Title: Effects of radio-frequency electromagnetic waves from cellular phone on human semen parameters, DNA integrity and reactive oxygen species levels: An in vitro pilot study

Objective: The intensive use of mobile phones has raised concern about possible health
problems caused by radiofrequency electromagnetic waves (RF-EMW) emitted by these devices. Reports from epidemiological studies, including our recently published study, suggest that RF-EMW may negatively affect male fertility. The objective of this pilot study was to establish the cause and effect relationship between cell phone radiation and a decrease in sperm parameters.

**Design:** Prospective in vitro controlled study.

**Materials and Methods:** Liquefied semen samples (n = 32) were divided in two parts: one aliquot was exposed to radiation from a commercially available cell phone (Commercially available cell phone, 850 MHz frequency, power density 1-40 μwatt/cm², distance from cell phone antenna to semen specimen: 2.5 cm) for 1h at room temp. The second aliquot was not exposed and served as the control. Sperm concentration, motility, viability, reactive oxygen species (ROS), total antioxidant capacity (TAC), ROS-TAC score and DNA damage were measured and compared between the exposed and unexposed group.

**Results:** Our results show a significant increase in ROS levels and a decrease in sperm motility, viability and ROS-TAC score in the group exposed to RF-EMW. Levels of TAC and DNA integrity did not differ between the two groups.

**Table 1.** Comparison of sperm parameters, viability, ROS, ROS-TAC score between exposed and unexposed samples.

<table>
<thead>
<tr>
<th>Motility (%) (n = 30)</th>
<th>Viability (%) (n = 32)</th>
<th>ROS × 10^6 cpm/ 20 million sperm (n = 32)</th>
<th>ROS-TAC score (n = 23)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed</td>
<td>Unexposed</td>
<td>Exposed</td>
<td>Unexposed</td>
</tr>
<tr>
<td>48.62 ± 17.36</td>
<td>52.11 ± 18.34</td>
<td>52.3 ± 13.21</td>
<td>58.97 ± 14.81</td>
</tr>
<tr>
<td>0.003</td>
<td>&lt;0.001</td>
<td>0.002</td>
<td>0.032</td>
</tr>
</tbody>
</table>

ROS values are expressed as median and 25th and 75th percentile; P <0.05 was considered significant by Wilcoxon rank sum test.

**Conclusions:** The most striking findings of our study were an increase in the levels of ROS and a decrease in ROS-TAC scores in semen samples exposed to RF-EMW. Our results suggest that cell phone radiation may induce seminal oxidative stress; this may result in decreased sperm motility and viability.

**Support:** None.

**Author:** Ashok Agarwal, Ph.D.

**Department/Institution:** Center for Reproductive Medicine, Cleveland Clinic

**Address:** E 9500, Euclid ave, Desk A 19.

**City/State/Zip/Country:** Cleveland, United States

**Phone:** 1-216-444-9485  **Cell Phone:** Fax: 1-216-445-6049  **E-mail:** agarwaa@ccf.org

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Author: Nisarg R Desai, M.D.
Department/Institution: Cleveland Clinic
Address: 
City/State/Zip/Country: Cleveland, United States
Phone: Cell Phone: Fax: E-mail: agarwaa@ccf.org

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check this box, you will not be allowed to participate in this CME activity.

Author: Kartikeya Makker, M.D.
Department/Institution: Cleveland Clinic
Address:
City/State/Zip/Country: Cleveland, United States
Phone: Cell Phone: Fax: E-mail: agarwaa@ccf.org

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Author: Rand Mouradi, M.S.
Department/Institution: Cleveland State University
Address:
City/State/Zip/Country: Cleveland, United States
Phone: Cell Phone: Fax: E-mail: agarwaa@ccf.org

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Author: Edmund Sabanegh, M.D.
Department/Institution: Cleveland Clinic
Address:
City/State/Zip/Country: Cleveland, United States
Phone: Cell Phone: Fax: E-mail: agarwaa@ccf.org
Author: Rakesh Sharma, Ph.D.
Department/Institution: Cleveland Clinic
Address: Cleveland, United States
Phone: Fax: E-mail: agarwaa@ccf.org

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