

**PRE-FILED TESTIMONY
OF DARIUSZ LESZCZYNSKI
MPUC Docket No. 2011-00262**

**THIS TESTIMONY CONSISTS OF MY OWN EXPERT SCIENTIFIC OPINIONS THAT
SHOULD NOT BE AUTOMATICALLY CONSIDERED AS OPINIONS OF ANY OF MY
PAST AND PRESENT EMPLOYERS**

1 **Q. Please state your name and business address.**

2 A. My name is Dariusz Leszczynski. My current address is: 173 City Road, Southbank,
3 Melbourne, VIC3006, Australia. My permanent address is in Kerava, Finland

4 **Q. Briefly state your occupation, educational background and employment.**

5 A. I received M.Sc. (1978) and D.Sc. (1983) from the Jagiellonian University in Krakow,
6 Poland and Ph.D. (1990) from the Helsinki University in Finland.

7 Currently I am a Visiting Professor at the Swinburne University of Technology,
8 Hawthorn/Melbourne, Australia (06/2012-02/2013).

9 I have tenure as Research Professor at STUK- Radiation and Nuclear Safety Authority,
10 Helsinki, Finland (at STUK from 1992; as Research Professor from 2000-present)

11 I am also an Adjunct Professor of Biochemistry at the University of Helsinki in Finland
12 (1992-present)

13 I spent two sabbatical periods in the USA: 1990-91 as a Visiting Scientist at Georgetown
14 University in Washington, DC, and in 1997-99 as a Visiting Assistant Professor at
15 Harvard University in Boston, MA.

16 I was Guangbiao Professor at the Zhejiang University School of Medicine in Hangzhou,
17 China (2007-2010)

18 I testified before the US Senate Appropriations Committee in September 2009.

19 I was a member of the Working Group of the IARC/WHO that in May 2011 classified
20 cell phone radiation as a possible carcinogen.

21 In 2002, I organized the first ever bioelectromagnetics session on “Genomics,
22 Transcriptomics & Proteomics” (Rhodes, Greece).

1 I co-organized and co-chaired WHO/Cost281/STUK workshops in Helsinki on cell phone
2 radiation effects on stress response (April 2004) and on proteome & transcriptome
3 (October 2005).

4 I was a Member of the Steering Committee of the Swiss National Science Foundation
5 programme (NFP 57).

6 I Chaired the Task Group on HTST in EMF research (EU COST BM0704 Action).

7 I am a Member of the Board of Directors of the Bioelectromagnetics Society (BEMS)
8 (2006-2009 & 2010-2013).

9 I was an Associate Editor of peer-reviewed journal Bioelectromagnetics (2006-2010).

10 Currently I am on Editorial Boards of the Bioelectromagnetics and of the Open
11 Proteomics Journal. I was Guest Editor of special issue of Proteomics. I am currently
12 Editor of Radiation Proteomics book for Springer.

13 I Co-Chaired Technical Program Committees for the BioEM 2009, Davos, Switzerland
14 and for 2010 BEMS meeting in Seoul, South Korea.

15 I lectured on topic of cell phone radiation biological and health effects around the world
16 (Europe, USA, India, Japan, China, South Korea, Australia, and South Africa).

17 I was reviewer of research grants in the field of bioelectromagnetics for various
18 organizations in the United Kingdom, Holland, Switzerland, Austria, China and South
19 Africa.

20 Attached as Exhibit A is my *curriculum vitae*.

21 **Q. Briefly describe your professional work and experience related to the study of**
22 **health risks related to electromagnetic fields and radio frequency waves in the 30**
23 **MHz to 300 GHz range (“RF”).**

24 A. I and my research group have worked in the field of biological and health effects of
25 mobile phone radiation for the past 15years. We have studied the biological and health
26 effects of mobile phone radiation using high-throughput screening techniques (HTST) of
27 proteomics to identify the radiation-affected proteins and genes. We identified cellular
28 signaling pathway that is activated by mobile phone radiation in human cells.

29 **Q. Have you authored any papers or journal articles?**

1 A. I co-authored over 90 publications in peer-reviewed journals.

2 **Q. Please summarize some of the findings and conclusions of your research.**

3 A. The main focus of our research has been and is determining whether mobile phone
4 radiation, at levels permitted by the current safety standards, has biological effects. Our
5 research consists of both, laboratory experiments and experiments on human volunteers.
6 The early sign of a living cell reaction to an external stress factor (e.g. chemicals,
7 radiation, heat, etc.) is activation of stress response designed to protect cells from the
8 damage to its vital functions. Observed in our experiments activation of stress response
9 by mobile phone radiation suggests that mobile phone radiation is recognized by the cells
10 as a stress factor that might interfere with normal cellular physiology (Leszczynski et al.
11 Non-thermal activation of hsp27/p38MAPK stress pathway by mobile phone radiation in
12 human endothelial cells: Molecular mechanism for cancer- and blood-brain barrier-
13 related effects. Differentiation 70, 2002, 120-129). Our published research suggests that
14 mobile phone radiation might activate cellular stress response in human endothelial cells,
15 cells that are lining blood vessels. Based on our observations we presented the
16 hypothesis that the activation of stress response in endothelial cells lining blood vessels
17 in the brain might affect function of blood-brain barrier (Leszczynski et al. Non-thermal
18 activation of hsp27/p38MAPK stress pathway by mobile phone radiation in human
19 endothelial cells: Molecular mechanism for cancer- and blood-brain barrier-related
20 effects. Differentiation 70, 2002, 120-129). This barrier, consisting among others of
21 endothelial cells, selectively regulates passage of molecules from blood stream to the
22 brain. Deregulation of function of blood-brain barrier might allow passage of such
23 molecules, present in blood stream, which might be damaging for the brain cells. The

1 issue of mobile phone radiation effect on blood-brain barrier is still unresolved, with
2 several animal studies suggesting existence of an effect and several animal studies
3 suggesting the lack of it (as examples see: Salford et al. (1994) Permeability of the blood-
4 brain barrier induced by 915 MHz electromagnetic radiation, continuous wave and
5 modulated at 8, 16, 50, and 200 Hz. *Microsc. Res. Tech.* 15: 535-542; Schirmacher et al.
6 (2000) Electromagnetic fields (1.8 GHz) increase the permeability to sucrose of the
7 blood-brain barrier in vitro, *Bioelectromagnetics* 21: 338-345; Fritze et al. (1997) Effect
8 of global system for mobile communication (GSM) microwave exposure on blood-brain
9 barrier permeability in rats, *Acta Neuropathol.* 94, 465-470; Tsurita et al. (2000)
10 Biological and morphological effects on the brain after exposure of rats to a 1439MHz
11 TDMA field, *Bioelectromagnetics* 21, 364-371; Neubauer et al. (1990) Microwave
12 irradiation of rats at 2.45 GHz activates pinocytotic-like uptake of tracer by capillary
13 endothelial cells of cerebral cortex, *Bioelectromagnetics* 11: 261-268; Töre et al. (2001)
14 Two-hour exposure to 2-W/kg, 900-MHZ GSM microwaves induces plasma protein
15 extravasation in rat brain and dura matter, *Proceedings of the 5th International congress*
16 *of the EBBA*, pp43-45).

17 The other part of my group's research is that we have developed the use of high-
18 throughput screening techniques of transcriptomics and proteomics to identify potential
19 molecular targets of mobile phone radiation. This so called "discovery science" approach
20 seems to be particularly suited for elucidation of potential mobile phone radiation-
21 associated health hazard issue because it might reveal effects that are not possible to
22 predict based on the present knowledge of the biological effects of mobile phone

1 radiation (Leszczynski et al., Applicability of Discovery Science-Approach to Determine
2 Biological Effects of Mobile Phone Radiation, *Proteomics* 4, 2004, 426-431).

3 Using high-throughput screening techniques of transcriptomics and proteomics
4 we have shown that mobile phone radiation might alter gene expression and expression
5 and activity of proteins (Nylund & Leszczynski, *Proteomics analysis of human*
6 *endothelial cell line EA.hy926 after exposure to GSM 900 radiation, Proteomics, 4,*
7 *2004, 1359-1365; Nylund et al. Proteomic analysis of the response of human endothelial*
8 *cell line EA.hy926 to 1800 GSM mobile phone radiation, J. Proteomics & Bioinformatics*
9 *2, 2009, 455-462; Nylund et al. Analysis of proteome response to the mobile phone*
10 *radiation in two types of human primary endothelial cells, Proteome Science* 2010, 8:52;
11 *Stander et al. Effects of non-thermal mobile phone radiation on breast adenocarcinoma*
12 *cells, South African Journal of Science* 2011, 107, 1-9; *Chen et al. Using model organism*
13 *Saccharomyces cerevisiae to evaluate the effects of ELF-MF and RF-EMF exposure on*
14 *global gene expression, Bioelectromagnetics, 2012 Apr 9. doi: 10.1002/bem.21724.*
15 *[Epub ahead of print]). The number of affected genes and proteins appeared to be small*
16 *and the confirmation of the impact of these changes on human physiology requires*
17 *further studies. The changes in gene and protein expression appeared to be dependent on*
18 *the genetic makeup of the cells (Nylund & Leszczynski, Mobile phone radiation causes*
19 *changes in gene and protein expression in human endothelial cell lines and the response*
20 *seems to be genome- and proteome-dependent, Proteomics 6, 2006, 4769-4780;*
21 *Remondini et al. Gene expression changes in human cells after exposure to mobile*
22 *phone microwaves, Proteomics 6, 2006, 4745-4754). Furthermore, changes in protein*
23 *expression that were induced by mobile phone radiation appeared to be induced not only*

1 in human cells grown in laboratory but also in the skin of human volunteers, as
2 preliminarily suggested by our pilot study (Karinen et al., Mobile phone radiation might
3 alter protein expression in human skin, BMC Genomics 9, 2008, 77-).

4 In summary, the basic finding of my group's research is that it appears that
5 mobile phone radiation induces biological response in human cells and human volunteers
6 and these responses might alter cell physiology. Further laboratory studies and studies
7 using human volunteers are necessary to clarify this issue.

8 **Q. Did you participate in the IARC Working Group classified low-level RF exposure as**
9 **a possible carcinogen?**

10 A. Yes, I was one of 30 scientists from 14 countries, who met at the International Agency
11 for Research on Cancer (IARC) in Lyon, France, to assess the carcinogenicity of
12 radiofrequency electromagnetic fields (RF-EMF) (list of experts in: Baan et al.
13 Carcinogenicity of radiofrequency electromagnetic fields, Lancet Oncology 2011, 12:
14 624-626). The Working Group reviewed epidemiological evidence from cohort, case
15 control, and time-trend studies, and also reviewed more than 40 studies assessing the
16 carcinogenicity of RF-EMF in rodents, with exposures that simulated emissions from
17 mobile phones.

18 The Working Group found "limited evidence in humans" for the carcinogenicity
19 of RF/EMF, based on positive associations between glioma and acoustic neuroma and
20 exposure to RF-EMF from wireless phones. The Working Group also concluded that
21 there is "limited evidence" in experimental animals for the carcinogenicity of RF-EMF.
22 Based on these findings, the Group concluded that RF-EMF should be classified as a

1 possible carcinogen (Baan et al., Carcinogenicity of radiofrequency electromagnetic
2 fields, Lancet Oncology 2011, 12: 624-626).

3 For epidemiology evidence, the Group relied predominantly on the results of
4 INTERPHONE study and studies of the Swedish group of Hardell, showing that long
5 time extensive use of cell phone might increase the risk of development of brain cancer.
6 The INTERPHONE study reported that the OR for glioma increased with increasing RF
7 dose for exposures 7 years or more before diagnosis, whereas there was no association
8 with estimated dose for exposures less than 7 years before diagnosis. The Hardell group
9 did a pooled analysis of two very similar studies of associations between mobile and
10 cordless phone use and glioma, acoustic neuroma, and meningioma. Participants who
11 had used a mobile phone for more than 1 year had an OR for glioma of 1.3 (95% CI 1.1–
12 1.6). The OR increased with increasing time since first use and with total call time,
13 reaching 3.2 (2.0–5.1) for more than 2000 h of use. Ipsilateral use of the mobile phone
14 was associated with higher risk. Similar findings were reported for use of cordless
15 phones.

16 **Q. What is meant by “limited evidence”?**

17 A. IARC defines “limited evidence of carcinogenicity” as:

18 A positive association has been observed between exposure to the agent and
19 cancer for which a causal interpretation is considered by the Working Group to be
20 credible, but chance, bias or confounding could not be ruled out with reasonable
21 confidence.

22 **Q. Did some of the Working Group members disagree with the conclusion that RF-**
23 **EMF is a possible cause of cancer?**

1 A. A very few members concluded that the evidence of carcinogenicity in humans was
2 “inadequate”. Their opinion focused on some inconsistency in the studies, the lack of
3 evidence of any increase in incidence rates for glioma to parallel the increase use of
4 mobile phone, and the Danish Cohort study which showed no increase in rates of glioma
5 or acoustic neuroma. These concerns are not convincing. The Danish study has several
6 serious design flaws, and the time-trend analyses of cancer incidence rates are unreliable
7 indicators because of long latency time of brain cancer.

8 Although time-trend analyses did not show an increased rate of brain tumors
9 during a period of increased use of mobile phones, most of the analyses examined trends
10 only until the early 2000s. Such analyses are not informative of risks that manifest only
11 after a decade or more of exposure, or of risks that may only affect a small proportion of
12 cases involving heavy use and exposure.

13 The following summarizes some of the flaws in the Danish study (pdf of the
14 published in BMJ Letter to Editor attached):

15 1. Exposure data was unreliable. The only information about the person’s
16 exposure to mobile phone radiation is the length of the mobile phone subscription with
17 the mobile phone operator. A person who spends many hours per week on the phone and
18 one who spends just a few minutes per week could be analyzed as belonging to the same
19 exposure group if they owned a mobile phone subscription for the same length of time.
20 The highly exposed persons and the nearly unexposed persons are mixed up in the same
21 exposure group. Analysis of such data cannot provide valid information about
22 correlation of the exposure to mobile phone radiation and induction of brain cancer.

1 2. Composition of the control group. All corporate subscribers (200,507
2 subscribers) were excluded from the starting cohort of 723,421 mobile phone subscribers.
3 Therefore, the people who most likely were the heaviest users and were the most exposed
4 to mobile phone radiation were excluded from the study. Besides this, the exclusion of
5 the corporate subscribers has likely led to “contamination” of the control group. As the
6 authors state in the discussion section: “Because we excluded corporate subscriptions,
7 mobile phone users who do not have a subscription in their own name will have been
8 misclassified as unexposed...”. This means that some of the possibly highly exposed
9 corporate users, who did not have personal phone subscriptions, ended up as “non-
10 exposed” persons in the control group.

11 Also the cut-off time of the exposure to mobile phone radiation was set for year
12 1995, but the analysis of the cancer induction was done based on 2007 cancer registry
13 data. Any person who got a subscription after 1995 was considered as non-exposed by
14 the set-up of the study. It means that for example a person diagnosed in 2007 with brain
15 cancer, who subscribed after 1996 was, by the design of the study, considered as a non-
16 exposed person who got brain cancer. Whereas, in reality, this person got brain cancer
17 after being exposed for 11 years. Finally, even though the study started with over
18 723,421 mobile phone subscribers, and after some exclusions used 358,043 subscribers,
19 the statistical evaluations presented by the study authors in tables 1, 2 and 3 in the article
20 are largely based on just a few, or few tens, of cases. This means that the statistical
21 results are unreliable because of low numbers.

22 **Q. What is your opinion about the implications of the IARC classification of RF-EMF**
23 **as a possible carcinogen?**

1 A. IARC classification supports three important conclusions:

2 1. That “non-thermal” biological effects are induced by the RF-EMF that
3 might, in due time, lead to health risks.

4 2. That current safety standards are insufficiently supported by the scientific
5 evidence when they claim to reliably protect all users of mobile phones or other devices
6 emitting mobile phone-like radiation.

7 3. That precautionary actions should be taken to protect people exposed to
8 low-level RF-EMF and, whenever possible and feasible, to avoid exposure.

9 ICNIRP and other standard setting agencies and organizations acknowledge the
10 existence of only thermal effects of cell phone radiation. ICNIRP's opinion is that the
11 non-thermal effects are not proven and that they are unlikely to exist. However, the
12 IARC classification contradicts this opinion and indicates that non-thermal effects do
13 exist. The results showing increased brain cancer risks in the INTERPHONE study and
14 the Hardell studies were obtained from people using regular cell phones that emit low-
15 level RF-EMF (below the levels at which thermal effects are confirmed) and that meet
16 current safety standards. In spite of meeting current safety standards, long-term use of
17 these cell phones led to increased risk of cancer. It logically means that low-level
18 exposures may cause health risks and that the current safety standards may be
19 insufficient.

20 When potentially dangerous effects have been identified as deriving from a
21 phenomenon, product or process, and the scientific evidence does not allow the risk to be
22 determined with sufficient certainty, there is good cause to take action to prevent or avoid
23 the risk. This is the essence of the Precautionary Principle recommended by the

1 European Union. It is also consistent with Sir Bradford Hill's analysis using his nine
2 factors to assess when an association between a risk and a potential cause is strong
3 enough to justify protective action. Bradford-Hill A, The environment and disease:
4 Association or causation? Proc R Soc Med 1965, 58:295-300. IARC evaluated all
5 available scientific evidence on cancer and identified a potentially dangerous product
6 (cell phone radiation and RF/EMF) but the scientific evaluation does not allow the risk to
7 be determined with certainty. The response to this uncertainty should be further research
8 and the prevention and avoidance of risk until the uncertainty is resolved or perhaps until
9 the proponents of the potentially dangerous product provide sufficient evidence of its
10 safety.

11 Since 2001, I am actively advocating implementation of precautionary approach,
12 including the Precautionary Principle, when dealing with RF-EMF radiation emitted by
13 mobile phones and other equipment (Leszczynski D. Letter to the Editor: Mobile phones,
14 precautionary principle, and future research. The Lancet 358, 2001, 1733)

15 **Q. In April, 2012, almost a year after the IARC Working Group issued its conclusions**
16 **on the carcinogenicity of RF/EMF, the UK Health Protection Agency's Advisory**
17 **Group on Non-ionising Radiation (AGNIR) issued its latest report, *Health Effects***
18 ***from Radiofrequency Electromagnetic Fields*. Do you agree with the conclusions of**
19 **this report?**

20 A. The report was released with lots of media attention, especially in UK. It is a lengthy
21 report, totaling some 333 pages, that claims to be an exhaustive review of all of the
22 science on the issue. Reading it, however, is a surreal experience. The authors either do
23 not understand the studies they reviewed or they had pre-written conclusions.

1 I disagree with much of the science and the interpretation of study results in this
2 report. However, there is something even more disturbing about this report. The report
3 claims to be an exhaustive review of the science, but it makes no mention of the 2011
4 IARC classification of cell phone radiation as a possible carcinogen, as if IARC's
5 evaluation never took place. It is obvious that the AGNIR's members do not agree with
6 the outcome of the IARC evaluation. However, the complete omission of it is like
7 rewriting history by omitting inconvenient facts. In my opinion it shows a very biased
8 attitude of AGNIR members towards the IARC classification. In cancer research the
9 IARC evaluations are a "gold standard".

10 The IARC classification is not the only thing missing from the report. The report
11 claims to be the most comprehensive to-date review of all relevant studies published after
12 2003 (year of the first AGNIR Report). During the years 2004 – 2010 my research group
13 at STUK published/co-authored 7 original studies on stress response, protein expression
14 and gene expression executed both in cells grown in laboratory and in human volunteers.
15 These studies are well known, very relevant, and were published in such well known
16 journals as PROTEOMICS and BMC Genomics. Anyone can find them on PubMed.
17 Not one of these studies performed by my research group is mentioned in the AGNIR
18 Report. I can understand that one or two studies might be mistakenly forgotten when
19 handling hundreds of studies. But seven separate studies? It is an intentional omission to
20 skew the review and to mislead readers. No other explanation is plausible.

21 I looked for some studies by other scientists that were published after 2003.

22 List of the missing studies from my research group:

- 1 1. Nylund et al. Analysis of proteome response to the mobile phone radiation
2 in two types of human primary endothelial cells. *Proteome Science* 2010, 8:52.
- 3 2. Nylund et al. Proteomic analysis of the response of human endothelial
4 cell line EA.hy926 to 1800 GSM mobile phone radiation. *J. Proteomics &*
5 *Bioinformatics* 2, 2009, 455-462.
- 6 3. Karinen et al. Mobile phone radiation might alter protein expression in
7 human skin. *BMC Genomics* 9, 2008, 77-.
- 8 4. Nylund & Leszczynski. Mobile phone radiation causes changes in gene
9 and protein expression in human endothelial cell lines and the response seems to be
10 genome- and proteome-dependent. *Proteomics* 6, 2006, 4769-4780.
- 11 5. Remondini et al. Gene expression changes in human cells after exposure
12 to mobile phone microwaves. *Proteomics* 6, 2006, 4745-4754.
- 13 6. Nylund & Leszczynski. Proteomics analysis of human endothelial cell
14 line EA.hy926 after exposure to GSM 900 radiation. *Proteomics*, 4, 2004, 1359-1365.
- 15 7. Leszczynski et al. Applicability of Discovery Science-Approach to
16 Determine Biological Effects of Mobile Phone Radiation. *Proteomics* 4, 2004, 426-431.
- 17 The inescapable conclusion is that AGNIR Report 2012 is not a comprehensive
18 review of the relevant science and it is a biased review.
- 19 **Q. On September 12, 2012, the Norwegian Institute of Public Health published a**
20 **report, *Low-level radiofrequency electromagnetic fields – an assessment of health***
21 ***risks and evaluation of regulatory practice*. Do you agree with the conclusions of this**
22 **report?**

1 A. The 204-pages long report is written in Norwegian and, therefore, I was not able to read
2 details of the scientific evaluation of the analyzed studies. However, similar to the
3 AGNIR Report published earlier in the year, the list of references cited in the report
4 suggests some kind of “selectivity”. For example, yet again, research from my group at
5 STUK is not mentioned in the report – not a single reference to any of our numerous
6 studies (see my full CV). It is deeply disturbing and it seriously undermines the
7 reliability of this and other reports when the authors omit without justification some of
8 the well-known relevant scientific studies.

9 **Q. What is your view of the “weight of the evidence” analyses relied upon by AGNIR
10 and some standards-setting agencies to conclude that exposure to low-level RF has
11 no biological effects or poses no health risk?**

12 A. The “weight of evidence” is often abused by those who wish to disregard scientific
13 studies showing that mobile phone radiation can induce biological effects.

14 When evaluating the possible health effects of RF, as with any other
15 environmental factors, no matter naturally occurring or man-made, there are needed
16 several types of scientific evidence such as (i) the possible mechanism how the effect is
17 induced in living organism, (ii) in vitro laboratory studies that confirm the existence of
18 the biophysical and biochemical mechanism of the effect, (iii) animal studies, including
19 long term effects and toxicology, (iv) human volunteer studies, and (v) epidemiological
20 evidence of the effect on human population at large.

21 In each area of investigation (epidemiology, human volunteers, animal studies,
22 laboratory in vitro experiments and biophysical mechanisms) there are both positive and
23 negative studies and by the sheer numbers, in some areas, the negative studies outweigh

1 the positive ones, but in some areas the opposite is true. The “weight of the evidence” is
2 sometimes used to reach a no-effect-conclusion because the outcome of the majority of
3 published research studies is negative. This argument is used, and often abused, to
4 support the notion that there are no proven effects on health below the present safety
5 standard limits. Negative studies seem to be accepted without much scrutiny, whereas
6 the positive studies are examined in every detail to determine why the result is positive.
7 Hence, the positive studies are not treated equally with the negative ones, even though
8 also the negative studies might include erroneous results or interpretations. Moreover,
9 only the positive studies are demanded to be replicated before they can be accepted as
10 valid scientific evidence.

11 At least the negative studies that are considered as providing the crucial evidence
12 of no-effect should be replicated. An error in study design, execution, data analysis or
13 interpretation might lead not only to positive but also to negative result. Furthermore,
14 many of the positive studies are not even being attempted to be replicated and of course
15 negative studies are not replicated at all. However, if the replication of the positive study
16 is attempted then, commonly, the protocol of the replication study has so many
17 modifications, introduced to improve the quality. That causes that the outcome of such
18 “replication” study is difficult, if not impossible, to compare with the original one. As
19 often happens, the outcome of the so-called replication study differs from that of the
20 original study. However, the failed replication might be either because of incorrect
21 (unreliable) result of the original study or because of the modifications introduced in
22 replication study. Usually, this question remains unanswered but the final result is often

1 claimed to be: in summary, the original study has not been replicated (= is not valid
2 evidence).

3 Sometimes there may be good explanations for the different results that are not
4 properly considered in “weighing” the evidence between positive and negative studies.
5 Some of the in vitro studies suggest that mobile phone radiation and other low-level RF
6 might alter cell physiology e.g. by triggering cellular stress response, causing DNA
7 damage, altering gene and protein expression. However, there are also studies that do not
8 indicate such effects. One of the reasons for such discrepancy might be, as postulated in
9 some studies, that genes and proteins expressed (=active) at the time of exposure to
10 mobile phone radiation might play a decisive role in the induction of the effects.

11 In this context, well designed, well executed state-of-the-art studies with the best
12 available radiation exposure dosimetry, might not be sufficient to cause any change in
13 thinking about low-level RF radiation effects. Other negative studies, of which many
14 were poorly designed or executed or had poor dosimetry design, provide “weight of
15 evidence” against any effects.

16 **Q. Based on your own review of all of the relevant scientific studies on the subject,**
17 **what is your opinion about whether exposure to low-level RF has biological effects**
18 **and whether it can cause adverse health conditions in humans?**

19 A. Safety standard-setting agencies, such as ICNIRP or ICES, are assuring users that there is
20 no proven health risk and that the current safety limits, on RF exposure, protect all users.
21 However, based on the available scientific evidence, such conclusions are not justified.
22 There are many reliable, well-designed studies showing positive results that cannot be
23 considered outweighed by negative studies or inconsistencies. We still do not know what

1 is the impact of the long-term use of cell phones on human health because mobile phones
2 are in common use for only little over 10 years. We do not know the impact of mobile
3 phone radiation on children, because such studies were not performed yet. There is only
4 one epidemiological study in children that is very small and has no statistical power to
5 prove anything. Such evidence is not enough to draw any reliable conclusions. I think
6 that at this time any statements suggesting conclusively that there “is no health risk” are
7 premature and not reliably supported by the available science.

8 **Q. Is there evidence to suggest that some persons may be more susceptible to health**
9 **risks from RF-EMF than others?**

10 A. There likely exist a sub-population of people with different sensitivity to mobile phone
11 radiation and possibly other low-level RF-EMF radiation. It is known that due to genetic
12 variability among people, the same stimuli (medication, radiation, chemicals, allergens,
13 environmental factors) may elicit responses of differing severity in different people.
14 Finding out such sensitive sub-population and defining it might be possible using
15 proteomics and transcriptomics (Leszczynski & Xu. Commentary: Mobile phone
16 radiation health risk controversy. Health Research Policy and Systems 8, 2010, 2-;
17 Leszczynski & Meltz. Report: Questions and answers concerning applicability of
18 proteomics and transcriptomics in EMF research. Proteomics 6, 2006, 4674-4677).

19 Human volunteer studies have focused on mobile phone radiation effects on e.g.
20 cognition, blood pressure, headaches, skin allergy-like symptoms, sleep disorders or
21 direct recognition, by the exposed subject, whether mobile phone is on or off. In these
22 studies the volunteers are not aware when they are exposed to mobile phone radiation and
23 when not. One major setback of these studies, however, is that the experimental

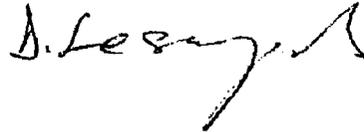
1 conditions and the exposure and measurement equipment may psychologically affect
2 behavior of the volunteers during the experiments and the obtained information might
3 become subjective and unreliable. In one study objective information of physiological
4 effects was obtained without asking the study subjects how/what they feel during the
5 exposure. In this study (Karinen A. *et al.* Mobile phone radiation might alter protein
6 expression in human skin. BMC Genomic 9, 2008, 77-) effects of mobile phone
7 radiation on human skin were examined at the molecular level. The outcome of this
8 study suggests that it might be possible that mobile phone radiation alters expression of
9 some proteins in human skin. This single available study has obvious limitations as well
10 as advantages. The main limitation is that, because of the shortage of funding only a pilot
11 study using 10 volunteers was possible to execute. The most obvious advantage of this
12 study is that it has used proteomics approach - simultaneous screening of the expression
13 of hundreds of proteins and, this way, it has shown that mobile phone radiation might
14 affect physiology of human tissue in vivo.

15 It is certain that just such human volunteer studies, using methods of proteomics,
16 transcriptomics and other biochemical analyses, are urgently needed to provide
17 information as to which proteins and genes react to mobile phone and other low-level RF
18 radiation exposure.

19 **Q. In your opinion, could a careful scientist familiar with the body of knowledge on the**
20 **subject reliably conclude that there are no risks of adverse health effects from the**
21 **exposure to mobile phone radiation and other like radiation types?**

1 A. No, as I stated above, I think that at this time any statements suggesting conclusively that
2 there "is no health risk" are premature and not reliably supported by the available
3 scientific evidence.

Dated this 23rd day of January, 2013.

A handwritten signature in black ink, appearing to read "D. Leszczynski". The signature is written in a cursive style with a large, sweeping flourish at the end.

Dariusz Leszczynski

CURRICULUM VITAE

Dariusz Leszczynski

Born 1955 (Poland)

Citizenship Finnish (since 1990)



Education

1974-1978 molecular biology, Jagiellonian University, Krakow, Poland

1978-1980 doctoral studies in cell biology, Medical Center of Postgraduate Education, Warsaw, Poland

Degrees and Titles

Master of Sciences (M.Sc.) - **1978** Jagiellonian University, Krakow, Poland

Doctor of Sciences (D.Sc.) - **1983** Jagiellonian University, Krakow, Poland

Doctor of Philosophy (Ph.D.) - **1990** University of Helsinki, Helsinki, Finland

Docent of Biochemistry - **1992** University of Helsinki, Helsinki, Finland

Appointments & Duties (present)

- **Research Professor** (2000 - present), Radiation Biology Laboratory, Department of Research and Environmental Surveillance, STUK - Radiation and Nuclear Safety Authority, Helsinki, Finland
- **Visiting Professor** (6/2012-2/2013), Bioelectromagnetics and Cellular Neuroscience Labs, Brain and Psychological Sciences Research Centre, Swinburne University of Technology, Hawthorn/Melbourne, VIC, Australia
- **Adjunct Professor** (1992 - present), Department of Biochemistry, University of Helsinki, Helsinki, Finland

Appointments (present & past)

- 2012 - 2013** Bioelectromagnetics and Cellular Neuroscience Labs, Brain and Psychological Sciences Research Centre, Swinburne University of Technology, Hawthorn/Melbourne, VIC, Australia
- 2007 - 2010** Guangbiao Professor (visiting), Bioelectromagnetics Laboratory, Zhejiang University School of Medicine, Hangzhou, China
- 2003 - 2007** Head of the Radiation Biology Laboratory of STUK, Helsinki, Finland
- 2000 - present** Research Professor, STUK - Radiation and Nuclear Safety Authority, Helsinki, Finland
- 1999 - 2000** Project Manager, Radiation Biology Laboratory, STUK - Radiation and Nuclear Safety Authority, Helsinki, Finland
- 1997 - 2000** Assistant Professor of Dermatology, Department of Dermatology, Harvard Medical School and Wellman Laboratories, Massachusetts General Hospital, Boston, MA, USA
- 1993 - 1999** Senior Scientist, Laboratory of Radiation Biology, STUK - Finnish Centre for Radiation and Nuclear Safety, Helsinki, Finland
- 1992 - 1993** Scientist, Laboratory of Radiation Biology, Department of Research, Finnish Centre for Radiation and Nuclear Safety, Helsinki, Finland

- 1992 - present** Adjunct Professor, Department of Biochemistry, University of Helsinki, Finland
- 1991 - 1992** Assistant, Department of Biochemistry, University of Helsinki, Finland
- 1990 - 1991** Scientist, Georgetown University Medical Center, Washington, DC, USA
- 1986 - 1991** Scientist, Transplantation Laboratory, University of Helsinki, Helsinki, Finland
- 1983 - 1985** Post-Doctoral Fellow, Transplantation Lab, Univ. Helsinki, Finland
- 1983 - 1986** Senior Scientist, Dept. Histology & Embryology, Pomeranian Medical Academy, Szczecin, Poland
- 1980 - 1983** Scientist, Dept. Histology & Embryology, Pomeranian Med. Acad., Szczecin, Poland
- 1978 - 1980** PhD Student, Cytophysiology Lab., Medical Ctr. Postgraduate Education, Warsaw, Poland
- 1977 - 1978** Junior Assistant, Institute of Pharmacology, Polish Academy of Sciences, Krakow, Poland

Sabbaticals (USA, China, Australia)

- 2012 – 2013** Bioelectromagnetics and Cellular Neuroscience Labs, Brain and Psychological Sciences Research Centre, Swinburne University of Technology, Hawthorn/Melbourne, VIC, Australia
- 2007 - 2010** Guangbiao Professor (visiting), Zhejiang University Medical School, Hangzhou, China
- 1997 - 1999** Assistant Professor of Dermatology, Department of Dermatology, Harvard Medical School and Wellman Laboratories, Massachusetts General Hospital, Boston, MA, USA
- 1990 - 1991** Scientist, Dept. Surgery, Georgetown University Medical Center, Washington, DC, USA

Editor of Scientific Journals

- **Editorial Board of Bioelectromagnetics**; 2010 - present
- **Associate Editor - Bioelectromagnetics**; 2006 - 2010
- **Editorial Advisory Board - Open Proteomics Journal**; 2007 - 2010
- **Guest Editor - Proteomics**; special issue on Application of Proteomics and Transcriptomics in EMF Research; vol. 6, issue 17, September 2006

Editor of Scientific Books and Author of Books

- **The mobile phone radiation and health controversy**: Between A Rock and A Hard Place. Authors: **D. Leszczynski** & K. Leszczynski; Publisher: Springer Science + Business Media B.V., The Netherlands; publication in 2013
- **Radiation Proteomics**: Elucidation of the effects of ionizing and non-ionizing radiation on cells and tissues using proteomics approach. Editor: **D. Leszczynski**, Publisher: Springer Science + Business Media B.V., The Netherlands; publication in February 2013 (<http://www.springer.com/biomed/book/978-94-007-5895-7>)

International Committees

- Chair of Task Group on High-Throughput Screening Techniques in EMF Research (TG-HTST-EMF), activity within the Working Group 4 of the EU COST Action

- BM0704 “Emerging EMF Technologies and Health Risk Management”
- Member of the Management Committee, EU COST Action BM0704 “Emerging EMF Technologies and Health Risk Management”
- Member of the Steering Committee of the Swiss National Science Foundation Research Program on Mobile Phones and Health (NRP57), 2005 - 2011
- Past Member of the Literature Review Committee ICES (SCC28) SC-4; Biological effects of electromagnetic fields; 2007 - 2009 (resigned in August 2009)

International & National Expert Responsibilities (invited)

- Invited Expert to Working Group on Non-Ionizing Radiation (RF fields) IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; Volume 102: Non-Ionizing Radiation, Part II: Radiofrequency Electromagnetic Fields. May 2011
- Invited Expert for the U.S. Senate hearing on “The Health Effects of Cell Phone Use” organized by the Committee on Appropriations, Subcommittee on Labor, Health and Human Services, Education and Related Agencies, September 14th, 2009
- Invited Reviewer for the “Children with Leukaemia” Foundation, London, UK 2008
- Invited Expert; U.S. National Academies; Workshop on Identification of Research Needs Relating to Potential Biological or Adverse Health Effects of Wireless Communications Devices, Washington, DC, August 7-9, 2007
- Invited Expert, German Telecommunication Research Programme, Bundesamt für Strahlenschutz; 2007 & 2008
- Invited reviewer; Electromagnetic Fields and Health The Netherlands Organization for Health Research and Development (ZonMw); 2006/7
- WHO - invited expert (e-mail comments); 2006 update of Research Agenda
- Finnish Parliament/ Environment and Nature Interests Group - invited expert on biological effects of mobile phone radiation; 19.05.2005
- WHO - invited expert; RF-EMF Research Review, Needs and Priorities Meeting, 11-13.06.2003, Geneva, Switzerland
- Finnish Parliament/Employment and Equality Committee – invited expert on mobile phone radiation effect on humans; 15.05.2003
- ICNIRP - 2000; invited reviewer; Biological effects of radiation emitted by security devices.

Memberships and Functions in the Scientific Societies

- Bioelectromagnetics Society (BEMS), USA
 - Technical Program Committee Co-Chair; 2010 BEMS Annual Meeting, Seoul, South Korea
 - Technical Program Committee Co-Chair BioEM 2009 - The Joint meeting of BEMS & EBEM, Davos, Switzerland
 - Member of the Board of Directors, 2006 - 2009 & 2010 - 2013
 - Member of Long Range Planning Committee 2009 - present
 - Member of the Development Committee 2007 - present
 - Member of the Finance Committee 2007 - 2009
 - Chair of the Publications Committee of BEMS; 2004 - 2006 & 2010 - 2013
 - Member of the Publications Committee of BEMS; 2006 - 2007
 - Member of the Journal Committee of BEMS; 2004 - 2006 & 2010 - 2013
 - Chair of the ad-hoc Sub-Committee to Investigate Bias in BEMS Newsletter Reporting 2004 - 2005

- American Society of Cell Biology (ASCB), USA
 - Member of the Membership Committee of the ASCB; 2006 - present
- EuroSkin, Germany
 - Member of the Steering Group on experimental biological research of skin cancer
- American Society for Photobiology, USA
 - Member of the Membership Committee; 2007 - present

Organizer of International Conferences

- **6th International EMF Seminar in China:** Electromagnetic Fields and Biological Effects; Co-Chair of the conference; Chongqing, China, October 2011
- **BEMS 2010:** Annual Meeting of Bioelectromagnetics Society; Co-Chair of the Technical Program Committee; June 14-18, 2010, Seoul, South Korea
- **U.S. Washington Conference** on "Cell Phones and Health: Science and Public Policy Questions", September 14-15, 2009, Washington, DC, USA; Member of Steering Committee, Session Chair, Invited speaker (opening lecture)
- **BioEM 2009:** the Joint Meeting of Bioelectromagnetics Society (USA) and European BioElectromagnetics Association, June 14-18 2009, Davos, Switzerland; Co-Chair Technical Program Committee, Session Moderator, Invited speaker
- **1st International Radiation Proteomics Workshop 2009;** co-organizer & member of the Scientific Committee, May 2009, Munich, Germany
- **5th International EMF Seminar in China;** Co-Chair, member of the Scientific Committee, April 2009, Hangzhou, China
- **South African Symposium on Mobile Telephony;** Mobile Telephony in relation to Health, Standards, Compliance with Standards & Precaution; Johannesburg, South Africa, October 8-9, 2007 (Co-Chair, Speaker, Rapporteur)
- **WHO/STUK Workshop** on Application of Proteomics and Transcriptomics in EMF Research. STUK, Helsinki, Finland, October 30 - November 1, 2005 (Co-Chair, Speaker, Rapporteur)
- **Cost281/WHO/FGF/STUK Workshop** on mobile phone radiation induced stress response. STUK, Helsinki, Finland, April 28-29, 2004 (Co-Chair, Speaker)

International Conference Co-Organizer, Session Chair, Rapporteur

- Monte Verita meeting "EMF Health Risk Research", Ticino/Monte Verita, Switzerland, October 22-25, 2012; Session Chair
- BEMS 2012, Session Chair; Brisbane, Australia, June 2012
- BEMS 2011; Session organizer and Invited speaker; Halifax, Canada, June 2011
- 3rd International Workshop in the Framework of NRP57 "Non-Ionizing Radiation - Health and Environment": "EMF and the Brain", May 2008, Session Chair
- The Korean Institute of Electromagnetic Engineering & Science (KIEES) Workshop on Health Effects on EMF and Electromagnetic Environment, Invited Speaker, September 2009, Seoul, South Korea
- 29th URSI General Assembly, Chicago, IL, USA, August 2008; Session Organizer and Chair
- 30th Annual Meeting of the Bioelectromagnetics Society, San Diego, CA, USA, 9-13.06.2008 (Member of the Technical Committee; Plenary Session Organizer & Chair & Speaker)
- 29th Annual Meeting of the Bioelectromagnetics Society, Kanazawa, Japan, 11-15.06.2007 (Member of the Technical Committee; Session Chair)
- 28th Annual Meeting of Bioelectromagnetics Society, Cancun, Mexico, 12-15.06.2006 (Member of the Technical Committee; Session Chair)
- VALDOR 2006, Stockholm, Sweden, May 14-18, 2006; Session organizer and

- Chair: Risk assessment of electromagnetic fields and mobile telephones
- Cost 281 Workshop, Graz, Austria, April, 20-21, 2006; Emerging Technologies, Potential Sensitive Groups and Health; Session co-Chair
 - 3rd Workshop on Biological Effects of Electromagnetic Fields, Greece, October 2004; Session “Genomics, Transcriptomics and Proteomics” (Session Organizer and Chair)
 - 26th Annual Meeting of Bioelectromagnetics Society, Washington, DC, USA, 20-24.06.2004, (Member of the Technical Committee; Organizer and Chair – Special Tutorial Session: Genomics, Transcriptomics & Proteomics methods in studying effects of electromagnetic fields on bio-systems)
 - NRPB/WHO Workshop on Static Magnetic Fields. Chilton/Oxford, UK, April 26-27, 2004 (invited rapporteur)
 - Finnish Symposium on Biological Effects of Mobile Phone Radiation, Autumn 2003 (Member of the Organizing Committee)
 - 25th Annual Meeting of Bioelectromagnetics Society, Maui, HI, USA, 23-27.06.2003, (Member of the Technical Committee)
 - 2nd Workshop on Biological Effects of Electromagnetic Fields, Rhodes, Greece, October 7-11.10.2002; Session “Genomics, Transcriptomics and Proteomics” (Session Organizer and Chair)
 - PIERS 2002 Symposium, Cambridge, MA, USA, 1-5.07.2002 (Session Chair)
 - Millennium Workshop on Biological Effects of Electromagnetic Fields, Crete, Greece, 17-20.10.2000 (Session Chair)

Invited Lectures at Foreign Universities and Research Institutes

Mobile phone radiation

- Swinburne University of Technology, Hawthorn, Victoria, Australia, 25.11.2010
- US NIEHS, National Toxicology Program, Durham, NC, 30.08.2010
- US FDA, Little Rock, AR, USA, 26.08.2010
- US FDA, Washington, DC, USA, 23.04.2010 (remote dial-in presentation over internet)
- Zhejiang University, Hangzhou, China, 10.04.2008
- Zhejiang University, Hangzhou, China, 16.11.2007
- Zhejiang University, Hangzhou, China, 12.11.2007
- University of Stellenbosch, Cape Town, South Africa, July/August 2005
- Tshwane University of Technology, Pretoria, South Africa, July/August 2005
- IT'IS Foundation, Zurich, Switzerland, 17.02.2005
- Pretoria University, Pretoria, South Africa, 21.10.2004
- Tshwane University of Technology, Pretoria, South Africa, 19.10.2004
- Brooks AFB, San Antonio, TX, USA, 3.12.2003
- Zhejiang University, Hangzhou, China, 10.10.2003
- Sydney University, Sydney, Australia, 15.02.2002
- Telstra Laboratories, Melbourne, Australia, 12.02.2002
- St. Vincent's Hospital, Sydney, Australia, 11.02.2002
- Harvard University, Wellman Laboratories of Photomedicine, Boston, MA, USA, 15.11.2000

Ultraviolet radiation

- Harvard University, Wellman Laboratories of Photomedicine, Boston, MA, USA, 27.11.1996

Other topics

- US FDA, Rockville, MD, USA, 22.11.1996, Radiation, protein kinase C and apoptosis.

- SSI, Stockholm, Sweden, 6.11.1995, Radiation-induced arteriosclerosis.

Invited Talks at International Scientific Conferences

- Monte Verita meeting “EMF Health Risk Research”, Ticino/Monte Verita, Switzerland, October 22-25, 2012
- Children with Cancer conference, London, UK, May 2012
- BEMS 2011; Session organizer and Invited speaker; Halifax, Canada, June 2011
- U.S. Washington Conference on “Cell Phones and Health: Science and Public Policy Questions”, September 14-15, 2009, Washington, DC, USA
- BioEM 2009 the Joint Meeting of Bioelectromagnetics Society (USA) and European BioElectromagnetics Association, June 14-18 2009, Davos, Switzerland
- 1st International Radiation Proteomics Workshop 2009, Munich, Germany, May 2009
- 5th International EMF Seminar in China; Hangzhou, China, April 2009
- International Workshop "OMICS for assessing unclear risks", Berlin, Germany, May 2008
- 29th URSI General Assembly, Chicago, IL, USA, August 2008
- South African Bureau of Standards Convention, Johannesburg, South Africa, 11.10.2007
- South African Symposium on Mobile Telephony, Johannesburg, South Africa, 7-9.10.2007
- Final meeting of the Cost 281 Action, Brussels, Belgium, 17.11.2006 (“Hot topic” talk)
- Cost 281 meeting “Emerging EMF Technologies, Potential Sensitive Groups and Health” Graz, Austria, 20 - 21.04.2006
- VALDOR 2006, Stockholm, Sweden, May 14-18, 2006
- ETHZ Symposium Health Risk Assessment of Mobile Telecommunications, Monte Verita, Switzerland, 20-25.11.2005; (Keynote talk)
- 28th URSI General Assembly, New Delhi, India, 23-29.10.2005. (2 invited talks)
- 4th Int. Seminar on Electromagnetic Fields and Biological Effects, Kunming, China, 12-16.09.2005
- European Radiation Research 2005, Leicester, UK, 5-7.09.2005 (Keynote talk)
- Nordic Radiobiology Meeting, Uppsala, Sweden, 16-17.09.2004.
- 26th Annual Meeting of Bioelectromagnetics Society, Washington, DC, USA, 20-24.06.2004.
- IEEE ICES (SCC-28) meeting, San Antonio TX, USA, 4-7.12.2003
- 6th Meeting of the EBFA, Budapest, Hungary, 12-16.11.2003, (Plenary talk)
- Workshop: The Blood-Brain Barrier (BBB) - Can it be influenced by RF-field interactions? FGF & COST281, 3-6.11.2003, Reims, Germany.
- WHO & ICNIRP & China Health Ministry, 3rd International EMF Seminar in China: Electromagnetic Fields and Biological Effects, 14-17.10.2003, Guilin, China (Keynote talk)
- 25th Annual Meeting of Bioelectromagnetics Society, Maui, HI, USA, 23-27.06.2003. (Plenary + Invited talk)
- Proteomica Symposium, University of Madrid, 4-8.02.2003, Cordoba, Spain.
- FGF & COST 281 Workshop on “Genetic and Cytogenetic Aspects of RF-Field Interaction”, 24-27.11.2002, Löwenstein, Germany.
- COST 281 Seminar “Subtle Temperature Effects of RF-EMF”, 12-13.11.2002, London, UK.
- 27th General Assembly of the International Union of Radio Science (URSI), Maastricht, The Netherlands, 17-24.08.2002.

- 24th Annual Meeting of Bioelectromagnetics Society, Quebec City, Canada, 23-27.06.2002
- 29th Nordic Congress of Dermatology and Venerology, 7-10.06.2001, Göteborg, Sweden (talk presented By Riikka Pastila)
- University of Tokyo, Japan, Int. Symposium on Electromagnetics in Biology and Medicine, 2-4.04.2001
- Workshop of a Concerted Action of the EC 5th Framework Programme: Environment & Health - Health Impact of Electromagnetic Fields, Helsinki, Finland 19-22.09.2000
- Jagiellonian University, 7th Polish National Conference on Cell Biology, Krakow, Poland, 9-11.09.1999
- NORDTOX/NordEMS, 5th Nordic Toxicology Meeting, Helsinki, Finland, 25.05.1998,

Funding of research

Mobile phone radiation research

- *KONE Foundation, Finland; 2010; € 23.000,-; to study effects of mobile phone radiation on cells (live imaging of effects) at the Swinburne University of Technology in Australia*
- *STUK - Equipment funds; 2006; € 100.000,-; 2-DE equipment (Typhoon scanner)*
- *National Technology Agency of Finland – TEKES; 2005-2006; € 57.900,- ; Protein expression in skin of volunteers exposed to mobile phone radiation.*
- *STUK - Equipment funds; 2002; € 168.000,-; Maldi-ToF mass spectrometer*
- *Equipment grant; VerUm Foundation, Germany & IT'IS Foundation, Switzerland; 2002; € 50.000,-; Exposure set-up for 1800MHz GSM mobile phone radiation*
- *EU 5th Framework Programme; 2000-2003; € 190.000; REFLEX consortium partner*
- *The Academy of Finland - salary for post-doctoral fellow; 2000-2002; € 83.300,- ; Biological effects of microwave radiation emitted by mobile phones.*
- *National Technology Agency of Finland – TEKES; 2000-2003; € 167.000,- ; PI of the project within the LaVita consortium - Health effects of wireless communications.*
- *National Technology Agency of Finland – TEKES; 1998-2000; € 85.000,- ;PI of the STUK's project participating in ETX consortium - Effects of RF fields on protein phosphorylation and on receptor ligand interaction.*

Ionizing radiation research

- *EU 7th Framework Programme, CARDIORISK consortium, 2008 - 2010; € 205.000,-; PI of the STUK project: Effects of ionizing radiation on endothelial cell proteome and phospho-proteome in relation to radiation-induced atherosclerosis*

Ultraviolet radiation research

- *The Academy of Finland – SYTYKE postgraduate school; 2002-2003; € 83.000,- 2-year salary for researcher (Riikka Pastila, MSc) working towards PhD on project: UVA effect on melanoma metastasis*
- *The Academy of Finland – Programme on “Environment and Health” (SYTTY); 1998-2001; € 100.000,- ; Immunosuppressive, carcinogenic and metastasis-related effects of solar UV radiation.*
- *US, Department of Energy - Center of Excellence Grant; 1998; 1-year fellowship in laser medicine for support of post-doctoral fellow Joerg Heckenkamp, MD, to work at Laser Center of the Massachusetts General Hospital, Boston, MA, USA, PI*

- Glenn LaMuraglia, Co-PI - Dariusz Leszczynski;
- *Finnish Cancer Foundation* Travel grants (several)

Supervision of Doctoral Fellows

- Nadia Falzone, MSc (Eng.), Technical University of Pretoria, Pretoria, South Africa; PhD awarded in 2007 (RF-EMF and fertility)
- Riikka Pastila, MSc, University of Helsinki, Finland; PhD awarded in 2006 (UVA and melanoma metastasis)
- Reetta Nylund, MSc (Tech.), Helsinki University of Technology, Espoo, Finland; PhD expected in 2011 (Proteomics and RF-EMF)

University Appointed Reviewer of the Professorship Appointments

- Isabelle Lagroye, University of Bordeaux, France (2012)
- Andrei Pakhomov, Associate Professor, Old Dominion University, Norfolk, VA, USA (2010)
- Annie Joubert, Associate Professor, University of Pretoria, Pretoria, South Africa (2010)
- Annie Joubert, Associate Professor, University of Pretoria, Pretoria, South Africa (2008)
- Zeng Qunli, Associate Professor, Zhejiang University Medical School, Hangzhou, China (2007)
- Timothy Griffin, Assistant Professor, University of Minnesota, Minneapolis, MN, USA (2006)

University Appointed Examiner of the Doctoral Theses:

- Johanna Berry, 2005, University of Wollongong, NSW, Australia
- Jocelyn Laurence, 2004, Sydney University of Technology, Sydney, Australia
- Visa Honkanen, 1991, University of Helsinki, Finland

Teaching Activities

- Supervision of Masters thesis (Hanna Tammio), Univ. Helsinki; 2007 - ongoing
- Supervision of Masters theses, University of Helsinki (Taina Jaatinen 1993; Sakari Joenväärä 1997)
- Supervision of research projects executed by the students of biochemistry, University of Helsinki
- Supervision of research projects executed by the medical students and postdoctoral fellows, Harvard Medical School, Boston, MA, USA (1997-2000)
- Lecturer on "Apoptosis" - course 51094-1 University of Helsinki (1995 and 1996)
- Supervision of research projects executed by the medical students (6 graduate students) and postdoctoral fellow, Georgetown University Medical School, Washington, DC, USA (1990-1991)
- Teaching courses of histology and cell biology to the medical students of the Pomeranian Medical Academy, Szczecin, Poland (1980-1986)

List of Publications

Articles in international peer-reviewed scientific journals or books

- **Leszczynski D**, de Pomerai D, Koczan D, Stoll D, Franke H, Pablo Albar J. Five years later: The current status of the use of proteomics and transcriptomics in EMF research. *Proteomics*. 2012 Jun 18. doi: 10.1002/pmic.201200122. [Epub ahead of print]
- Chen G, Lu D, Chiang H, Leszczynski D, Xu Z. Using model organism *Saccharomyces cerevisiae* to evaluate the effects of ELF-MF and RF-EMF exposure on global gene expression. *Bioelectromagnetics*. 2012 Apr 9. doi: 10.1002/bem.21724. [Epub ahead of print]
- Pastila R, Heinävaara S, Ylianttila L, **Leszczynski D**. In vivo UVA irradiation of mouse is more efficient in promoting pulmonary melanoma metastasis than in vitro. *Cancer Cell Int*. 2011 Jun 6; 11(1):16.
- **Leszczynski D**. Chapter 17: Proteomic approach in mobile phone radiation research. In G. Obe, B. Jandrig, G. Marchant, H. Schütz (Editors) "Methods of Cancer Risk Assessment: Current and Prospective Approaches with Special Reference to Ionizing and Non-ionizing Radiation"; Wiley-VCH, 2011, pp 265-273
- Pluder F, Barjaktarovic Z, Azimzadeh O, Steininger S, Sarioglu H, **Leszczynski D**, Nylund R, Hakanen A, Atkinson MJ, Tapio D. Low-dose irradiation causes rapid alterations to the proteome of the human endothelial cell line EA.hy926. *Radiation & Environmental Biophysics*, 2011, 50: 155-166
- Stander BA, Marais S, Huyser C, Fourie Z, **Leszczynski D**, Joubert AM. Effects of non-thermal mobile phone radiation on breast adenocarcinoma cells. *South African Journal of Science* 2011, 107, pages 1-9
- Baan R, Grosse Y, Lauby-Secretan B, El Ghissassi F, Bouvard V, Benbrahim-Tallaa L, Guha N, Islami F, Galichet L, Straif K; WHO International Agency for Research on Cancer Monograph Working Group & Collaborators: Samet J, Armstrong B, Sim M, Degraeve E, Verschaeve L, Siemiatycki J, McNamee J, **Leszczynski D**, Juutilainen J, de Seze R, Doré JF, Blettner M, Dasenbrock C, Miyakoshi J, Shirai T, Szmigielski S, Kim N, Belyaev I, Cardis E, Hardell L, Mevissen M, Rössli M, Mann S, Blackman C, Inskip P, McCormick D, Melnick R, Portier C, Richardson D, Ahlbom A, Kuster N, Bontoux L, Broman K, Dekhil H, Galland C, Merckel O, Elder J, Marrant C, Nuttall R, Rowley J, Swicord M, Baan R, Benbrahim-Tallaa L, Bouvard V, Byrnes G, Carel R, Deltour I, El Ghissassi F, Galichet L, Grosse Y, Guha N, Harbo Poulsen A, Islami F, Kesminiene A, Lauby-Secretan B, Moissonnier M, Saracci R, Schüz J, Straif K, van Deventer E. Carcinogenicity of radiofrequency electromagnetic fields. *Lancet Oncology* 2011, 12: 624-626
- **Leszczynski D**. Proteomic approach in mobile phone radiation research. In G. Obe, B. Jandrig, G. Marchant, H. Schütz (Editors) "Methods of Cancer Risk Assessment: Current and Prospective Approaches with Special Reference to Ionizing and Non-ionizing Radiation"; Wiley-VCH, 2011 in press
- Falzone N, Huyser C, Becker P, **Leszczynski D**, Franken DR. The effect of pulsed 900-MHz GSM mobile phone radiation on the acrosome reaction, head morphometry and zona binding of human spermatozoa. *Int J Androl*. 2011 Feb;34(1):20-6; Article first published online: 7 MAR 2010; DOI: 10.1111/j.1365-2605.2010.01054.x

- Pluder F, Barjaktarovic Z, Azimzadeh O, Mörtl S, Krämer A, Steininger S, Sarioglu H, **Leszczynski D**, Nylund R, Hakanen A, Sriharshan A, Atkinson MJ, Tapio S. Low-dose irradiation causes rapid alterations to the proteome of the human endothelial cell line EA.hy926. *Radiat Environ Biophys*. 2010 Nov 23. [Epub ahead of print] PMID: 21104263
- Nylund R, Kuster N, **Leszczynski D**. Analysis of proteome response to the mobile phone radiation in two types of human primary endothelial cells. *Proteome Science* 2010, 8:52
- Falzone N, Huyser C, Franken DR, **Leszczynski D**. Mobile phone radiation does not induce pro-apoptosis effects in human spermatozoa. *Radiation Research* 2010 Aug;174(2):169-76
- **Leszczynski D**, Xu Z. Commentary: Mobile phone radiation health risk controversy. *Health Research Policy and Systems* 8, 2010, 2-
- Tapio S, Hornhardt S, Gomolka M, **Leszczynski D**, Posch A, Thalhammer S, Atkinson MJ. Use of proteomics in radiobiological research: current state of the art. *Radiat Environ Biophys* 49, 2010, 1-4
- Nylund R, Tammio H, Kuster N, **Leszczynski D**. Proteomic analysis of the response of human endothelial cell line EA.hy926 to 1800 GSM mobile phone radiation. *J. Proteomics & Bioinformatics* 2, 2009, 455-462
- Karinen A, Heinävaara S, Nylund R, **Leszczynski D**. Mobile phone radiation might alter protein expression in human skin. *BMC Genomics* 9, 2008, 77-
- Falzone N, Huyser C, Fourie F, Toivo T, **Leszczynski D**, Franken D. In vitro effect of pulsed 900 MHz GSM radiation on mitochondrial membrane potential and motility of human spermatozoa. *Bioelectromagnetics* 29, 2008, 268-276
- Dawe AS, Nylund R, **Leszczynski D**, Kuster N, Reader T, De Pomeraï DI. Continuous wave and simulated GSM exposure at 1.8 W/kg and 1.8 GHz do not induce hsp16-1 heat-shock gene expression in *Caenorhabditis elegans*. *Bioelectromagnetics*. 29, 2008, 92-99
- Pastila R, **Leszczynski D**. Ultraviolet-A radiation induces changes in cyclin G gene expression in mouse melanoma B16-F1 cells. *Cancer Cell Int.* 7, 2007, 7-
- Nylund R, **Leszczynski D**. Mobile phone radiation causes changes in gene and protein expression in human endothelial cell lines and the response seems to be genome- and proteome-dependent. *Proteomics* 6, 2006, 4769-4780
- Remondini D, Nylund R, Reivinen J, Poullietier de Gannes F, Veyret B, Lagroye I, Haro E, Trillo MA, Capri M, Franceschi C, Schlatterer K, Gminski R, Fitzner R, Tauber R, Schuderer J, Kuster N, **Leszczynski D**, Bersani F, Maereker Ch. Gene expression changes in human cells after exposure to mobile phone microwaves. *Proteomics* 6, 2006, 4745-4754
- **Leszczynski D**, Meltz ML. Report: Questions and answers concerning applicability of proteomics and transcriptomics in EMF research. *Proteomics* 6, 2006, 4674-4677
- Pastila R, **Leszczynski D**. Ultraviolet A alters adhesive properties of mouse melanoma cells. *Photodermatology Photoimmunology & Photomedicine* 21, 2005, 183-190
- Pastila R, **Leszczynski D**. ultraviolet A exposure might increase metastasis of mouse melanoma: A pilot study. *Photodermatology Photoimmunology & Photomedicine* 21, 2005, 234-241
- Nylund R, **Leszczynski D**. Proteomics analysis of human endothelial cell line EA.hy926 after exposure to GSM 900 radiation. *Proteomics*, 4, 2004, 1359-1365

- **Leszczynski D**, Nylund R, Joenväärä S, Reivinen J. Applicability of Discovery Science-Approach to Determine Biological Effects of Mobile Phone Radiation. *Proteomics* 4, 2004, 426-431
- **Leszczynski D**. Cellular, Animal and Epidemiological Studies of the Effects of Static Magnetic Fields Relevant to Human Health. *Progress Biophys. Mol. Biol.* 87, 2005, 247-253
- **Leszczynski D**, Joenväärä S, Reivinen J, Kuokka R. Non-thermal activation of hsp27/p38MAPK stress pathway by mobile phone radiation in human endothelial cells: Molecular mechanism for cancer- and blood-brain barrier-related effects. *Differentiation* 70, 2002, 120-129
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