

# Cell Phone Animal Studies (1997 - 2007)

## WHEELS (PERFORM A)

Principal Authors	Reference	Animal	Exposure: Frequency Modulation (Carcinogen)	Exposure System# Dose (W/Kg)*	Weight (g)			Tumor Incidence** (%)			Sponsor†
					CC	S	E	CC	S	E	
T. Utteridge T. Kuchel (Australia)	<i>Radiation Research</i> <b>158, 357, 2002</b> <b>159, 276, 2003</b>	Mice <i>Pim1</i> (transgenic: lymphoma-prone)	898.4 MHz GSM far-field	Mouse Wheel #1 0.25,1,2,4 1h/d,5d/w,24m	CC Weights Not Given			Lymphoma <sup>a</sup> <b>80</b> <b>75</b> 73,72,78,84 All Tumors <b>85</b> <b>79</b> 82,74,81,85			NHMRC ARPANSA Motorola
D. Yu H. Chiang (China)	<i>Radiation Research</i> <b>165, 174, 2006</b>	Rats (f) Sprague Dawley	900 MHz GSM (with DMBA) far-field	Rat Wheel 0.44,1.33,4 4h/d,5d/w,6m	CC 10% Heavier Than S and E A Statistically Significant Difference			Palpable Masses <sup>§</sup> <b>41</b> <b>19</b> 28,27,32 Mammary Tumors <b>All:</b> <b>60</b> <b>45</b> 37,41,43 <b>Bf:</b> <b>23</b> <b>8</b> 13,7,5 <b>Mf:</b> <b>37</b> <b>37</b> 25,34,38			GSMA MMF (PERFORM A follow-up)
T. Tillmann C. Dasenbrock (Germany)	<i>Bioelectromagnetics</i> <b>28, 173, 2007</b>	Mice B6C3F1	1. 902 MHz GSM 2. 1747 MHz DCS both far-field	Mouse Wheel #2 0.4,1.3,4 2h/d,5d/w,24m	CAGE CONTROL ANIMALS NOT EXAMINED						PERFORM A EC, GSMA, MMF
G. Oberto S. Tofani (Italy)	<i>Radiation Research</i> <b>168, 316, 2007</b>	Mice <i>Pim1</i> (transgenic: lymphoma-prone)	900 MHz GSM far-field	Mouse Wheel #2 0.5,1.4,4 1h/d,7d/w,18m	CC 10% Heavier Than S and E			Lymphoma m: <b>16</b> <b>18</b> 20,20,6 f: <b>52</b> <b>44</b> 36,60,40 All Tumors <b>Bm:</b> <b>26</b> <b>6</b> 8,12,24 <b>Bf:</b> <b>42</b> <b>24</b> 32,30,30 <b>Mm:</b> <b>28</b> <b>26</b> 26,22,12 <b>Mf:</b> <b>70</b> <b>54</b> 58,68,46			PERFORM A EC, GSMA, MMF
P. Smith (Switzerland)	<i>Radiation Research</i> <b>168, 480, 2007</b>	Rats Wistar	1. 902 MHz GSM 2. 1747 MHz DCS both far-field	Rat Wheel 0.44,1.33,4 2h/d,5d/w,24m	CC Weight: "Considerably Greater" Than S and E Exact Numbers Not Available			1. GSM m: <b>20</b> <b>6</b> 16,4,18 f: <b>28</b> <b>40</b> 34,36,30 2. DCS m: <b>20</b> <b>4</b> 16,10,20 f: <b>28</b> <b>42</b> 24,30,32 NO HISTOPATHOLOGY FOR CAGE CONTROLS			PERFORM A EC, GSMA, MMF
R. Hruby (Austria)	Presented at the 8th meeting of the <i>European Bioelectromagnetics Association (EBEA), April 2007</i> (in press, <i>Mutation Research</i> )	Rats (f) Sprague Dawley	902 MHz GSM (with DMBA) far-field	Rat Wheel 0.4,1.3,4 4h/d,5d/w,6m	"No Differences" Between CC and S			Palpable Masses <sup>§</sup> <b>43</b> <b>19</b> 33,26,33 Mammary Tumors <b>All:</b> <b>73</b> <b>60</b> 57,50,65 <b>Bf:</b> <b>28</b> <b>30</b> 17,15,18 <b>Mf:</b> <b>45</b> <b>30</b> 40,35,47			PERFORM A EC, GSMA, MMF

## UNRESTRAINED and PARTIALLY RESTRAINED

Principal Authors	Reference	Animal [number/cage]	Exposure: Frequency Modulation (Carcinogen)	Exposure System <sup>‡</sup> Dose (W/Kg)*	Weight (g)			Tumor Incidence** (%)			Sponsor <sup>†</sup>
					CC	S	E	CC	S	E	
M. Repacholi (Australia)	<i>Radiation Research</i> <b>147, 631, 1997</b>	Mice (f) <i>Pim1</i> (transgenic lymphoma-prone) [5]	900 MHz GSM far-field	Unrestrained 0.008-4.2 0.13-1.4 (average) 2x0.5h/d,18m	_____			NO CAGE CONTROLS			NHMRC Telstra, Ltd.
P. Heikkinen J. Juutilainen (Finland)	<i>Radiation Research</i> <b>156, 775, 2001</b>	Mice CBA/S [6-7]	902.5 MHz NMT <sup>x</sup> 902.4 MHz GSM (with X-ray) far-field	Partial Restraint NMT:1.5 GSM:0.35 up to±30% 1.5h/d,5d/w,18m	S (with X-Rays) Lighter than CC			No Sham/Sham Group Shams Were Exposed to X-Rays			TEKES, FGF Benefon, Finnish Work Environment Fund Elisa Com., Nokia, Sonera
H. Bartsch C. Bartsch (Germany)	<i>Radiation Research</i> <b>157, 183, 2002</b>	Rats Sprague-Dawley [12]	900 MHz GSM (with DMBA) far-field	Unrestrained 0.0175-0.07 (0.08 for young) continuous <sup>‡</sup> , 8-11m	_____ (3 experiments carried out over 3 successive years)			NO CAGE CONTROLS			Deutsche Telekom
P. Heikkinen J. Juutilainen (Finland)	<i>International Journal of Radiation Biology</i> <b>79, 221, 2003</b>	Mice transgenic and non-transgenic [6-7]	849 MHz DAMPS (pulsed at 50 Hz) 902 MHz GSM (with UV) far-field	Partial Restraint both 0.5 ±30% for adults 1.5h/d,5d/w,12m	S (with UV) Lighter than CC			No Sham/Sham Group Shams Were Exposed to UV Radiation			TEKES, Benefon Elisa Com Nokia, Sonera
R. Anane B. Veyret (France)	<i>Radiation Research</i> <b>160, 492, 2003</b>	Rats Sprague-Dawley [8/cage; 1/compartment]	900 MHz GSM (with DMBA) far-field	Partial Restraint 1. 1.4,2.2,3.5 2. 0.1,0.7,1.4 ±0.2 2h/d,5d/w,9w	_____			8 CAGE CONTROL RATS ONLY NO CAGE CONTROL DATA PRESENTED			CNRS France Telecom Aquitaine Research Council
A. Sommer A. Lerchl (Germany)	<i>BMC Cancer</i> <b>4, 77, 2004</b>	Mice AKR/J [6-7]	900 MHz GSM far-field	Unrestrained 0.4 ±40% continuous <sup>‡</sup> , life	_____			NO CAGE CONTROLS			BfS
P. Heikkinen J. Juutilainen (Finland)	<i>Radiation Research</i> <b>166, 397, 2006</b> (see also <i>Radiation Research</i> <b>165, 598, 2006</b> )	Rats (f) Wistar [3]	900 MHz GSM (with MX) far-field	Unrestrained 0.3 (0.07-1.2) 0.9 (0.21-3.6) 2h/d,5d/w,24m	S (with MX) 5% Heavier than CC			No Sham/Sham Group Shams Were Given MX, a Known Carcinogen			CEMFEC EC, Nokia
A. Sommer A. Lerchl (Germany)	<i>Radiation Research</i> <b>168, 72, 2007</b>	Mice AKR/J (lymphoma-prone) [6-7]	1.966 GHz UMTS far-field	Unrestrained 0.4 ±50% continuous <sup>‡</sup> , life	CC Lighter 27.2 38.9 40.4 CCs "had to work harder for their food"			Lymphoma <b>96.7 93.1</b> 88.1			BfS

## CAROUSELS

Principal Authors	Reference	Animal [number/ carousel]	Exposure: Frequency Modulation (Carcinogen)	Exposure System‡ Dose (W/Kg)*	Weight (g)			Tumor Incidence** (%)			Sponsor
					CC	S	E	CC	S	E	
W.R. Adey (U.S.)	<i>Radiation Research</i> <b>152, 293, 1999</b>	Rats Fischer344 [10]	836 MHz TDMA (with ENU) near-field <sup>¶</sup>	0.33-0.53 ±25% in brain 2h/d,4d/w,24m	NO CAGE CONTROLS						Motorola
W.R. Adey (U.S.)	<i>Cancer Research</i> <b>60, 1857, 2000</b>	Rats Fischer344 [10]	836.55 MHz FM (with ENU) near-field <sup>¶</sup>	1.0-1.2 in brain 2h/d,4d/w,24m	Not Given			Central Nervous System Tumors ENU <b>14</b> <b>22</b> 18 non-ENU <b>4</b> <b>1</b> 4			Motorola
B. Zook (U.S.)	<i>Radiation Research</i> <b>155, 572, 2001</b>	Rats Sprague Dawley [10]	860 MHz CW and Pulsed (both with ENU) near-field	0.27-0.42 1.0 ±0.2 in brain 6h/d,5d/w,22m	CC Heavier Exact Numbers Not Available			Brain Tumors 0 ENU <b>10</b> <b>7</b> CW: 5, P: 8 2.5 ENU <b>8</b> <b>9</b> CW: 5, P: 13 10 ENU <b>68</b> <b>58</b> CW: N/A, P: 60			Motorola
M. La Regina J. Roti Roti (U.S.)	<i>Radiation Research</i> <b>160, 143, 2003</b>	Rats Fischer344 [10]	835.62 MHz FDMA 847.74 MHz CDMA near-field	1.3 ±0.5 in brain 4h/d,5d/w,24m	NO CAGE CONTROLS						Motorola
L. Anderson (U.S.)	<i>Radiation Research</i> <b>162, 201, 2004</b>	Rats Fischer344 [10]	1.6 GHz Iridium near-field <sup>¶</sup>	0.16,1.6 +15%/-30% in brain 2h/d,7d/w,24m	CC Heavier Than E or S Exact Numbers Not Available			CAGE CONTROLS NOT EXAMINED			Motorola

\* Whole-Body, except where noted

\*\* CC: Cage control; S: sham; E: exposed; **B**: benign; **M**: malignant; **m**: male; **f**: female

¶ Following far-field exposure *in utero*

§ Approximate numbers; read off graph

† ARPANSA: Australian Radiation Protection and Nuclear Safety Agency; PERFORM A: project funded under the EC's 5th Framework Research Program; BfS: German Bureau for Radiation Protection; CEMFEC: project funded under the EC's 5th Framework Research Program; CNRS: Centre National de la Recherche Scientifique; FGF: Research Association for Radio Applications (Germany); GSMA: GSM Alliance; MMF: Mobile Manufacturers Forum; EC: European Commission; NHMRC: National Health and Medical Research Council; TEKES: The National Technology Agency (Finland). PERFORM A received additional funding from the Austrian and Swiss governments.

‡ In the Utteridge study, the mouse wheel (#1) could accommodate up to 40 mice. For PERFORM A, the wheel was redesigned (#2), and could hold up to 65. The rat wheel could accommodate up to 17 rats.

∅ These percentages are approximate; Utteridge and Kuchel reported different statistics at different times.

¥ Nordic Mobile Telephones (NMT): This system used CW radiation.

ƒ Continuous except when animals were weighed, or palpated, and when the cages were cleaned.

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