain Cancer Incidence By Age, 1973-2005

Surveillance, Epidemiology and End Results (SEER) - USA



Brain cancer statistics

- The American Cancer Society estimates that 21,810 malignant tumors of the brain or spinal cord (11,780 in men and 10,030 in women) will be diagnosed during 2008 in the United States. These numbers would likely be much higher if benign tumors were also included. About 13,070 people (7,420 men and 5,650 women) will die from these tumors.
- This would account for about 1.5% of all cancers and 2.3% of all expected cancer-related deaths in 2008. Both adults and children are included in these statistics.
- Overall, the chance that a person will develop a malignant tumor of the brain or spinal cord in his or her lifetime is less than 1% (about 1 in 150 for a man and 1 in 182 for a woman).

Conclusões

Pesquisas das próprias indústrias mostraram que celulares causaram tumores cerebrais.

Cell Phones, Invisible Hazards in the Wireless Age, An Insiders Alarming Discoveries About Cancer and Genetic Damage, Dr. George Carlo and Martin Schram, Carrol & Graf Publishers, Inc. New York, 2001

Subsequentes pesquisas, custeadas pelas indústrias, também mostraram que usando um celular eleva-se o risco de tumor cerebral(2000-2002).

Auvinen, et al., Brain tumors and salivary gland cancers among cellular telephone users, Epidemiology 13 (May (3)) (2002) 356–359. [Risk of glioma (cancer) with more than 3 years of cellphone use: OR=1.7, 95% Confidence Interval 0.9 to 3.5, p=0.12, 88% confidence, and percentage increase risk of glioma per year of cellphone use: OR=1.2, 95% Confidence Interval 1.0 to 1.4, p= 0.050, 95% confidence]

Estudos INTERPHONES, publicados até o momento, sugerem que um aument do risco de tumores cerebrais em exposições de altos níveis de uso, por menos de 10 anos. No entanto, nenhum aumento do risco de gliomas ou meningiomas foram observados???

Conclusões

Pesquisas independentes evidenciam que há risco de tumores cerebrais pelo uso de celular.

Hansson Mild, et al., Pooled analysis of two Swedish case-control studies on the use of mobile and cordless telephones and the risk of brain tumours diagnosed during 1997–2003, *Int. J. Occup. Safety Ergon. (JOSE)* 13 (1) (2007) 63–71

Independente dos resultados de estudo INTERPHONES, um risco significativo para tumores cerebrais pelo uso de celular foi ainda assim encontrado.

Morgan LL. Estimating the risk of brain tumors from cellphone use: Published case-control studies. *Pathophysiology*. 2009 Apr 6. [Epub ahead of print]

Eles sugerem que quando 02 altos riscos combinados (10 ou mais anos de uso do celular e o uso do celular do mesmo lado da cabeça que o tumor foi diagnosticado) estão presentes, então um significante aumento de risco é reportado

Kundi, M. The Controversy about a Possible Relationship between Mobile Phone Use and Cancer. *Environmental Health Perspectives* doi: 10.1289/ehp.11902

Conclusões

O perigo de tumores cerebrais pelo uso de celular é maior em crianças e adolescentes do que em adultos, principalmente quando eles iniciam e mantêm o uso por um longo período.

Hardell and Carlberg. Mobile phones, cordless phones and the risk for brain tumours. INTERNATIONAL JOURNAL OF ONCOLOGY 35: 5-17, 2009.

Os limites atuais de exposição para celulares são baseados somente no perigo a exposição pelo calor.

Microwave News. Interphone Project: The Cracks Begin To Show, Cardis Endorses Precaution. 19 June 2008 (<http://snurl.com/ostx9>, accessed 28 June 2009).

A radiação emitida pelo celular danifica o DNA, uma causa indiscutível de câncer.

Phillips et al., Electromagnetic fields and DNA damage. Pathophysiology. 2009 Mar 3. [Epub]

Conclusões

A radiação emitida pelo celular tem sido mostrada como causa de quebra da barreira hemoencefálica.

Salford et al. TOPIC IN FOCUS 2: RF-EMF and BBB, Non-thermal Electromagnetic Fields from Mobile Phones and Base Stations do have Effects Upon the Mamalian Brain. BioEM 2009 Meeting, Davos, Switzerland. 16 June 2009.

Manuais de celulares avisam aos consumidores para manter seus aparelhos longe do corpo sempre que o aparelho não esteja em uso.

Nokia 1100 User's Guide, page 63

Motorola V195 GSM User's Manual, page 70

Safety and Product Information, BlackBerry Curve 8300 Smartphone, p15 and 17

A fertilidade masculina é afetada pela radiação do celular.

Argarwaletal. Effect of cellphone usage on semen - an alysis in menattending infertility clinic:an observational study. Fertil Steril. 2008 Jan;89(1):124-8. Epub 2007 May 4.

Estudos Independentes vs Estudos Custeados pela Indústria

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.	154	47.5%	76	23.5%	230	70.6%
	%	67.0%		33.0%			
Totals		181	55.5%	145	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



MUITO OBRIGADO