CELL PHONE USAGE AND THE RISK OF CANCER

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Purpose and Hypothesis

- Purpose: To evaluate the possible association between cell phone use and cancer risk.
- Hypothesis: Cell phone use is not related to any increase in overall cancer risk and in brain tumors.

Methods

- Data from a recently reported cohort study with null results (Schuz et al. 2006) were realigned.
- To estimate the statistical power at a 1-sided alpha 0.025 level for the results from the study, a simulation method was applied using R.
- Appropriate sample sizes for further analysis at a 1-sided alpha 0.025 level with 0.95 power were explored.

Data Analysis

- Statistical powers to detect cancer risk increases in overall and brain tumors were estimated for Schuz’s study.

Data Analysis

- Under the assumption of the baseline incidence for brain tumors as reported (0.80/100,000 yearly), sample sizes were calculated using 1-sided statistical level 0.025 with 0.95 power as follows:

<table>
<thead>
<tr>
<th>Increase in Cancer Risk (%)</th>
<th>Personal Years (PY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>239</td>
</tr>
<tr>
<td>10</td>
<td>109</td>
</tr>
<tr>
<td>15</td>
<td>56</td>
</tr>
</tbody>
</table>

Conclusion

- Overall, there is no evidence to rule out cell phone’s carcinogenic effect for brain tumors currently.
- The possible increase in risk for brain tumor could be lower.

Future Considerations

- Studies with larger population and/or longer follow-up data.

What I learned

- How to use statistics to analyze and organize data.
- How to use R

Acknowledgements

- Dr. Cuin
- INSA
- IISF

Literature Review

- Current study results for the cell phone use and cancer risk were found to be inconsistent due to limited data.
- Cell phone’s radio frequencies (RF) exposure has been suspected as a possible carcinogen.
- To control known and unknown influences and biases, results from the cohort data were one of the ways to identify the possible moderate or small increase in cancer risk related to cell phone use.

Data Analysis

- In Schuz’s study, data were reported from 43.9,015 cell phone users in Denmark with average 8.5 years follow-up.

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Cases Observed</th>
<th>Cases Expected</th>
<th>Observed Cancer Incidence (10^4/Person-years)</th>
<th>Expected Cancer Incident (10^4/Person-years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>14348</td>
<td>1661</td>
<td>92.44</td>
<td>90.68</td>
</tr>
<tr>
<td>Brain Tumor</td>
<td>800</td>
<td>660</td>
<td>9.84</td>
<td>8.80</td>
</tr>
</tbody>
</table>

Cancer Incidence and Statistical Power Estimates

<table>
<thead>
<tr>
<th>Increment in Cancer Risk (%)</th>
<th>Overall</th>
<th>Brain Tumor</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>10</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>15</td>
<td>0.15</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Abstract

Conclusion: Our simulation results found that there was enough power to detect more than 5% increase in overall cancer risk and confirmed that there was no association between overall cancer risk and cell phone use. But the Danish data did not have power to detect any less than 5% increase in brain tumor risk associated with cell phone use. Therefore, there was insufficient evidence to suggest that there was no increased risk in brain tumor associated with cell phone use. Future studies with either a larger population or longer follow-up times should be conducted to elucidate the relationship between cell phone and brain tumor risk.

References