



Interphone Brain Tumors Studies To Date

An Examination of Poor Study Design
Resulting in an UNDER-ESTIMATION
of the Risk of Brain Tumors

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Methodology

What If There Is No Risk of Brain Tumors?

- ORs <1.0 would be ~equal ORs >1.0
 - Think coin tossing
 - OR=1.0 are excluded
 - OR <1.0 implies protection
 - OR >1.0 implies risk
- 13 Interphone brain tumor studies to date
 - 10 Interphone brain tumor studies analyzed
 - 3 excluded: 2 overlapping studies, 1 recent study
- Calculate Protection/Risk ratio (OR <1.0 /OR >1.0)
- Calculate binomial p-values



Methodology

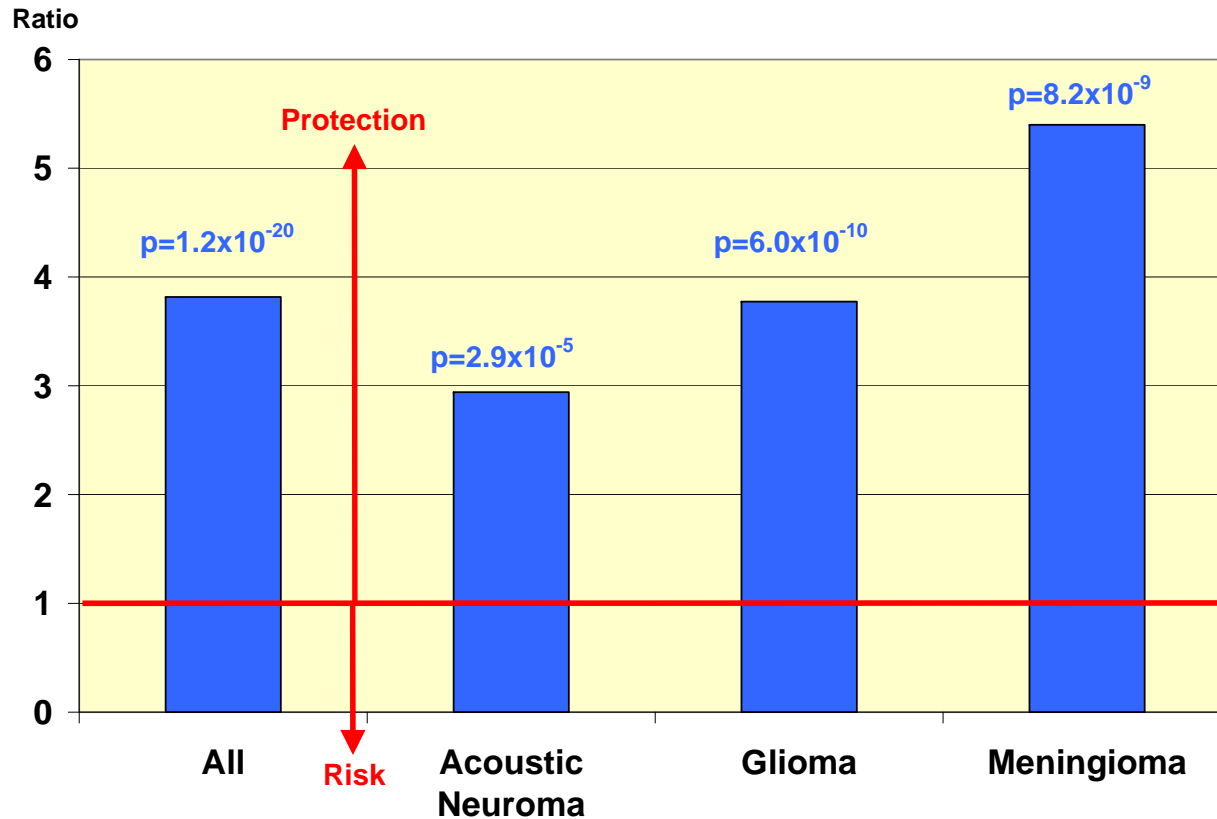
Statistical Independence

- Compare between studies, not within studies
 - Comparison categories
 - Brain Tumors
 - All
 - Acoustic Neuroma
 - Glioma
 - Meningioma
 - Years of use (Years)
 - Cumulative hours of use (Hours)
 - Cumulative number of calls (Call #)
 - “Regular” cellphone use (“Regular”)
 - Years of ipsilateral cellphone use (Years Ipsi)
 - Years of contralateral cellphone use (Yrs Contra)
 - Minutes of cellphone use per day (Min/Day)



Results

Protection/Risk Ratio by Brain Tumor Type

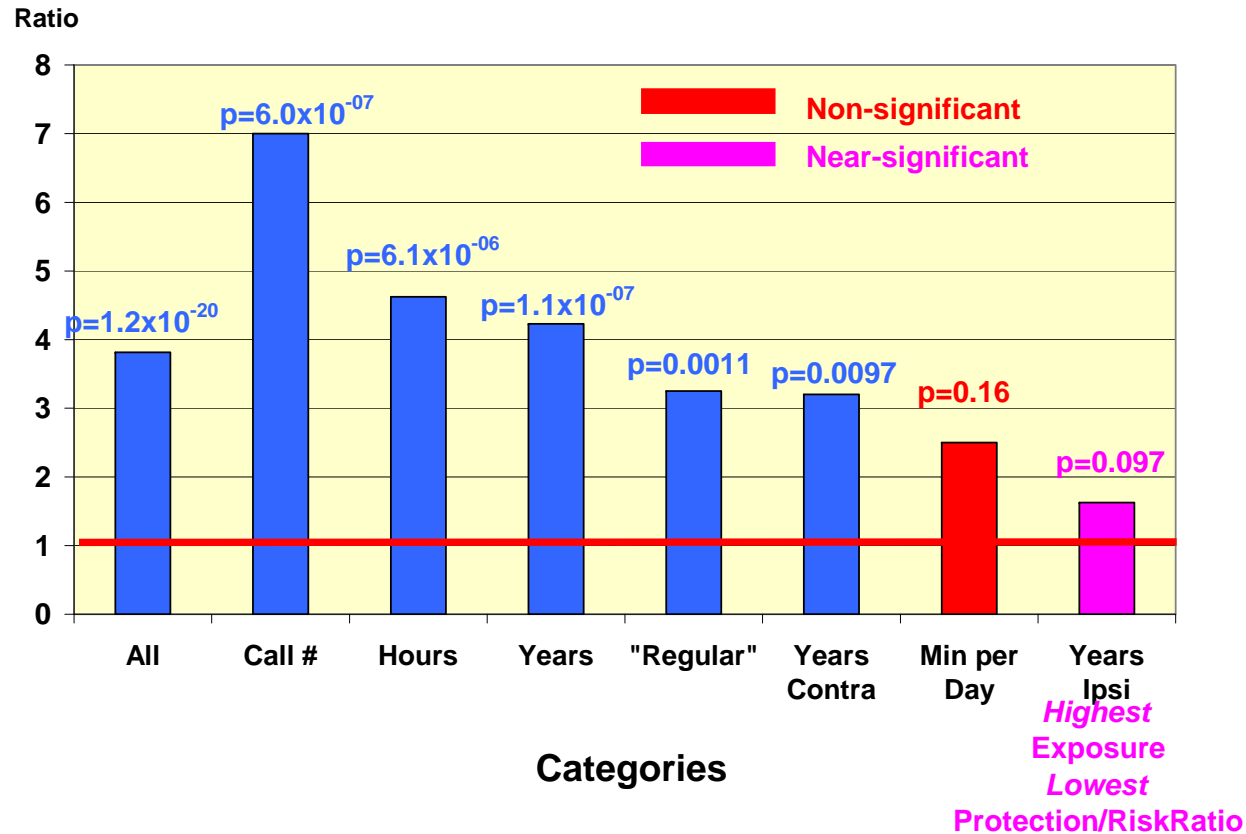




Results

Protection/Risk Ratio by Category

(exclusive of brain tumor types)

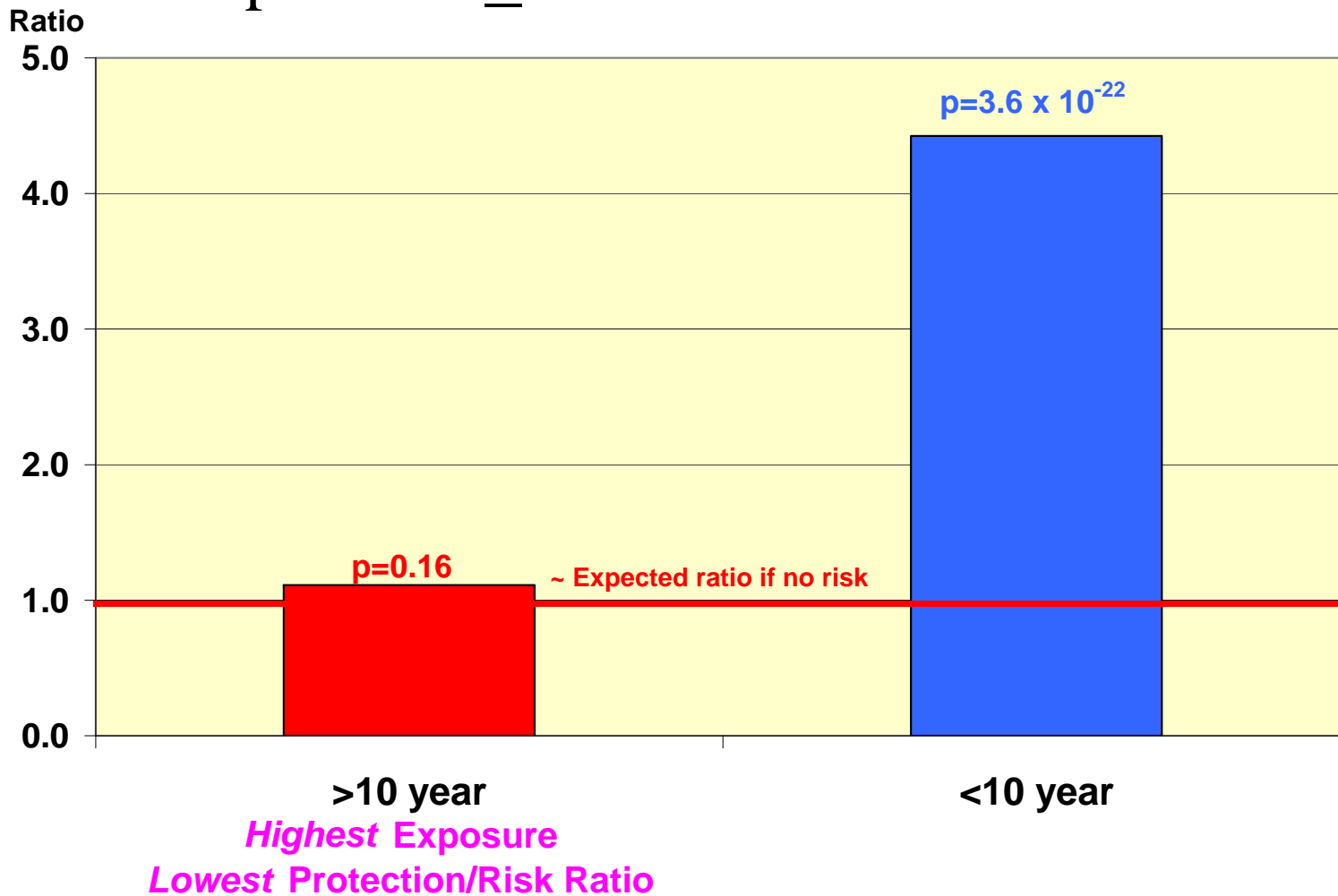




Results

Protection/Risk Ratio

Exposures: ≥ 10 Years and < 10 Years





Interphone Protocol Design Flaws

- **Flaw 1: Selection Bias**
 - Participating controls use cellphones more than non-participating controls
 - Weighted average control participation rate: 59%
 - Controls and cellphone use (Löon 2004)
 - » Participating: 59% used a cellphone
 - » Non-participating: 34% used a cellphone
 - Underestimates risk
- **Flaw 2: Tumors outside the radiation plume are treated as “exposed”**
 - Underestimates risk

Flaw 2

Tumors Outside Radiation Plume Are “Exposed”

- Ipsilateral: **exposed** Contralateral: **unexposed**
- Percentage of absorbed cellphone radiation by anatomical structure
 - Ipsilateral temporal lobe: 50-60% ~15% of brain's volume
 - “Ipsilateral” cerebellum: 12-25% ~5% of brain's volume
- 62-85% of absorbed radiation is in ~20% of the brain's volume



Interphone Protocol Design Flaws

- **Flaw 3:** Short latency times
 - Ionizing radiation & brain tumor: 20-40 years
 - Smoking & lung cancer: ~30 years
 - Asbestos & mesothelioma: 20-40 years
 - Short latency times underestimates risk
- **Flaw 4:** Definition of “regular” user
 - At least once a week for 6 months or more
 - Definition of “regular” user underestimates risk



Flaws 3 & 4: Latency Time & “Regular” Use

- UK cellphone subscriber data
 - 85% of “regular” use
 - <5 years
 - 98% of “regular” use
 - <10 years
- Years of use (latency time) too short for Dx
- Reporting “regular” use
 - Suppresses finding a risk



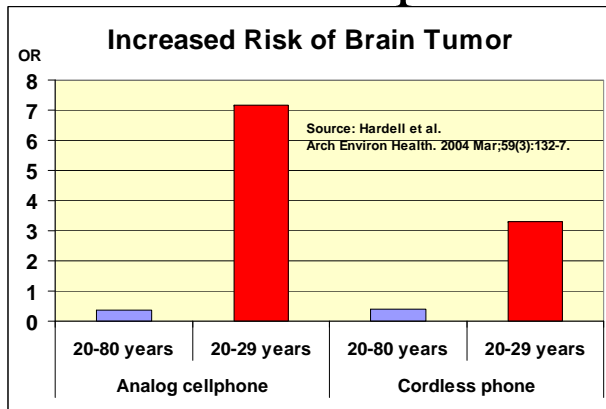
Interphone Protocol Design Flaws

- **Flaw 5:** Young adults and children are excluded
 - Young adults and children
 - Highest risk group
 - Underestimates risk

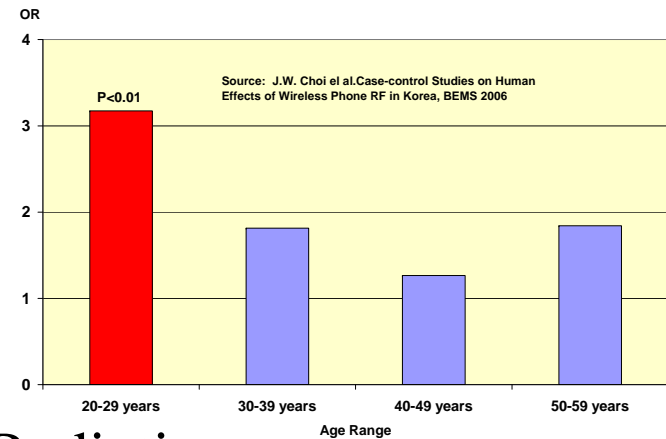
Flaw 5

Young Adults and Children Excluded

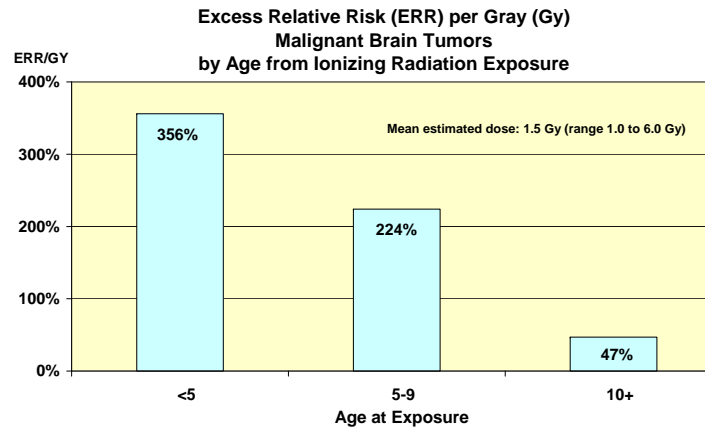
Swedish: Cellphone.



Korean: Cellphone



Israeli: Ionizing Radiation



Source: Sadezki et al., RADIATION RESEARCH 163, 424-432 (2005)



Interphone Protocol Design Flaws

- **Flaw 6:** Cellphones radiating higher power levels are not examined (few exceptions)
 - Analog Vs Digital cellphone use
 - Rural Vs Urban cellphone use
 - Without inclusion of cellphones radiating the most power there is an underestimation of risk
 - Requires sufficient number of cases for statistical power
- **Flaw 7:** Other RF exposures treated as unexposed
 - Cordless phones, walkie-talkies, etc.
 - Underestimation of risk



Interphone Protocol Design Flaws

- **Flaw 8:** Exclusion of brain tumor types
 - Includes acoustic neuroma, glioma & meningioma
 - Excludes other brain tumor types
 - Underestimates risk
- **Flaw 9:** Exclusion of brain tumor cases because of death
 - Underestimates risk of the most deadly brain tumors



Flaw Mitigation

- Increase the diagnosis eligibility time
 - Ten Interphone studies: weighted-average 2.6 years
 - Hardell et al. eligibility time: 6 years
- Lower age range to ≤ 10 years
- Pay controls (and cases?) for participation in study
 - Do not tell controls what is the purpose of the study
- Interview proxies in case of death
- Treat unexposed tumors as unexposed
- Etc., Etc., Etc., ...
 - **It could have been done**



Conflicts-of-Interest

- Cellphone Industry
 - If risk is found: major revenue loss
 - Interphone's funding is inadequate to mitigate flaws
 - Substantial funding from cellphone industry
- Researchers' conflict-of-interest (unconscious?)
 - Source of funds: known in spite of "Firewall"
 - Honest, but "Don't bite the hand that feeds you"
 - **90 significant *protective* results**
 - Ignored by authors (no commentary in the text)



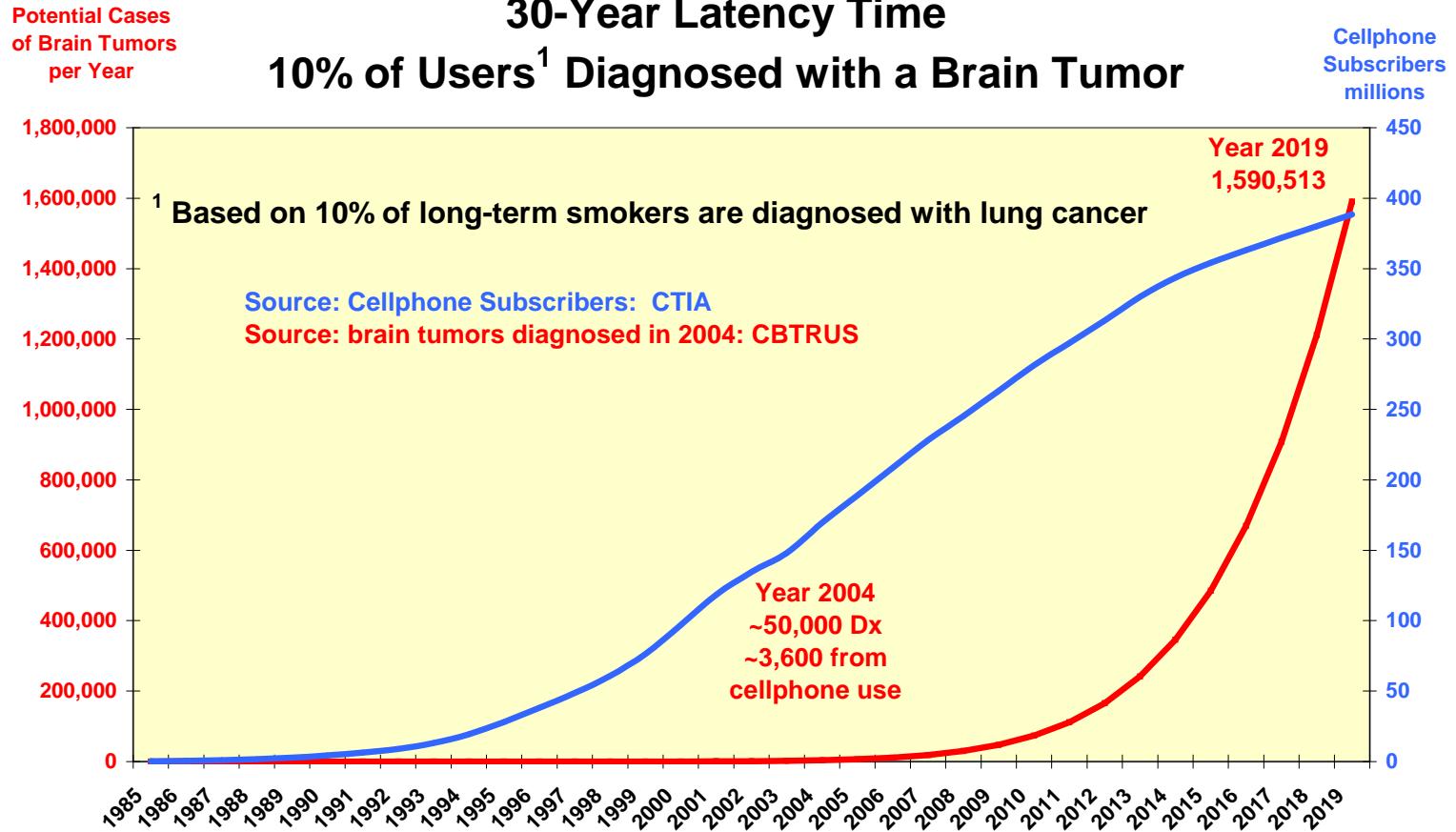
Conclusions

- **Either cellphone use is protective, or the study has major flaws**
- The Interphone Protocol substantially, underestimates the risk of brain tumors
 - Protection/Risk Ratio is *lowest* for *highest* exposure
 - Increased exposure counteracts design flaws
 - Significant risk found in the Interphone studies
 - ≥ 10 years and ipsilateral use
- Without design flaws, risk would increase substantially
- Cellphone industry's conflict-of-interest is obvious
- **Potential public health impact is enormous**
- Studies independent of industry are required

Potential Public Health Risk

Potential Brain Tumor Cases From Cellphone Use 30-Year Latency Time

10% of Users¹ Diagnosed with a Brain Tumor





I Pray I'm Wrong!