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

- All: $p=1.2\times10^{-20}$
- Acoustic Neuroma: $p=2.9\times10^{-5}$
- Glioma: $p=6.0\times10^{-10}$
- Meningioma: $p=8.2\times10^{-9}$
Results

Protection/Risk Ratio by Category
(exclusive of brain tumor types)
Results

Protection/Risk Ratio
Exposures: ≥10 Years and <10 Years

\[ \text{Ratio} \]
\[ 5.0 \]
\[ 4.0 \]
\[ 3.0 \]
\[ 2.0 \]
\[ 1.0 \]
\[ 0.0 \]

\[ >10 \text{ year} \]
\[ <10 \text{ year} \]

\[ p=0.16 \]
\[ p=3.6 \times 10^{-22} \]

\text{Highest Exposure}
\text{Lowest Protection/Risk Ratio}

~ Expected ratio if no risk
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

Excess Relative Risk (ERR) per Gray (Gy)
Malignant Brain Tumors by Age from Ionizing Radiation Exposure

Mean estimated dose: 1.5 Gy (range 1.0 to 6.0 Gy)

Source: Sadetzki 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 $\leq 10$ 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 Users\(^1\) Diagnosed with a Brain Tumor

Source: Cellphone Subscribers: CTIA

Source: brain tumors diagnosed in 2004: CBTRUS

Based on 10% of long-term smokers are diagnosed with lung cancer

\(1\) Year 2004

~50,000 Dx

~3,600 from cellphone use

Year 2019

1,590,513

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I Pray I’m Wrong!