

FMK / FGF Workshop
Erbgutschäden durch Mobilfunk?
Wien, 17. September 2008

Wissenschaftliche Methodik und Kommunikation

Prof. Dr. Alexander Lerchl
Jacobs-University Bremen

Grundsätzliche Anforderungen für “gute wissenschaftliche Praxis”

- Geeignete Kontrollen
- Ausreichend große Gruppen
- Verblindung
- Offenlegung der Originaldaten
- Methodische Reproduzierbarkeit
- Peer-Review mit statistisch versierten Gutachtern



Available online at www.sciencedirect.com

SCIENCE @ DIRECT®

Mutation Research 583 (2005) 178–183

Genetic Toxicology and
Environmental Mutagenesis

www.elsevier.com/locate/gentox

Community address: www.elsevier.com/locate/mutres

Non-thermal DNA breakage by mobile-phone radiation (1800 MHz) in human fibroblasts and in transformed GFSH-R17 rat granulosa cells in vitro

Elisabeth Diem^a, Claudia Schwarz^a, Franz Adlkofer^b,
Oswald Jahn^a, Hugo Rüdiger^{a,*}

^a *Division of Occupational Medicine, Medical University of Vienna, Waehringer Guertel 18-20, Vienna 1090, Austria*

^b *Verum Foundation, Munich, Germany*

Received 30 May 2003; received in revised form 18 February 2005; accepted 23 March 2005

Grundsätzliche Anforderungen für “gute wissenschaftliche Praxis” erfüllt?

- ✓ Geeignete Kontrollen
- ✓ Ausreichend große Gruppen
- ✓ Verblindung (laut Publikation ...)
- Offenlegung der Originaldaten
- ✓ Methodische Reproduzierbarkeit
- Peer-Review mit statistisch versierten Gutachtern

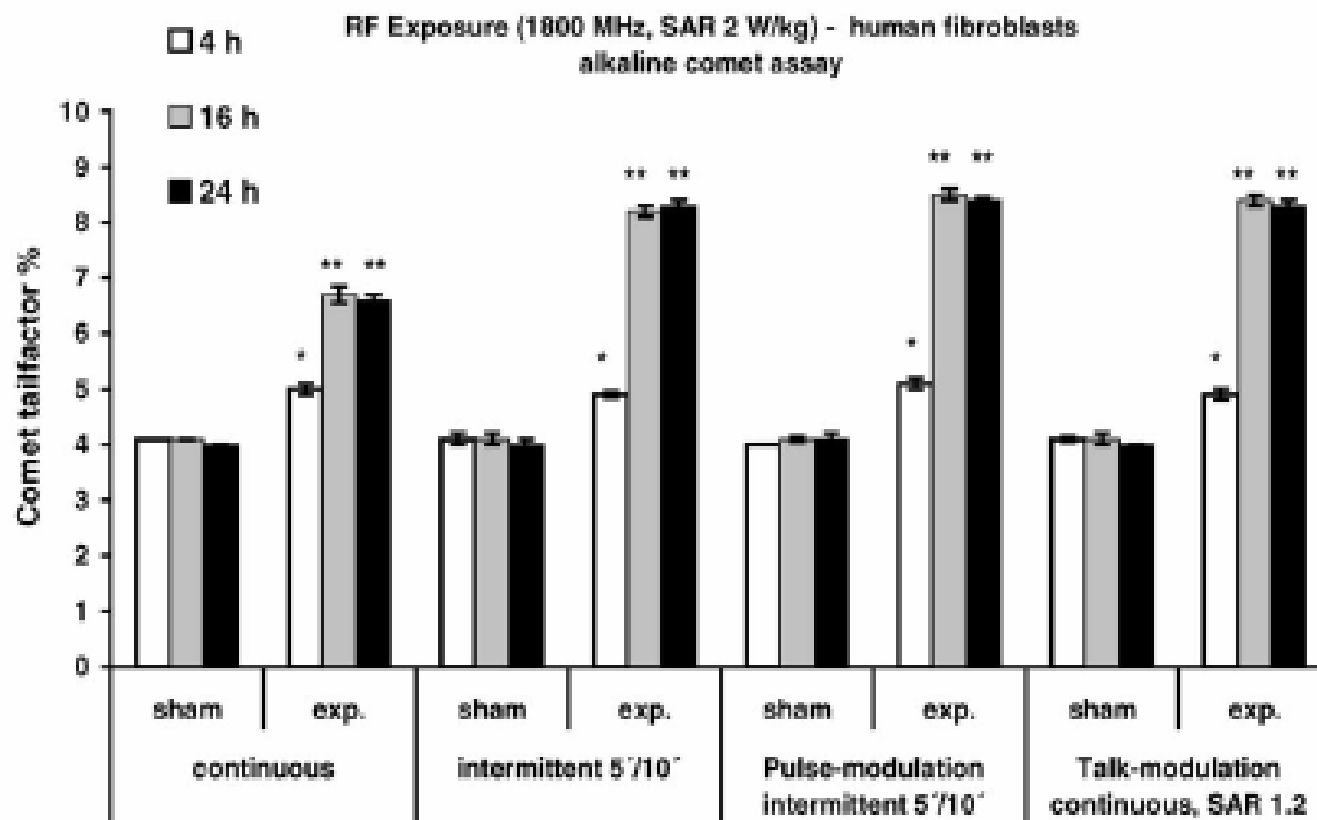


Fig. 1. Influence of exposure time and different exposure conditions on the formation of DNA single- and double-strand breaks in human fibroblasts, determined with the comet assay under alkaline conditions (* statistically not significant, ** $p < 0.01$).

Letter to the Editor

**Comments on: “DNA strand breaks” by Diem et al.
[Mutat. Res. 583 (2005) 178–183] and Ivancsits et al.
[Mutat. Res. 583 (2005) 184–188]**

Vijayalaxmi*

*Department of Radiation Oncology,
University of Texas Health Science Center,
San Antonio, TX 78229, USA*

James P. McNamee

*Consumer and Clinical Radiation Protection
Bureau, Health Canada, Ont., Canada*

Maria Rosaria Scarfi

*CNR-IREA, Via Diocleziano,
328-80124 Napoli, Italy*

Our concern also relates to the statistics applied in these studies. In the study by Diem et al. [1], the data presented in Figs. 1 and 2 (SSB), 3 and 4 (DSB) show negligible standard deviations. It is not clear whether the standard deviations were calculated from a total of 2000 comets (1000 comets from each of duplicate experiments) or from the mean of the two experiments. If the standard deviations were based on 2000 individual comet measurements, then, it is nearly assured that significant differences will be obtained between exposed and sham groups as the standard deviations generated are negligible. Indeed, it is surprising that such small standard deviations were presented in Diem et al. [1] while in the technical document describing the ‘tail factor’ transformation technique, the standard deviations reported by Diem et al. [4] were ~25% that of the mean. Most researchers would consider the use of standard error of the means (S.E.M.) to be the appropriate variance estimator used for statistical analysis and the data from a minimum of at least three independent experiments.

. . . .

In conclusion, a ‘potential’ increase in the number of confounding cells (S-phase with replication forks-induced strand breaks and/or ‘apoptotic cells’ with severely fragmented DNA) in RFR- and ELF-EMF-exposed cells, relative to sham-exposed samples, would certainly increase the number of cells classified into category E. For every 1% increase in confounding cells in category E the tail factor would increase by a value of 1.0. Since the numbers of these confounding cells were

Viel zu geringe Standardabweichungen

Widersprüche zu Daten, die die Gruppe selbst publiziert hat

Erhebliche Auswirkungen einzelner Zellzahlen

Reply to the Letter to the Editor

Reply to the letter by Vijayalaxmi et al.

in EMF-exposure

Hugo W. Rüdiger*
Elisabeth Kratochvil
Alexander Pilger

*Division of Occupational Medicine,
Medical University of Vienna,
Währinger Gürtel 18-20,
A-1090 Vienna, Austria*

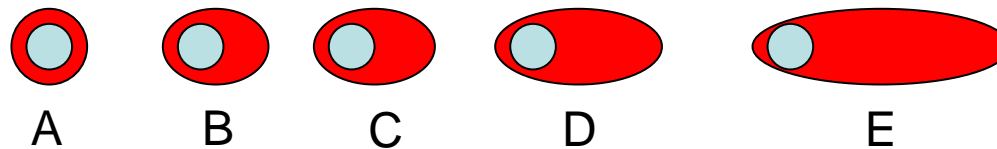
Table 1
Raw data of comet-tail factors corresponding to Fig. 1 in Diem and co-workers [3]

Cell line ES-1. Alkaline comet assay		Number of cells counted as					TF %	
		A >5 ^a	B 5–20 ^a	C 20–40 ^a	D 40–95 ^a	E >95 ^a	With E	Without E
GSM basic 1800 MHz SAR 2 W/kg continuous wave	exp. 4 h	442	40	12	3	3	4.9	4.4
	exp. 4 h	441	38	14	4	3	5.1	4.6
	sham 4 h	451	36	11	2	0	4.1	4.1
	sham 4 h	452	37	9	1	1	4.1	3.9
	exp. 16 h	423	46	18	7	6	6.5	5.4
	exp. 16 h	419	47	20	7	7	6.8	5.5
	sham 16 h	452	37	9	1	1	4.1	3.9
	sham 16 h	452	36	10	1	1	4.1	3.9
	exp. 24 h	419	47	20	8	6	6.7	5.6
	exp. 24 h	423	45	19	7	6	6.5	5.4
	sham 24 h	452	37	9	2	0	4.0	4.0
	sham 24 h	449	40	10	0	1	4.0	3.9
	exp. 4 h	444	37	14	3	2	4.8	4.4
	exp. 4 h	443	39	12	3	3	4.9	4.3
GSM basic 1800 MHz SAR 2 W/kg 5' on, 10' off	sham 4 h	448	39	11	1	1	4.2	4.0
	sham 4 h	446	43	11	0	0	4.0	4.0
	exp. 16 h	413	46	16	12	13	8.3	5.9
	exp. 16 h	417	44	14	13	12	8.2	5.9
	sham 16 h	451	36	10	2	1	4.2	4.0
	sham 16 h	449	39	11	0	1	4.0	3.9
	exp. 24 h	412	45	18	13	12	8.4	6.2
	exp. 24 h	410	49	17	13	11	8.2	6.2
	sham 24 h	452	35	11	1	1	4.1	3.9
	sham 24 h	450	40	10	0	0	3.9	3.9
GSM basic 1800 MHz 217 Hz pulsmodulation 5' on, 10' off	exp. 4 h	440	38	15	4	3	5.2	4.6
	exp. 4 h	443	37	14	3	3	5.0	4.4
	sham 4 h	451	38	10	0	1	4.0	3.8
	sham 4 h	453	36	9	1	1	4.0	3.8
	exp. 16 h	414	45	15	13	13	8.4	6.0
	exp. 16 h	414	42	17	13	14	8.6	6.1
	sham 16 h	448	41	9	1	1	4.1	3.9
	sham 16 h	446	42	12	0	0	4.0	4.0
	exp. 24 h	416	44	14	13	13	8.3	5.9
	exp. 24 h	412	47	16	12	13	8.4	6.0
	sham 24 h	447	42	8	2	1	4.2	4.0
	sham 24 h	449	40	10	0	1	4.0	3.9
GSM basic 1800 MHz talkmodulation	exp. 4 h	441	38	15	3	3	5.0	4.5
	exp. 4 h	445	36	14	3	2	4.8	4.4
	sham 4 h	449	40	10	1	0	4.0	4.0
	sham 4 h	449	38	12	1	0	4.1	4.1
	exp. 16 h	412	47	15	15	11	8.3	6.3
	exp. 16 h	412	46	15	14	13	8.5	6.2
	sham 16 h	452	35	10	2	1	4.2	4.0
	sham 16 h	452	37	9	2	0	4.0	4.0
	exp. 24 h	412	47	16	14	11	8.2	6.2
	exp. 24 h	412	49	13	13	13	8.4	6.0
	sham 24 h	448	41	10	1	0	4.0	4.0
	sham 24 h	443	46	11	0	0	4.0	4.0

Total amount of counted cells: 500 cells/slide; two slides/experiment were evaluated separately.

^a % of DNA-fragmentation.

Der Comet-Assay



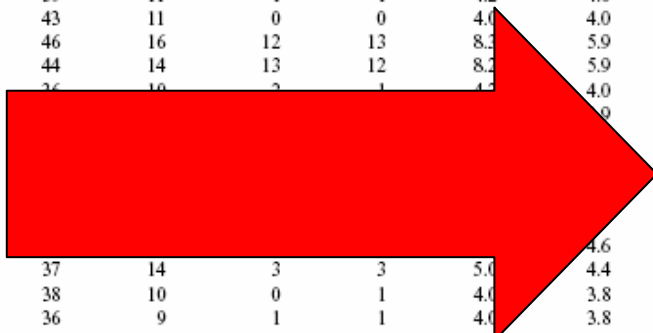
The first line of Table 1 (“exp. 4h”) in the response letter by Rüdiger et al. is given here to fully describe the analysis:

Cell Type	Factor	Number	Number * Factor	Cumul. Sum
A	2.5	442	1105.0	1105.0
B	12.5	40	500.0	1605.0
C	30	12	360.0	1965.0
D	67.5	3	202.5	2167.5
E	97.5	3	292.5	2640.0

The last number (2460), divided by 500 (number of cells), yields the tail factor of 4.92. The data for the second row in Table 1 of the response letter of Rüdiger et al. yield 5.12, the average of the two replicates is therefore 5.02, the standard deviation is 0.14. These and the remaining data in the table (column “TF % with E”) correspond to Fig. 1 of the original publication.

Table 1
Raw data of comet-tail factors corresponding to Fig. 1 in Diem and co-workers [3]

Cell line ES-1. Alkaline comet assay		Number of cells counted as					TF %	
		A >5 ^a	B 5-20 ^a	C 20-40 ^a	D 40-95 ^a	E >95 ^a	With E	Without E
GSM basic 1800 MHz SAR 2 W/kg continuous wave	exp. 4 h	442	40	12	3	3	4.9	4.4
	exp. 4 h	441	38	14	4	3	5.1	4.6
	sham 4 h	451	36	11	2	0	4.1	4.1
	sham 4 h	452	37	9	1	1	4.1	3.9
	exp. 16 h	423	46	18	7	6	6.5	5.4
	exp. 16 h	419	47	20	7	7	6.8	5.5
	sham 16 h	452	37	9	1	1	4.1	3.9
	sham 16 h	452	36	10	1	1	4.1	3.9
	exp. 24 h	419	47	20	8	6	6.7	5.6
	exp. 24 h	423	45	19	7	6	6.5	5.4
	sham 24 h	452	37	9	2	0	4.0	4.0
	sham 24 h	449	40	10	0	1	4.0	3.9
	exp. 4 h	444	37	14	3	2	4.8	4.4
	exp. 4 h	443	39	12	3	3	4.9	4.3
GSM basic 1800 MHz SAR 2 W/kg 5' on, 10' off	sham 4 h	448	39	11	1	1	4.2	4.0
	sham 4 h	446	43	11	0	0	4.0	4.0
	exp. 16 h	413	46	16	12	13	8.2	5.9
	exp. 16 h	417	44	14	13	12	8.2	5.9
	sham 16 h	451	36	10	2	1	4.2	4.0
	sham 16 h	449	36	10	2	1	4.2	4.0
	exp. 24 h	412	47	16	12	13	8.4	6.0
	exp. 24 h	410	47	16	12	13	8.4	6.0
	sham 24 h	452	37	9	2	0	4.0	4.0
	sham 24 h	450	37	9	2	0	4.0	4.0
	exp. 4 h	440	37	14	3	3	5.0	4.6
	exp. 4 h	443	37	14	3	3	5.0	4.4
	sham 4 h	451	38	10	0	1	4.0	3.8
	sham 4 h	453	36	9	1	1	4.0	3.8
GSM basic 1800 MHz 217 Hz pulsmodulation 5' on, 10' off	exp. 16 h	414	45	15	13	13	8.4	6.0
	exp. 16 h	414	42	17	13	14	8.6	6.1
	sham 16 h	448	41	9	1	1	4.1	3.9
	sham 16 h	446	42	12	0	0	4.0	4.0
	exp. 24 h	416	44	14	13	13	8.3	5.9
	exp. 24 h	412	47	16	12	13	8.4	6.0
	sham 24 h	447	42	8	2	1	4.2	4.0
	sham 24 h	449	40	10	0	1	4.0	3.9
	exp. 4 h	441	38	15	3	3	5.0	4.5
	exp. 4 h	445	36	14	3	2	4.8	4.4
	sham 4 h	449	40	10	1	0	4.0	4.0
	sham 4 h	449	38	12	1	0	4.1	4.1
	exp. 16 h	412	47	15	15	11	8.3	6.3
	exp. 16 h	412	46	15	14	13	8.5	6.2
sham 16 h	452	35	10	2	1	4.2	4.0	
sham 16 h	452	37	9	2	0	4.0	4.0	
exp. 24 h	412	47	16	14	11	8.2	6.2	
exp. 24 h	412	49	13	13	13	8.4	6.0	
sham 24 h	448	41	10	1	0	4.0	4.0	
sham 24 h	443	46	11	0	0	4.0	4.0	



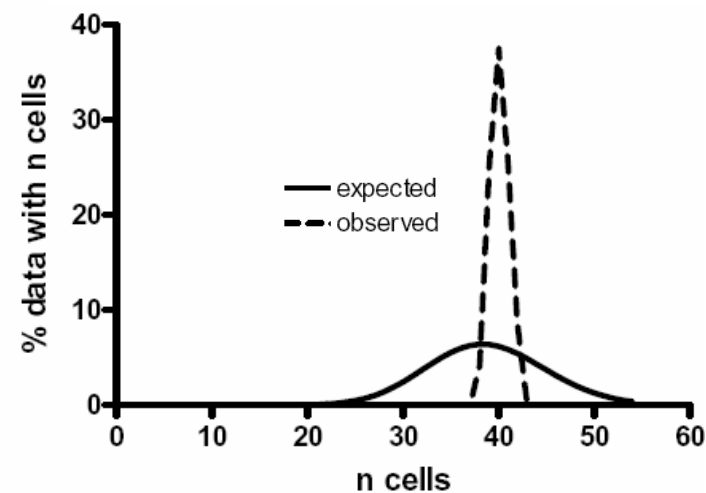
Letzte Ziffern:
2: 14 x
5: 1 x
p=0.001

Total amount of counted cells: 500 cells/slide; two slides/experiment were evaluated separately.

^a % of DNA-fragmentation.

Table 1
Raw data of comet-tail factors corresponding to Fig. 1 in Diem and co-workers [3]

Cell line ES-1. Alkaline comet assay		Number of cells counted as					TF %	
		A >5*	B 5-20*	C 20-40*	D 40-95*	E >95*	With E	Without E
GSM basic 1800 MHz SAR 2 W/kg continuous wave	exp. 4 h	442	40	12	3	3	4.9	4.4
	exp. 4 h	441	38	14	4	3	5.1	4.6
	sham 4 h	451	36	11	2	0	4.1	4.1
	sham 4 h	452	37	9	1	1	4.1	3.9
	exp. 16 h	423	46	18	7	6	6.5	5.4
	exp. 16 h	419	47	20	7	7	6.8	5.5
	sham 16 h	452	37	9	1	1	4.1	3.9
	sham 16 h	452	36	10	1	1	4.1	3.9
	exp. 24 h	419	47	20	8	6	6.7	5.6
	exp. 24 h	423	45	19	7	6	6.5	5.4
	sham 24 h	452	37	9	2	0	4.0	4.0
	sham 24 h	449	40	10	0	1	4.0	3.9
GSM basic 1800 MHz SAR 2 W/kg 5' on, 10' off	exp. 4 h	444	37	14	3	2	4.8	4.4
	exp. 4 h	443	39	12	3	3	4.9	4.3
	sham 4 h	448	39	11	1	1	4.2	4.0
	sham 4 h	446	43	11	0	0	4.0	4.0
	exp. 16 h	413	46	16	12	13	8.3	5.9
	exp. 16 h	417	44	14	13	12	8.2	5.9
	sham 16 h	451	36	10	2	1	4.2	4.0
	sham 16 h	449	39	10	2	1	4.2	3.9
	exp. 24 h	412	45	16	12	13	8.4	6.0
	exp. 24 h	410	49	14	13	12	8.4	6.0
	sham 24 h	452	35	10	2	1	4.2	4.0
	sham 24 h	450	40	10	0	1	4.0	3.9
GSM basic 1800 MHz 217 Hz pulsmodulation 5' on, 10' off	exp. 4 h	440	38	14	3	3	5.0	4.6
	exp. 4 h	443	37	14	3	3	5.0	4.4
	sham 4 h	451	38	10	0	1	4.0	3.8
	sham 4 h	453	36	9	1	1	4.0	3.8
	exp. 16 h	414	45	15	13	13	8.4	6.0
	exp. 16 h	414	42	17	13	14	8.6	6.1
	sham 16 h	448	41	9	1	1	4.1	3.9
	sham 16 h	446	42	12	0	0	4.0	4.0
	exp. 24 h	416	44	14	13	13	8.3	5.9
	exp. 24 h	412	47	16	12	13	8.4	6.0
	sham 24 h	447	42	8	2	1	4.2	4.0
	sham 24 h	449	40	10	0	1	4.0	3.9
GSM basic 1800 MHz talkmodulation	exp. 4 h	441	38	15	3	3	5.0	4.5
	exp. 4 h	445	36	14	3	2	4.8	4.4
	sham 4 h	449	40	10	1	0	4.0	4.0
	sham 4 h	449	38	12	1	0	4.1	4.1
	exp. 16 h	412	47	15	15	11	8.3	6.3
	exp. 16 h	412	46	15	14	13	8.5	6.2
	sham 16 h	452	35	10	2	1	4.2	4.0
	sham 16 h	452	37	9	2	0	4.0	4.0
	exp. 24 h	412	47	16	14	11	8.2	6.2
	exp. 24 h	412	49	13	13	13	8.4	6.0
	sham 24 h	448	41	10	1	0	4.0	4.0
	sham 24 h	443	46	11	0	0	4.0	4.0

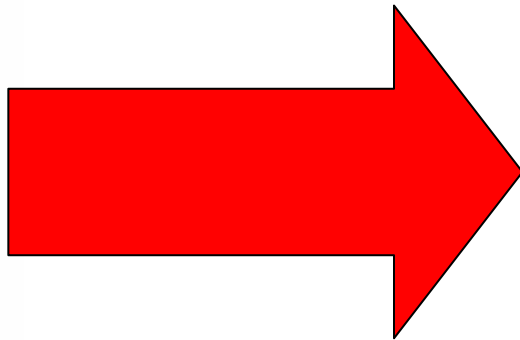


Total amount of counted cells: 500 cells/slide; two slides/experiment were evaluated separately.

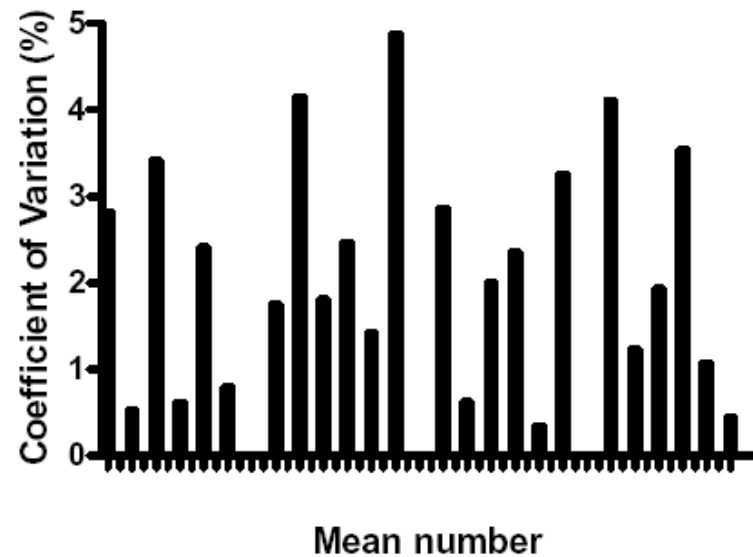
* % of DNA-fragmentation.

		TF %
E		With E
		>95 ^a
3		4.9
3		5.1
0		4.1
1		4.1
6		6.5
7		6.8
1		4.1
1		4.1
6		6.7
6		6.5
0		4.0
1		4.0
2		4.8
3		4.9
1		4.2
0		4.0
13		8.3
12		8.2
1		4.2
1		4.0
12		8.4
11		8.2
1		4.1
0		3.9
3		5.2
3		5.0
1		4.0
1		4.0
13		8.4
14		8.6
1		4.1
0		4.0
13		8.3
13		8.4
1		4.2
1		4.0
3		5.0
2		4.8
0		4.0
0		4.1
11		8.3
13		8.5
1		4.2
0		4.0
11		8.2
13		8.4
0		4.0
0		4.0

24 average values
each: n=2



**Coefficients of Variations of the 24 Data Pairs
in Table 1 (Rüdiger et al., Mut. Res. 603: 107 - 109)**



Die zweite Wiener Mobilfunkstudie

Int Arch Occup Environ Health
DOI 10.1007/s00420-008-0305-5

ORIGINAL ARTICLE

Radiofrequency electromagnetic fields (UMTS, 1,950 MHz) induce genotoxic effects in vitro in human fibroblasts but not in lymphocytes

**Claudia Schwarz · Elisabeth Kratochvil ·
Alexander Pilger · Niels Kuster · Franz Adlkofer ·
Hugo W. Rüdiger**

Received: 10 August 2007 / Accepted: 30 January 2008
© Springer-Verlag 2008

Online February 2008

International Archives of Occupational and Environmental Health
Editor-in-Chief: Hans Drexler, Erlangen-Nürnberg

Editorial Board u.a.

H. W. Rüdiger

Dept. of Occupational Medicine

University Hospital for Internal Medicine IV

Währinger Gürtel 18-20

1090 Vienna, Austria

Table 2 Percentage of nuclei visually classified as A–E according to the proportion of DNA in the “tail” of comets (indicating degree of DNA fragmentation), after exposure of fibroblasts of donor ES-1 to various SAR levels as indicated in Fig. 1

Exposure conditions			A cells <5%	B cells 5–20%	C cells 20–40%	D cells 40–95%	E cells >95%	Comet tail factor (%)
<i>n</i> = 3	0.05 W/kg	Exposed	379.9 ± 2.03	81.7 ± 3.11	23.7 ± 2.18	5.2 ± 0.62	9.5 ± 0.68	7.9 ± 0.17
		Sham	440.2 ± 2.84	40.8 ± 2.76	15.0 ± 1.21	2.5 ± 0.90	1.5 ± 0.90	4.7 ± 0.15
		Positive cont.	11.7 ± 3.64	178.6 ± 3.86	227.3 ± 4.01	40.7 ± 3.88	44.2 ± 2.86	32.2 ± 0.41
		Negative cont.	449.1 ± 2.76	43.8 ± 2.46	15.6 ± 1.25	2.7 ± 0.78	1.8 ± 0.88	4.8 ± 0.16
<i>n</i> = 3	0.1 W/kg	Exposed	301.3 ± 6.34	128.3 ± 4.19	32.8 ± 3.02	7.9 ± 0.80	29.7 ± 2.08	13.5 ± 0.40
		Sham	436.9 ± 3.80	43.6 ± 3.03	15.4 ± 1.56	2.7 ± 1.29	1.4 ± 0.79	4.9 ± 0.19
		Positive cont.	12.2 ± 3.17	175.6 ± 3.75	224.1 ± 3.79	42.0 ± 3.45	44.2 ± 2.45	31.6 ± 0.36
		Negative cont.	441.4 ± 2.77	40.8 ± 2.78	16.0 ± 1.12	2.8 ± 0.98	2.0 ± 0.94	4.9 ± 0.24
<i>n</i> = 3	0.5 W/kg	Exposed	370.8 ± 2.31	72.3 ± 2.71	31.6 ± 1.82	9.2 ± 1.03	16.2 ± 1.12	10.0 ± 0.26
		Sham	439.6 ± 3.43	41.5 ± 2.93	15.5 ± 1.78	2.2 ± 0.75	1.2 ± 0.72	4.7 ± 0.18
		Positive cont.	11.5 ± 2.84	179.9 ± 3.23	225.9 ± 3.63	42.1 ± 2.89	44.3 ± 2.79	32.1 ± 0.36
		Negative cont.	448.7 ± 2.74	41.0 ± 2.73	16.1 ± 1.37	2.4 ± 0.82	1.9 ± 0.79	4.8 ± 0.17
<i>n</i> = 3	1.0 W/kg	Exposed	398.3 ± 5.19	46.8 ± 3.58	37.1 ± 3.99	9.3 ± 1.56	8.7 ± 0.71	8.3 ± 0.15
		Sham	444.3 ± 5.55	39.2 ± 4.51	12.9 ± 1.25	2.3 ± 0.78	1.2 ± 1.05	4.4 ± 0.19
		Positive cont.	11.2 ± 3.27	179.6 ± 3.45	228.1 ± 3.49	40.9 ± 3.39	43.9 ± 2.53	32.0 ± 0.37
		Negative cont.	450.1 ± 2.72	44.1 ± 2.49	16.0 ± 1.19	2.3 ± 0.81	2.1 ± 1.07	4.9 ± 0.19
<i>n</i> = 3	2.0 W/kg	Exposed	402.8 ± 4.02	44.0 ± 3.74	30.5 ± 1.45	14.8 ± 1.11	8.0 ± 1.04	8.5 ± 0.29
		Sham	453.2 ± 2.29	28.5 ± 1.51	14.8 ± 0.62	2.3 ± 0.62	1.3 ± 0.98	4.4 ± 0.19
		Positive cont.	11.8 ± 3.27	180.0 ± 3.89	227.2 ± 3.39	44.6 ± 3.51	44.0 ± 2.28	32.0 ± 0.42
		Negative cont.	441.1 ± 2.36	42.9 ± 2.37	16.1 ± 1.29	2.4 ± 0.79	2.0 ± 0.91	4.8 ± 0.23

Coefficient of variation: calculated by S.D. / mean

SAR levels

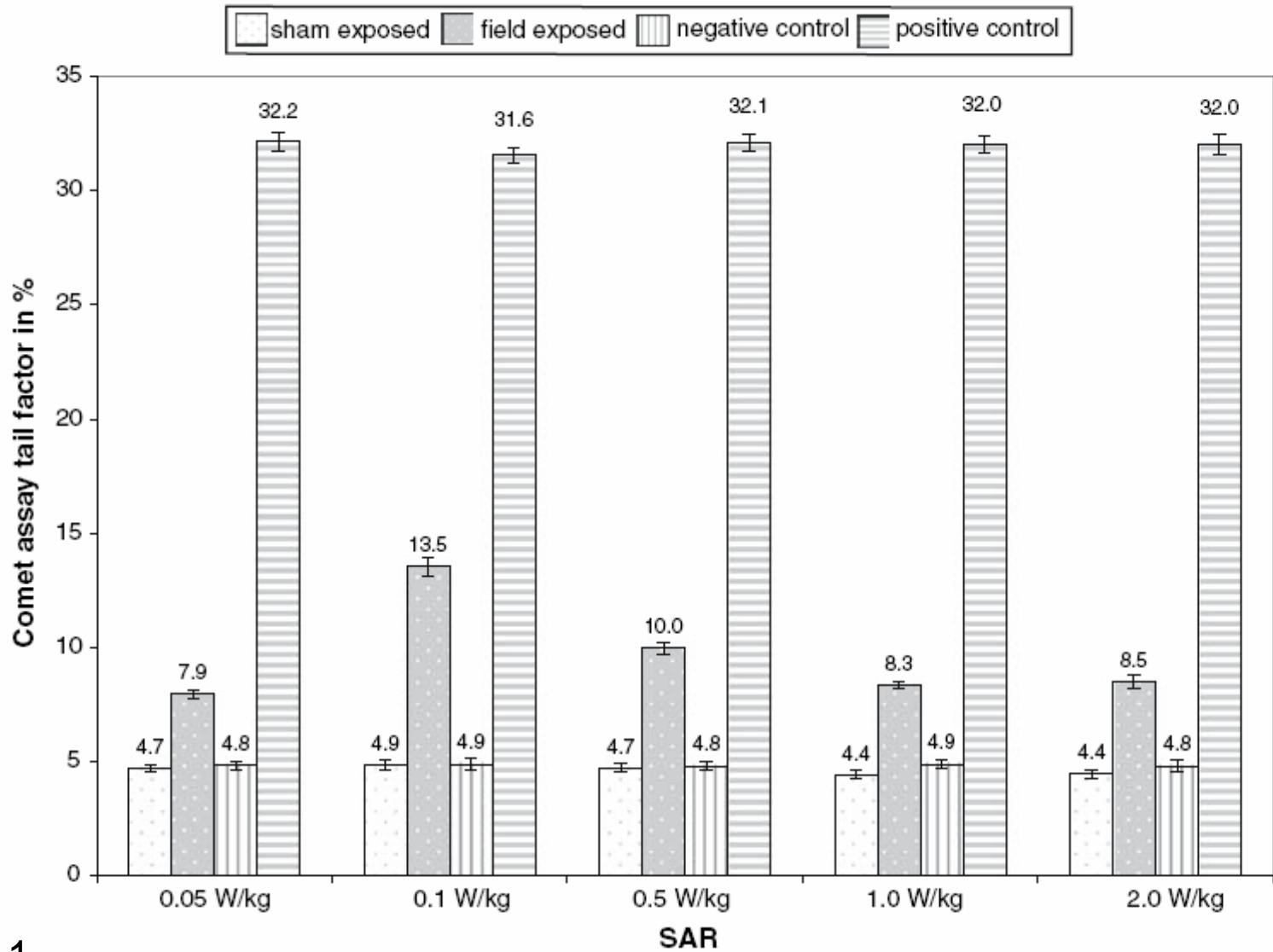
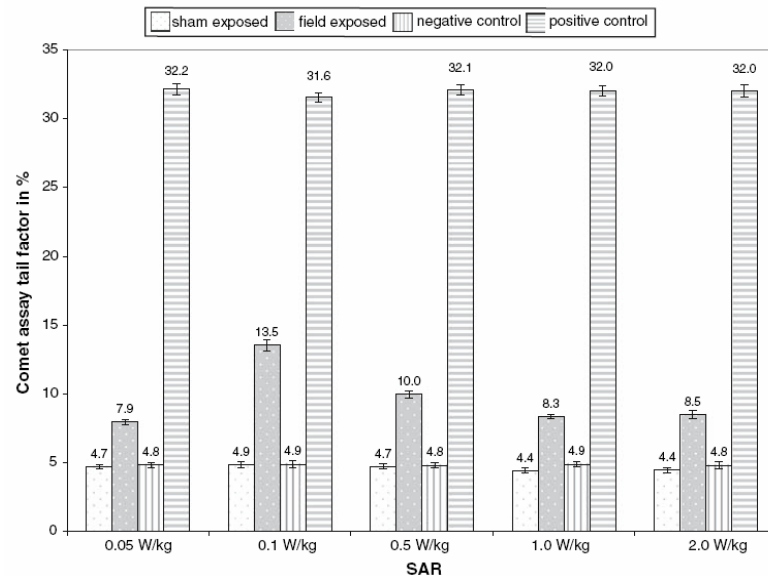


Fig .1

Fig. 1 Specific absorption rate dependent increase of the comet assay tail factor after 24 h exposure. Figures and bars represent mean and standard deviation of three independent exposures/SAR level, using fibroblasts of donor ES-1. Negative, positive, and sham-exposed controls were performed for each exposure.

The CTF increase was statistically significant ($P = 0.02$) for all SAR levels, calculated for each individual SAR using three EMF exposed versus the combined values of three sham-exposed plus three negative controls

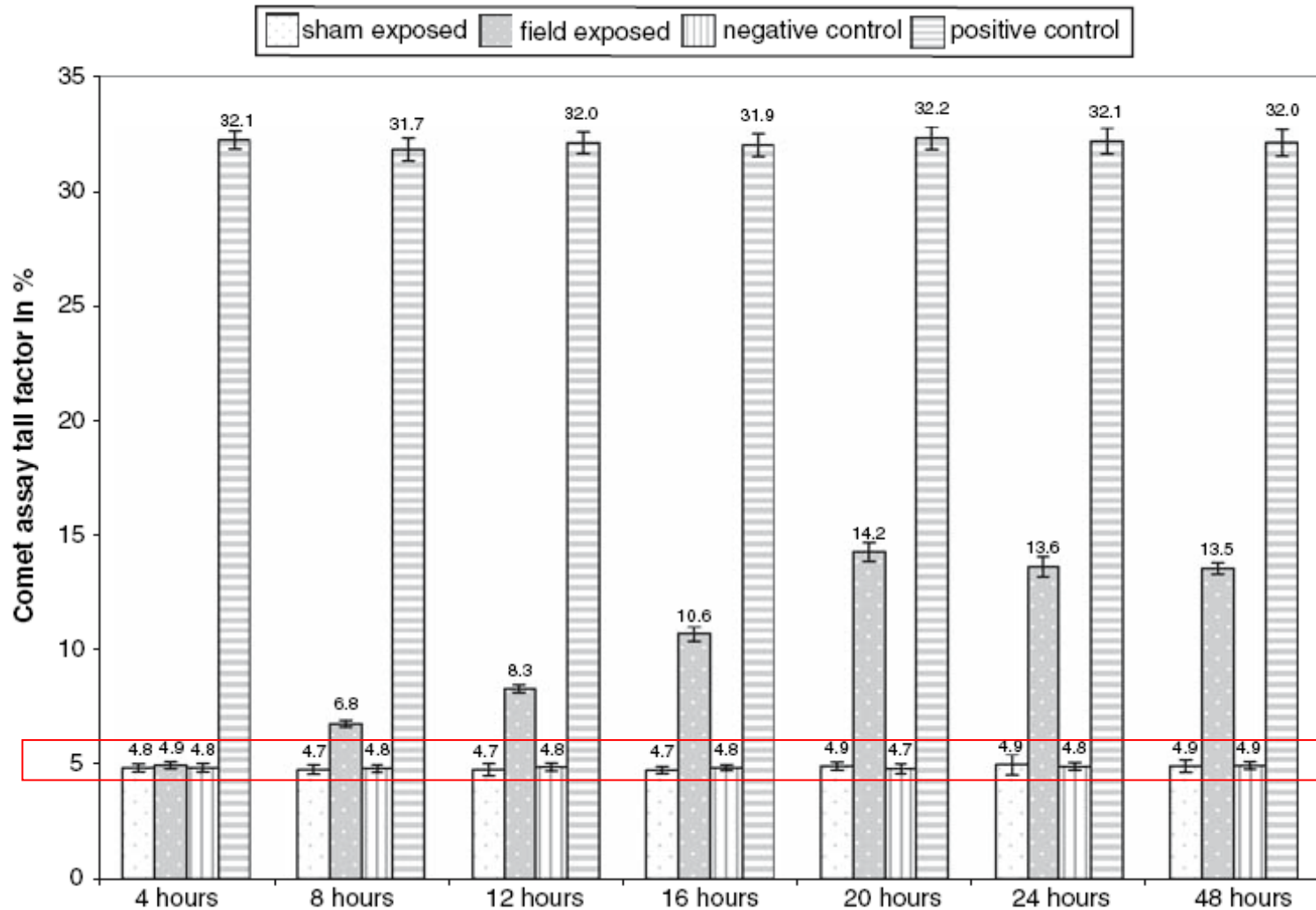


Non-parametric Mann-Whitney-Wilcoxon test !

Variationskoeffizienten (Fig. 1)

- Scheinexponiert: 3.9%
- Negative Kontrollen: 4.1%
- Exponiert: 2.6%
(bei 25% Abweichungen der SAR-Werte!!)
- Positive Kontrollen: 1.2%

Time Course

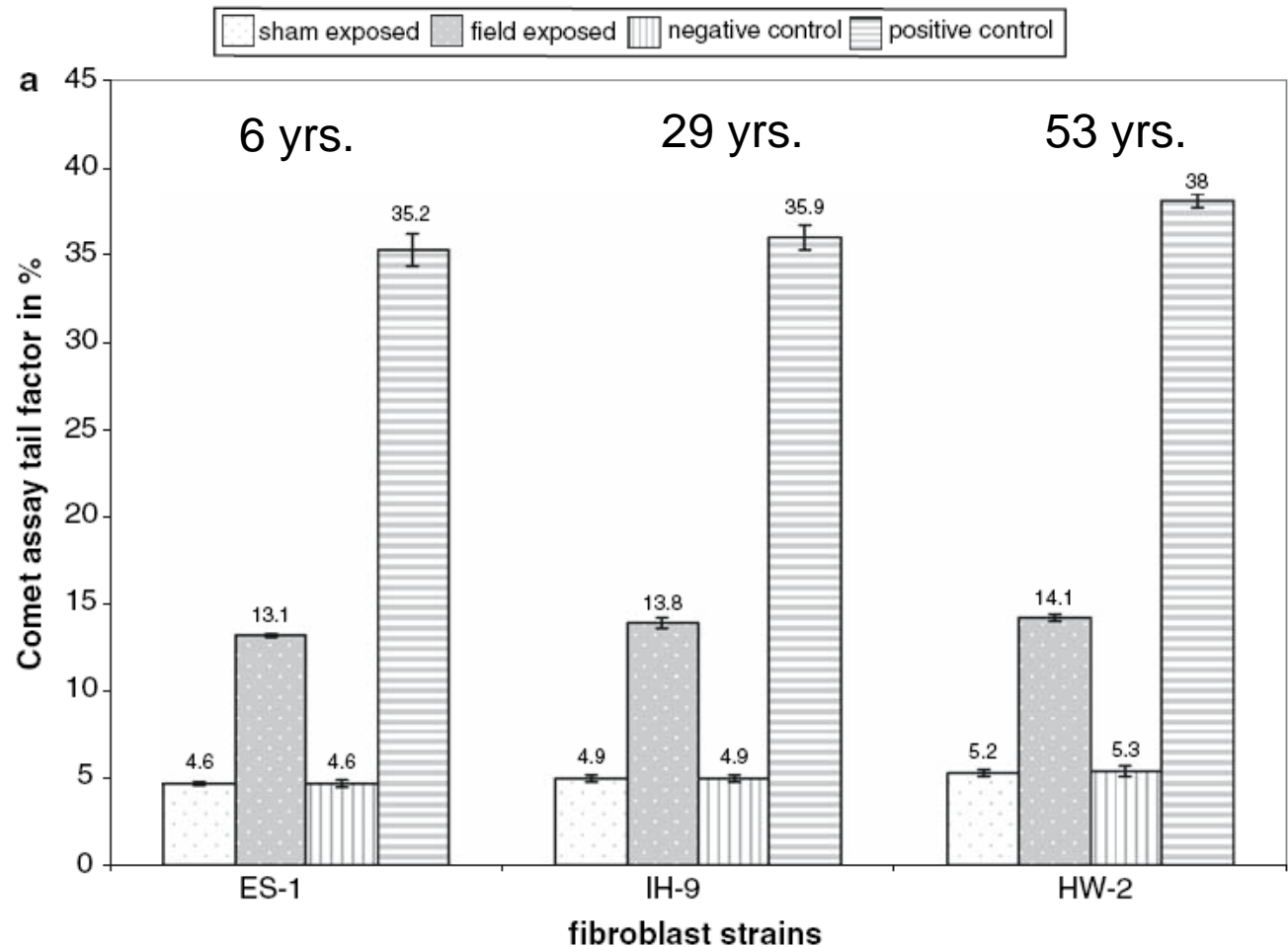


Variationskoeffizienten (Fig. 3)

- Scheinexponiert: 2.1%
- Negative Kontrollen: 1.2%
- Keine Unterschiede zwischen scheinexponierten Zellen und Inkubatorkontrollen

Zu geringe individuelle Unterschiede

Fig. 6 a Radiofrequency electromagnetic field (RF-EMF)-induced increase of CTF in cultured fibroblasts from three donors. *Figures and bars* represent mean and standard deviation of three independent exposures. Sixteen hours of exposure and 0.1 W/kg was used in all cases, and negative, positive, and sham-exposed controls were included in each exposure. **b** RF-EMF-induced MN. Cells and exposure conditions identical as described for Fig. 6a. CTF and MN increases were each calculated for each fibroblast strain against the three negative plus three sham-exposed controls and were statistically significant for all strains ($P = 0.02$)



CV sham: 6.1%; exposed: 3.8%; neg. cont.: 7.1%; pos. cont: 4.0%
Literature: 25 – 30% (Diem et al., 2002)

Statistische Unkenntnis

of fragmented DNA). Due to the scoring of 500 cells, being about ten times the cells usually processed by computer-aided image analysis, standard deviations become very low. The coefficient of variation of the CTF in unexposed fibroblasts was 4.2%, as estimated from triplicates of negative controls out of 20 experiments ($n = 60$).

Fundamentale Kenntnislücken

Since a SAR of 0.05 W/kg, which consistently produced genotoxic effects in our in vitro study does not provide enough energy directly to break a chemical bond in DNA, we postulate an indirect mode of genotoxic action (as the generation or liberation of radicals or inactivation of repair processes). In addition, such an assumption would also

Fälschung erfordert Kenntnis der Expositionsbedingungen

Bioelectromagnetics (2008)

Brief Communication

Security Considerations in Blinded Exposure Experiments Using Electromagnetic Waves

Christian Wolf*

Medical University of Vienna, Clinic of Internal Medicine 2, Occupational Medicine Unit, Vienna, Austria



Fig. 1. Display panel on the Agilent 34970A Data Acquisition/Switch Unit: switched to channel 102. Third digit in eight-digit number (left) indicates waveguide in use (0 = waveguide 1, 1 = waveguide 2).

Reaktionen

- Medizinische Universität Wien:

“Eine vom Rektor der Medizinischen Universität ... angeregte unabhängige statistische Begutachtung der Daten legt nun tatsächlich den Verdacht nahe, dass diese nicht experimentell gemessen, sondern vielmehr fabriziert wurden.” (23.5.2008)

Zitat aus dem Gutachten: “... liegt Evidenz vor, dass ein Versuch einer unabhängigen Forschergruppe völlig fehlgeschlagen ist, die wiederholt von der Gruppe publizierten, ähnlichen und schon im Einzelfall unplausiblen sowie wenig wahrscheinlichen Datenmuster zu reproduzieren. Daher müssen an der Validität der Ergebnisse fundamentale Zweifel angemeldet werden.”

Weitere 6 Studien gefälscht?

Radiat Environ Biophys (2004) 43:203–207
DOI 10.1007/s00411-004-0252-9

ORIGINAL PAPER

Alexander Pilger · Sabine Ivancsits · Elisabeth Diem ·
Melanie Steffens · Hans-Albert Kolb ·
Hugo W. Rüdiger

No effects of intermittent 50 Hz EMF on cytoplasmic free calcium and on the mitochondrial membrane potential in human diploid fibroblasts

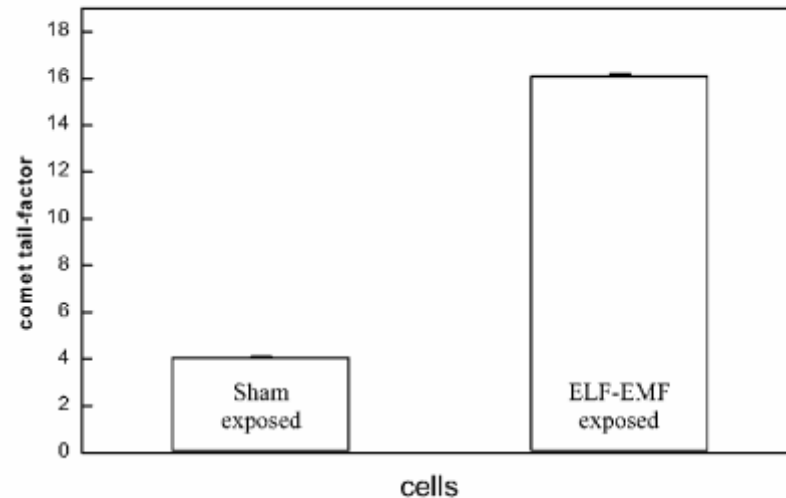


Fig. 1 The effect of ELF-EMF exposure on the formation of DNA strand breaks in human fibroblasts. Mean values (\pm SD) were obtained from five independent series of exposure

Wissenschaft und Wahrheit

- Zitat: *“Die nächste Aufgabe des Rats für Wissenschaftsethik besteht nur darin, sämtliche weitere Publikationen, an welcher dieselbe Autorin unter Anwendung derselben Versuchsanordnung beteiligt war, zu erheben und dann den zuständigen Herausgebern auch die Retraktion dieser Publikationen zu empfehlen.”*
Aus: Wissenschaft und Wahrheit, MUW

Konsequenzen?

- Keine einzige Studie wurde bislang zurückgezogen
- Für nicht zuständig im Sinne einer eigenen Untersuchung haben sich erklärt:
 - DFG-Ombudsman
 - Europäische Kommission

Schlussfolgerungen

- Peer-Reviews mit Statistikern
- Schaffung nationaler und internationaler Stellen (wie z.B. ORI in den USA)
- Bessere Selbstkontrolle der wissenschaftlichen Zeitschriften (z.B. durch COPE)
- Bereitstellung / Hinterlegung aller Originaldaten bereits bei Einreichung des Manuskriptes