PRE-FILED TESTIMONY
OF JERRY L. PHILLIPS
MPUC Docket No. 2011-00262

Q. Please state your name and business address.

A. My name is Jerry L. Phillips. My address is:

Center for Excellence in Science, Department of Chemistry and Biochemistry,
University of Colorado Colorado Springs
1420 Austin Bluffs Parkway
Colorado Springs, CO 80918

Q. Briefly state your occupation, educational background and current employment.

A. Currently I am the Director of the Center for Excellence in Science and Professor Attendant of Chemistry and Biochemistry at the University of Colorado Colorado Springs. I've earned a Bachelor of Arts degree in Chemistry from the University of Colorado Boulder and a Ph.D. in Biochemistry from Colorado State University. I had postdoctoral experience in oncology research at the McArdle Cancer Research Laboratory at the University of Wisconsin.

Q. Briefly describe your professional experience.

A. Details are in my curriculum vitae, which is attached as Exhibit A. Briefly, I have served at academic levels from assistant to full professor. I also served as Senior Scientist at the Cancer Therapy & Research Center in San Antonio, TX, and as Research Scientist at the Jerry L. Pettis Memorial VA Medical Center in Loma Linda, CA. I am an educator and a research scientist.

Q. Have you authored any papers or journal articles?

A. I have published scientific studies in peer-reviewed scientific journals, chapters in books, technical reports, and meeting abstracts. Full lists are in my *curriculum vitae*, attached as Exhibit A.

Q. Briefly describe your work and experience related to the study of electromagnetic fields and radio frequency waves in the 30 MHz to 300 GHz range ("RF"), and about their potential effects on biological systems.

A. I began studying the biological effects of 60Hz electric and magnetic fields in about 1983 at the University of Texas San Antonio and at the University of Texas Health Sciences Center at San Antonio and the Cancer Therapy and Research Center. My laboratory's focus was on the effects of extremely low frequency (ELF) electromagnetic fields (EMFs) on cancer cell proliferation ("growth") and survival characteristics. After moving to the Pettis Memorial VA Center in Loma Linda, CA, my laboratory continued the ELF EMF work and began work with funding from Motorola Corporation on the biological effects of RF radiation (RFR) at cell telephone frequencies. We studied several endpoints, including RFR effects on gene expression, DNA damage and repair, and central nervous system tumor development. At the University of Colorado Colorado Springs, I maintain an active interest in the biological effects of non-ionizing radiation. Additionally, at the request of editors of several peer-reviewed publications, I review 3–6 manuscripts/year that have been submitted to those journals.

Q. Are you familiar with other research studies and writings on the subject?

A. Yes, I am reasonably familiar with a wide range of literature over the last 40 years that describes biological effects (or not) as a result of ELF EMF and RFR exposure.

Q. Are you familiar with peer-reviewed research studies, *in vivo* and /or *in vitro*, that reported positive results showing non-thermal biological effects after exposure to low-level RF, meaning below the level at which "thermal" effects have been confirmed?

A. Yes, I am familiar with many peer-reviewed research studies reporting positive results of non-thermal biological effects from exposure to low-level RF.

Q. Please list some of the types of biological effects for which the studies have reported positive results.

A. The reported biological effects include a wide range of changes, including those associated with cells in a dish (*in vitro* studies), laboratory animals (*in vivo* studies), and humans ("clinical" studies and epidemiologic studies). Those associated with cells include DNA damage and other genotoxic effects, increased permeability of blood-brain barrier, changes in calcium ion efflux, changes in gene expression and protein expression.

Q. Did some studies involve exposure to RF in or near the 2.4 GHz range?

A. Yes. A number of studies involving exposure to RF in that range have shown positive results for non-thermal biological effects.

Q. Are there possible explanations for the mechanisms by which non-thermal biological effects reported in the literature could be caused by RF exposure?

A. Yes, a number of studies and reports have described possible mechanisms to explain the physiological or biochemical mechanisms by which the observed effects could occur. One possibility is that DNA is damaged by free radicals that are formed inside cells. Free radicals affect cells by damaging macromolecules, such as DNA, protein, and membrane lipids. Several reports have indicated that EMF enhances free radical activity in cells, particularly via the Fenton reaction:

H. Lai, N.P. Singh, Melatonin and a spin-trap compound block radiofrequency electromagnetic radiation-induced DNA strand breaks in rat brain cells, Bioelectromagnetics 18 (1997) 446–454;

H. Lai, N.P. Singh, Effects of microwaves and a temporally incoherent magnetic field on single and double DNA strand breaks in rat brain cells, Electromag. Biol. Med. 24 (2005) 23–29;

H. Lai, N.P. Singh, Melatonin, N-tert-butyl-alpha-phenylnitrone block 60-Hz magnetic field-induced DNA single and double strand breaks in rat brain cells, J. Pineal. Res. 22 (1997) 152–162;

H. Lai, N.P. Singh, Magnetic-field-induced DNA strand breaks in brain cells of the rat, Environ. Health Perspect. 112 (2004) 687–694;

B. Oral, M. Guney, F. Ozguner, N. Karahan, T. Mungan, S. Comlekci, G. Cesur, Endometrial apoptosis induced by a 900-MHz mobile phone: preventive effects of vitamins E and C, Adv. Ther. 23 (2006) 957–973;

M. Simkó, Cell type specific redox status is responsible for diverse electromagnetic field effects, Curr. Med. Chem. 14 (2007) 1141–1152.

Additionally, the work of Blank and Soo and Blank and Goodman support the possibility that EMF exposure at low levels has a direct effect on electron transfer processes:

M. Blank, L. Soo, Electromagnetic acceleration of the Belousov-Zhabotinski reaction, Bioelectrochemistry 61 (2003) 93–97.

M. Blank, R. Goodman, A mechanism for stimulation of biosynthesis by electromagnetic fields: charge transfer in DNA and base pair separation, J. Cell. Physiol. 214 (2008) 20–26.

Although the authors do not discuss their work in the context of EMF-induced DNA damage, the possibility exists that EMF exposure could produce oxidative damage to DNA. Other possible mechanisms include RFR-induced changes in gene expression, in stress-protein expression, in permeability of the blood-brain barrier, and in the level or movement of key cellular ions, such as calcium.

Q. **Are you familiar with any peer-reviewed epidemiological studies reporting positive results for a risk of cancer, disease, or other adverse health effects resulting from the exposure to RF?**

A. Yes.

Q. **Are there possible explanations for the mechanisms by which cancer and other diseases could be causally related to the non-thermal biological effects of RF exposure?**

A. Yes. Some of the observed biological effects, including DNA damage and other genotoxic effects, could possibly have carcinogenic effects resulting from repeated exposures over time. It is interesting that ELF EMF, in addition to RFR, has also been shown to cause DNA damage. Furthermore, free radicals have been implicated in this effect of ELF EMF. This further supports the view that EMF affects DNA via an indirect secondary process, since the energy content of ELF EMF is much lower than that of RFR. Effects via the Fenton reaction predict how a cell would respond to EMF. For instance:

(1) Cells that are metabolically active would be more susceptible to EMF, because more hydrogen peroxide is generated by mitochondria to fuel the reaction.

(2) Cells that have high level of intracellular free iron would be more vulnerable to EMF. Cancer cells and cells undergoing abnormal proliferation have higher concentrations of free iron because they uptake more iron and have less efficient iron storage regulation. Thus, these cells could be selectively damaged by EMF. Consequently, this suggests that EMF could potentially be used for the treatment of cancer and hyperplastic diseases. The effect could be further enhanced if one could shift anaerobic glycolysis of cancer cells to oxidative glycolysis. There is quite a large database of information on the effects of EMF (mostly in the ELF range) on cancer cells and tumors. The data tend to indicate that EMF could retard tumor growth and kill cancer cells. One consequence of this consideration is that epidemiological studies of cancer incidence in cell phone users may not show a risk at all or even a protection effect. Note that Adey et al. reported a decrease in central nervous system tumors in rats exposed to RFR at cell telephone frequencies [W. Adey, et al., Spontaneous and nitrosourea-induced primary tumors of the central nervous system in Fischer 344 rats chronically exposed to 836MHz modulated microwaves, Radiat. Res. 152 (1999) 293–302].

(3) Since the brain is exposed to rather high levels of EMF during cell phone use, the consequences of EMF-induced genetic damage in brain cells are of particular importance. Brain cells have high levels of iron. Special molecular pumps are present on nerve cell nuclear membranes to pump iron into the nucleus. Iron

atoms have been found to intercalate within DNA molecules. In addition, nerve cells have a low capacity for DNA repair, and DNA breaks could easily accumulate. Another concern is the presence of superparamagnetic iron-particles (magnetites) in body tissues, particularly in the brain. These particles could enhance free radical activity in cells and thus increase the cellular-damaging effects of EMF. These factors make nerve cells more vulnerable to EMF. Thus, the effect of EMF on DNA could conceivably be more significant on nerve cells than on other cell types of the body. Since nerve cells do not divide and are not likely to become cancerous, the more likely consequences of DNA damage in nerve cells include changes in cellular functions and in cell death, which could either lead to or accelerate the development of neurodegenerative diseases. Double-strand breaks, if not properly repaired, are known to lead to cell death. Cumulative DNA damage in nerve cells of the brain has been associated with neurodegenerative diseases, such as Alzheimer's, Huntington's, and Parkinson's diseases. However, another type of brain cell, the glial cell, can become cancerous as a result of DNA damage. The question is whether the damaged cells would develop into tumors before they are killed by EMF due to over accumulation of genetic damages. The outcome depends on the interplay of these different physical and biological factors—an increase, decrease, or no significant change in cancer risk could result from EMF exposure.

(4) On the other hand, cells with high amounts of antioxidants and antioxidative enzymes would be less susceptible to EMF. Furthermore, the effect of free radicals could depend on the nutritional status of an individual, e.g., availability

of dietary antioxidants, consumption of alcohol, and amount of food consumption. Various life conditions, such as psychological stress and strenuous physical exercise, have been shown to increase oxidative stress and enhance the effect of free radicals in the body. Thus, one can also speculate that some individuals may be more susceptible to the effects of EMF exposure.

Other observed effects, including increased permeability of blood-brain barrier and changes in gene expression and protein expression, could possibly contribute to other disease conditions over time. Examples studies of these results are (this list is not intended to be all-inclusive):

B.R.R. Persson, Salford, L. G., Brun, A. BBB permeability in rats exposed to electromagnetic fields used in wireless communication. Wireless Networks:455–461 (1997).

L.G. Salford, A. Brun, J.L. Eberhardt, and B.R.R. Persson. Permeability of the blood-brain-barrier induced by 915 MHz electromagnetic-radiation, continuous wave and modulated at 8, 16, 50 and 200 Hz. Bioelectrochemistry and Bioenergetics. 30:293-301 (1993).

L.G. Salford, A. Brun, K. Sturesson, J.L. Eberhardt, and B.R. Persson. Permeability of the blood-brain barrier induced by 915 MHz electromagnetic radiation, continuous wave and modulated at 8, 16, 50, and 200 Hz. Microscopy research and technique. 27:535-542 (1994).

Schirmacher, A et al, 2000. Electromagnetic fields (1.8 GHz) increase the permeability of sucrose of the blood-brain barrier in vitro. Bioelectromagnetics 21:338-345.

Ivaschuk, OI et al, 1997. Exposure of nerve growth factor-treated PC 12 rat pheochromocytoma cells to a modulated radiofrequency field at 836.55 MHz: effects on c-jun and c-fos expression. Bioelectromagnetics 18 (3): 223-229.

Kwee, S et al, 2001. Changes in cellular protiens due to environmental non-ionizing radiation. I. Heat-shock protiens. Electro-and Magnetobiology 20:141-152.

Leszczynski, D et al, 2002. Non-thermal activation of the hsp27/p38MAPK stress pathway by mobile phone radiation in the human endothelial cells: Molecular mechanism for cancer- and blood-brain barrier-related effects. Differentiation 70: 120-129.

Leszczynski, D et al, 2004. Proteomics analysis of human endothelial cell line EA.hy926 after exposue to GSM 900 radiation. Short Communication. Proteomics 4, 1359-1365.

Q. **Have some lab research and epidemiological studies shown negative results for non-thermal biological effects from RF exposure and are there other inconsistencies between study results?**

A. Yes.

Q. **Do the inconsistencies and negative result studies prove that the studies showing positive results are unreliable or wrong?**

A. No, nor do the studies showing negative results negate or cancel similarly done studies that demonstrate positive results. The positive results reported in well designed, peer-reviewed studies stand on their own merit as evidence of non-thermal biological effects, and the extensive number and quality of these studies as a whole stand as substantial evidence that such effects can occur from RF exposure. That many of the studies on both sides of this issue have been done well is encouraging from a scientific perspective. RFR exposure does indeed appear to produce a variety of biological effects, and the total body of available data contains clues as to conditions producing effects and methodologies to detect them. This view is in contrast to that of those who believe that studies unable to replicate the work of others are more credible than the original studies, that studies showing no effects

cancel studies showing an effect, or that studies showing effects are not credible simply because we do not understand how those effects might occur.

Some may be tempted to apply incorrectly the teachings of Sir Karl Popper, one of the great science philosophers of the 20th century. Popper proposed that many examples may lend support to an hypothesis, while only one negative instance is required to refute it. While this holds most strongly for logical subjects, such as mathematics, it does not hold well for more complex biological phenomena that are influenced by stochastic factors. Each study to investigate RFR-induced biological changes must be evaluated on its own merits, and then studies that both show effects and do not show effects must be carefully evaluated to define the relationship of experimental variables to experimental outcomes and to assess the value of experimental methodologies to detect and measure these outcomes.

The negative results and inconsistencies among similarly done studies, so-called replication studies, or studies of similar endpoints (e.g., various types of DNA damage, or changes in the expression of various genes) may very well be explained by various factors or causes. For instance, differences in methodology can and often do produce distinctly different results. As an example, the use of an enzyme called proteinase K greatly enhances the sensitivity of the "comet assay," a technique used to detect damage to DNA. While some of us who have studied RFR-induced DNA damage have used proteinase K in our work, others who claim attempts to replicate our studies did not. Other methodological differences also contribute to lack of reproducibility.

There is a final point to be made about "consistency" of results. My own work [J.L. Phillips, O. Ivaschuk, T. Ishida-Jones, R.A. Jones, M. Campbell-Beachler, W. Haggren, DNA damage in Molt-4 T- lymphoblastoid cells exposed to cellular telephone radiofrequency fields *in vitro*, Bioelectrochem. Bioenerg. 45 (1998) 103–110] was criticized by Gos and colleagues [P. Gos, B. Eicher, J. Kohli,W.D. Heyer, No mutagenic or recombinogenic effects of mobile phone fields at 900MHz detected in the yeast *saccharomyces cerevisiae*, Bioelectromagnetics 21 (2000) 515–523], who state: "The results in the latter study (Phillips et al., 1998) are puzzling and difficult to interpret, as no consistent increase or decrease in signal in the comet assay at various SARs or times of exposure was identified." What has been perceived as an inconsistent effect is indeed consistent with the observations of bimodal effects reported in hundreds of peer-reviewed publications. These bimodal effects may be dependent on concentration of an agent, time of incubation with an agent, or some other parameter relating to the state of the system under investigation.

Numerous examples from the literature point out that what appears to be inconsistency may instead be real events related to and determined by the agents involved and the state of the biological system under investigation. Our own results may be the result of signal modulation, signal intensity, time of exposure, or state of the cells. The results may indicate a bimodal effect, or they may, as we suggested, represent time- and signal-dependant changes in the balance between damage and repair because of direct or indirect effects of RFR exposure on repair mechanisms.

Q. Have you reviewed the joint testimony of William H. Bailey, Ph.D. and Yakov Shkolnikov, Ph.D., dated September 19, 2012?

A. Yes.

Q. Dr. Bailey and Dr. Shkolnikov cite a 2012 review by AGNIR stating that "the evidence for a direct or indirect genotoxic effect is unconvincing." Do you agree with this conclusion?

A. No. Drs. Bailey and Shkolnikov seem to base their opinion on their version of "weight of evidence"—numbers of studies showing or not showing effects, not on the strength of specific studies. There are well-done studies from several laboratories, including mine and Dr. Henry Lai's, in which changes in DNA damage are incontrovertible.

Phillips, J et al., 1998. DNA damage in molt-4 lymphoblastoid cells exposed to cellular telephone radiofrequency fields in vitro. Bioelectrochemistry and Bioenergetics 45:103-110.

De Iuliis GN, Newey RJ, King BV, Aitken RJ. 2009. Mobile phone radiation induces reactive oxygen species production and DNA damage in human spermatozoa in vitro. PLoS One 4(7):e6446.

Huang TQ, Lee MS, Oh E, Zhang BT, Seo JS, Park WY, (2008a) Molecular responses of Jurkat T-cells to 1763 MHz radiofrequency radiation. *Int J Radiat Biol.,* 84(9):734-741.

Lai H, Singh NP, Acute low-intensity microwave exposure increases DNA single-strand breaks in rat brain cells. *Bioelectromagnetics* 16(3):207-210, 1995.

Lai H, Singh NP, Single- and double-strand DNA breaks in rat brain cells after acute exposure to radiofrequency electromagnetic radiation. *Int J Radiat Biol* 69(4):513-521, 1996.

Lai, H, Singh, NP, Melatonin and a spin-trap compound block radiofrequency electromagnetic radiation-induced DNA strand breaks in rat brain cells.

Bioelectromagnetics 18(6):446-454, 1997a.

Lai H, Singh NP. Melatonin and N-tert-butyl-alpha-phenylnitrone block 60-Hz magnetic field-induced DNA single and double strand breaks in rat brain cells. *J Pineal Res.* 22(3):152-162, 1997b.

Lai H, Carino MA, Singh NP, Naltrexone blocks RFR-induced DNA double strand breaks in rat brain cells. *Wireless Networks* 3:471-476, 1997.
Lai H, Singh NP Magnetic-field-induced DNA strand breaks in brain cells of the rat. *Environ Health Perspect.* 112(6):687-694, 2004.

Lai H, Singh NP, Interaction of microwaves and a temporally incoherent magnetic field on single and double DNA strand breaks in rat brain cells. *Electromag Biol Med* 24:23-29, 2005.

Q. **Dr. Bailey and Dr. Shkolnikov cite a report by the ICNIRP Committee, which concluded that "the trend in the accumulated evidence is increasingly against the hypothesis that mobile phone use causes brain tumors." Do you agree with that conclusion?**

A. No. Drs. Bailey and Shkolnikov once again seem to base their opinion on their version of "weight of evidence," or perhaps on epidemiological studies that are flawed. There are sufficient studies (some mentioned above) that identify the means by which RFR exposure could cause an increase in disease, including cancer, that identify an increase in disease in animals, and that identify an increased incidence of disease, including cancer, in humans. The IARC saw fit to classify RFR exposure as a Group 2B carcinogen (Group 2B: The agent is possibly carcinogenic to humans). This category is used for agents for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence of carcinogenicity in experimental animals. It may also be used when there is inadequate evidence of carcinogenicity in humans but there is sufficient evidence of carcinogenicity in

experimental animals. In some instances, an agent for which there is inadequate evidence of carcinogenicity in humans and less than sufficient evidence of carcinogenicity in experimental animals together with supporting evidence from mechanistic and other relevant data may be placed in this group. An agent may be classified in this category solely on the basis of strong evidence from mechanistic and other relevant data..

Q. **Do you agree with their testimony that "The weight of the evidence does not support the idea that significant biological or adverse health effects can occur" from exposure to RF?**

A. Because the issue of RFR-induced bioeffects is contentious, and because the issue is tried in courtrooms and various public forums, a term heard frequently is weight of evidence. This term generally is used to describe a method by which all scientific evidence related to a causal hypothesis is considered and evaluated. This process is used extensively in matters of regulation, policy, and the law, and it provides a means of weighing results across different modalities of evidence. When considering the effects of RFR exposure on DNA damage and repair, modalities of evidence include studies of cells and tissues from laboratory animals exposed in vivo to RFR, studies of cells from humans exposed to RFR in vivo, and studies of cells exposed in vitro to RFR. While weight of evidence is gaining favor with regulators, its application by scientists to decide matters of science is often of questionable value. One of the reasons for this is that there generally is no discussion or characterization of what weight of evidence actually means in the context in which it

is used. Additionally, the distinction between weight of evidence and strength of evidence often is lacking or not defined, and differences in methodologies between investigators are not considered.

Consequently, weight of evidence generally amounts to what Krimsky [S. Krimsky, The weight of scientific evidence in policy and law, Am. J. Public Health 95 (2005) S129–S136.] refers to as a "seat-of-the-pants qualitative assessment." Krimsky points out that according to this view, weight of evidence is "a vague term that scientists use when they apply implicit, qualitative, and/or subjective criteria to evaluate a body of evidence." As examples, such is the case in the reviews by Juutilainen and Lang [J. Juutilainen, S. Lang, Genotoxic, carcinogenic, and teratogenic effects of electromagnetic fields, Introduction and overview, Mutat. Res 387 (1997) 165–171.] and Verschaeve and Maes [L.Verschaeve,A. Maes, Genetic, carcinogenic and teratogenic effects of radiofrequency fields, Mutat. Res. 410 (1998) 141–165.]. There is little emphasis on a critical analysis of similarities and differences in biological systems used, exposure regimens, data produced, and investigator's interpretations and conclusions. Rather, there is greater emphasis on the number of publications either finding or not finding an effect of RFR exposure on some endpoint. To some investigators, weight of evidence does indeed refer to the balance (or imbalance) between the number of studies producing apparently opposing results, without regard to critical experimental variables. While understanding the role these variables play in determining experimental outcome could provide

remarkable insights into defining mechanisms by which RFR produced biological effects, few seem interested in or willing to delve deeply into the science.

Given the lack of rigor in adequately evaluating the strengths and weaknesses of studies, the issue of weight of evidence is moot. What is more relevant is the existence of well-done studies that both show and don't show biological effects that result from RFR exposure, and the existence of epidemiological studies that show changes in disease incidence associated with RFR exposure. Together these well done studies provide a link between RFR exposure, the incidence of disease in humans, and possible mechanisms by which disease incidence changes.

Q. **Do you agree with the testimony of CMP's experts that "a careful scientist cannot conclude that studies and reports have identified a true, non-thermal effect."?**

A. No. I do not agree with this opinion. I, and many other very careful scientists, have concluded that an extensive number of studies and reports have identified a number of non-thermal biological effects resulting from low-level RF exposure.

Q. **In your opinion, could a careful scientist familiar with the body of knowledge on the subject reliably conclude that there is no evidence of, and no risk of, non-thermal effects from exposure to RF in the range of 1–3GHz?**

A. No.

Q. **In your opinion, could a careful scientist familiar with the body of knowledge on the subject reliably conclude that there are no risks of adverse health effects from the exposure to RF in the 1–3 GHz range?**

1 A. No.

Dated this 14 day of January, 2013.

Jerry L. Phillips

STATE OF COLORADO
COUNTY OF El Paso :

January 14, 2013

Personally appeared the above-named Jerry L. Phillips, and stated under oath that the foregoing Affidavit made by him is true and based upon his own personal knowledge, information or belief, and so far as upon information and belief, he believes the information to be true. Before me,

Notary Public/Attorney-at-Law
Bethanie Traver
Name Typed or Printed
My Commission Expires: MY COMMISSION EXPIRES 10/26/2014

J. PHILLIPS
EXHIBIT A

Curriculum Vita

JERRY L. PHILLIPS, PH.D.

Mailing Address: University of Colorado at Colorado Springs
1420 Austin Bluffs Parkway
Colorado Springs, CO 80918

Phone: (719) 255-3649

E-Mail: jphillip@uccs.edu

COLLEGE AND UNIVERSITY EDUCATION

INSTITUTION	DATES	DISCIPLINE	DEGREE
Western Reserve University	9-63/6-65	Chemistry	—
University of Colorado	9-65/8-67	Chemistry	B.A.
Colorado State University	9-67/8-70	Biochemistry	Ph.D.

PROFESSIONAL EXPERIENCE

EMPLOYER	DATES	DISCIPLINE	POSITION
University of Colorado at Colorado Springs, Dept. Chemistry and Biochemistry	9-09/	Biochemistry	Professor (Attendant Rank)
University of Colorado at Colorado Springs	8-06/	Science Science Education	Director, Science Center
Science Applications International Corporation; NIDDK	3-06/8-06	Science, Science Education	Consultant
Biological Sciences Curriculum Study Colorado Springs, CO	12-99/3-06	Science Education Biological Sciences	Science Educator Project Director

California State University at San Bernardino Biology Department San Bernardino, CA	9-98/6-99	Biological Sciences	Visiting Scholar
Loma Linda University School of Medicine Dept. Physiology & Pharmacology	2-93/6-99	Cell Biology	Professor
Jerry L. Pettis VA Med. Ctr. Research Service Loma Linda, CA	5-90/12-98	Biochemistry Molecular Biology	Research Biologist
University of Texas Health Science Center at San Antonio Department of Medicine, Division Clinical Immunology	8-89/5-90	Molecular Biology	Visiting Research Fellow
Cancer Therapy and Research Ctr. and University of Texas Health Science Center at San Antonio Dept. Medicine, Div. Oncology	9-82/6-89	Biochemistry Oncology	Senior Scientist Dir. Phase I Drug Development Lab Adj. Assoc. Professor
University of Texas San Antonio Div of Allied Health and Life Sciences	9-78/8/82	Biochemistry	Associate Professor (Tenured)
University of Texas San Antonio Div. of Allied Health and Life Sciences	9-75/8-78	Biochemistry	Assistant Professor
Colorado State University Dept. of Biochemistry and Dept. of Physiology and Biophysics	7-72/8-75	Biochemistry	Instructor
Colorado State University Dept. of Biochemistry	1-72/6-72	Biochemistry	Research Associate
University of Wisconsin McArdle Laboratory for Cancer Research	9-70/12-71	Biochemistry Oncology	Postdoctoral Fellow

PRESENT RESPONSIBILITIES

As Director of the Center for Excellence in Science, I oversee the administration of established programs to ensure the academic success of university science students; the development of new programs to engender academic success; the teaching, training, hiring, and supervision of Center personnel; the management of the budget; assessment, evaluation and accountability for Center programs; collaborations with faculty and other center directors to coordinate curricular efforts, support instruction and student development; and extend support for student success. As Professor (Attendant) of Chemistry and Biochemistry, I teach up to two courses per semester, including Chem/Biol 4830 Biochemistry Principles, and Chem/Biol 4860/5860 Biochemistry Laboratory Techniques.

RECENT RESPONSIBILITIES

Primary consulting responsibilities were to the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) for their program, Diabetes Education in Tribal Schools, and to Science Applications International Corporation (SAIC) on issues relating to work with NIH. I also consulted with several tribal colleges, including Stone Child College, Northwest Indian College, Leach Lake Tribal College, Southwest Indian Polytechnic Institute, and Candeska Cikana Community College. I was a member of the authoring team and a curriculum developer for three curriculum units that are part of the K–12 project, Diabetes Education in Tribal Schools, which was released in 2009: All Life is Connected Lifestyle, Environment, and Diabetes; Life in Balance; and A Balancing Act: Preventing Diabetes.

At BSCS, I was Project Director and Science Educator on contracts from National Institutes of Health, with responsibilities for developing science curriculum supplements (instructional materials and activities). All curricula included written (about 150 pages) and Web-based components. I also directed the production of a DVD, *Evolution, Why Bother?* and a book of student activities, *Evolutionary Science and Society: Activities for the Classroom*. Additional work performed at BSCS included development of material for a CD-ROM-based program on Developmental Biology and conducting workshops on inquiry in the classroom, developing effective teaching strategies, and evaluating curricular materials.

Curricula developed won the following awards:

- NIH Good Plain Language Award (2008) – The Science of Healthy Behaviors Curriculum Supplement (Grades 7-8)
- NIH Excellent Plain Language Award (2007) - *Doing Science: The Process of Scientific Inquiry Curriculum Supplement* (Grades 7-8)
- NIH Honorable Mention Plain Language Award (2007) – *Looking Good, Feeling Good: From the Inside Out (Exploring Bone, Muscle, and Skin) Curriculum Supplement* (Grades 7-8)
- NIH Honorable Mention Plain Language Award (2007) – *The Science of Mental Illness Curriculum Supplement* (Grades 6-8)
- NIH Excellent Plain Language Award (2006) – *The Science of Energy Balance Curriculum*

Supplement (Grades 7-8)

- NIH Honorable Mention Plain Language Award (2006) – *The Brain: Our Sense of Self Curriculum Supplement* (Grades 7-8)
- NIH Honorable Mention Plain Language Award (2006) - *Using Technology to Study Cellular and Molecular Biology Curriculum Supplement* (Grades 9-12)
- NIH Excellent Plain Language Award (2005) – *Understanding Alcohol Curriculum Supplement* (Grades 7-8)
- NIH Honorable Mention Plain Language Award (2005) – *How Your Brain Understands What Your Ear Hears Curriculum Supplement* (Grades 7-8)
- NIH Honorable Mention Plain Language Award (2005) – *Sleep, Sleep Disorders, and Biological Rhythms Curriculum Supplement* (Grades 9-12)
- Rated "A+" by Educations World (December 2004) - *Sleep, Sleep Disorders and Biological Rhythms Curriculum Supplement (Grades 9-12)*

PROFESSIONAL AND HONORARY SOCIETIES

New York Academy of Sciences, American Chemical Society, Sigma Xi, Phi Kappa Phi, Phi Sigma

SCHOLARSHIPS, FELLOWSHIPS, ACADEMIC HONORS

N.S.F. Predoctoral Traineeship, 1968-1970; Honored by Phi Beta Kappa, 1970;
American Cancer Society Postdoctoral Fellowship, 1970-1971

MAJOR SERVICE RESPONSIBILITIES

Chair, Search Committee, Director, Writing Center, 2012–2013
Admissions and Records Advisory Committee, 2012–
Chair, Search Committee, Associate Director, Communication Center, 2012
Member, General Education Task Force, University Academic Innovations Committee, 2009-2010
Member, Emergency Preparedness Advisory Committee, 2009-2012
Member, Search Committee, Director, Oral Communication Center, 2009
Member, Search Committee, Interim Director, Oral Communication Center, 2009
Chair, Search Committee, Director, Language Technology Committee, 2008-2009
Member, Information Technology Advisory Committee, 2008-present
Member, Search Committee, Director, Math Learning Center, 2007

BSCS Liaison to the American Institute for Biological Sciences (AIBS), 2003-2006
BSCS representative, AIBS Public Policy Committee, 2004-2006

Member, Research and Development Committee, 1990-1998
Member, Radiation Safety Committee, 1991-1998
Member, Research Biosafety Committee, 1990-1995
Assignments were at the Pettis VA Medical Center

Radiation Safety Officer (University of Texas at San Antonio), 1976-1982
Served on and chaired numerous departmental, college, and university committees.

RESEARCH FUNDING

Between 1974 and 1999, research funding was obtained from the National Institutes of Health, The Robert A. Welch Foundation, The Nutrition Foundation, The Morrison Trust, The HEB Foundation, The James Dougherty Foundation, The H.B. Zachry Foundation, The John E. Fetzer Institute, The US Department of Energy, Southern California Edison, The Motorola Corporation. While at BSCS, contract funding was secured from NIH for the development of various curriculum supplements.

RELEVANT ACTIVITIES

Reviewed manuscripts for Cancer Research, International Journal of Radiation Biology, Environmental and Molecular Mutagenesis, Bioelectromagnetics, FASEB Journal, Radiation Research, Life Sciences, FEBS Letters, Journal of Biological Physics, Molecular and Cellular Biochemistry, Pathophysiology, Science of the Total Environment, IEEE Spectrum Magazine, Electromagnetic Biology and Medicine, and Micron. Last review, 10/2012.

Reviewed grant applications for NSF, The Research Corporation, The Air Force Office of Sponsored Research, The Hong Kong Government, The American Chemical Society, the government of the Netherlands, and the American Institute of Biological Sciences (AIBS) on behalf of the Air Force Surgeon General. Last review, 06/2010.

Consultant, Collingwood Community Health Centre, Melbourne, Australia, 1986-1990.

Invited speaker, Royal Melbourne Institute of Technology, June, 1986.

Invited to present testimony to Scientific Advisory Panel of the Florida Department of Environmental Regulation concerning biological effects of electromagnetic fields, March 29, 1987.

Invited to present testimony at Oversight Hearing on Health Effects of High Voltage Power Lines held by U.S. House of Representatives Subcommittee on Water and Power Resources, October 6, 1987.

Invited speaker, American Public Power Association 32nd Annual Engineering and Operations Workshop, "Are There Adverse Human Health Effects Due to Electric and Magnetic Fields From Utility Power Lines?" March, 1988, New Orleans, LA.

Invited speaker, University of Colorado, Colorado Springs, Biotechnology Center, September, 1988.

Invited speaker, Jerry L. Pettis Memorial VA Hospital, Loma Linda, CA, November, 1988.

Invited Speaker, Electromagnetic Energy Power Alliance, "Electromagnetic Field Exposure and Cancer." April, 1989, Washington, DC.

Invited speaker, Catholic University, Washington, DC, July, 1989.

Invited speaker, Jerry L. Pettis Memorial VA Hospital, Loma Linda, CA, December, 1989.

Associate Editor, *Investigational New Drugs*, Martinus Nijhoff Publishers, 1982-89.

Co-chair, Cancer Discussion Session, 12th Annual Meeting of the Bioelectromagnetics Society, June, 1990, San Antonio, TX.

Invited speaker, Men's International Roundtable Club, Redlands, CA, September 4, 1990.

Assistant Editor, Journal of Bioelectricity, Marcel Dekker, Inc., Publishers, 1988-90.

Invited Symposium speaker, Bioelectrical Repair and Growth Society, 10th Annual Meeting, "Molecular Biology and Electromagnetic Field Exposure," October, 1990, Philadelphia, PA.

Invited participant, John E. Fetzer Institute Symposium, "Planning of Multi-Center Study of Electrochemical Treatment (ECT) of Cancer," October 19-21, 1990, Kalamazoo, MI.

Invited Speaker, Loma Linda University Medical Center, Perinatal Biology Group , Loma Linda, CA, November 30, 1990.

Invited Speaker, Basic Sciences Seminar Program, Loma Linda University Medical Center, Loma Linda, CA, May 2, 1991.

Invited Speaker, California Association of Medical Technologists, Riverside, CA, May 22, 1991.

Invited Speaker, Nursing Education of America Annual Convention, Las Vegas, NV, June 9-10, 1991. Topics of talk: Basic Principles of Electromagnetics and the Etiology and Effects of Electropolution.

Invited Speaker, City of Riverside, CA, Environmental Protection Commission, "Health Effects of Electromagnetic Field Exposure." June 12, 1991.

Invited Speaker and Participant, "Health Effects of Electric and Magnetic Fields," a one-day program offered through the University of California at Riverside Continuing Education Center. June 29, 1991.

Invited Speaker, American Bar Association/Young Lawyers Division Public Utilities and Transportation Law Committee program, "Health Litigation: Electromagnetic Radiation Field Liability," August 13, 1991, Atlanta, GA.

Invited Speaker, FASEB EMF Symposium, "Effects of Electromagnetic Field Exposure on Specific Gene Transcription," April 7, 1992, Anaheim, CA.

Invited Plenary Speaker, The First World Congress for Electricity and Magnetism in Biology and Medicine, "Molecular Biology in Bioelectromagnetics: The Road To The Future," June 16, 1992, Lake Buena Vista, FL.

Invited Participant, John E. Fetzer Institute Forum on the Future of Bioelectromagnetics, September 17-18, 1992, Kalamazoo, MI.

Invited Speaker, Battelle Pacific Northwest Laboratories, October 8-9, 1992, Richland, WA.

Invited Speaker, IEEE/EMBS 14th International Conference, Electromagnetics Interactions Program, "Biological Effects of Electromagnetic Field Exposure: The Issues of Threshold and Credibility," October 29 - November 1, 1992, Paris, France.

Invited speaker, University of Bern, Institute for General Microbiology, "Biological Effects of Electromagnetic Field Exposure: An Overview," November 2, 1992, Bern, Switzerland.

Invited speaker, University of Bern, Institute for General Microbiology, "Effects of Electromagnetic Field Exposure on Gene Transcription," November 2, 1992, Bern, Switzerland.

Invited Speaker, Mini-Symposium on Biological Effects of Electromagnetic Field Exposure, Annual Meeting of the American Society for Cell Biology, November 15, 1992, Denver, CO.

Invited Speaker, 5th International Montreux Conference on Stress, Session on Stress, Free Radicals, Health & Aging, "Free Radicals in Biological Systems: What are They and What Do They Do?" February 19, 1993, Montreux, Switzerland.

Invited Speaker, Technical University of Lausanne, "Biological Effects of Exposure to Extremely Low Frequency Electromagnetic Fields," February 20, 1993, Lausanne, Switzerland.

Invited Chair, International Society for Bioelectricity Symposium, Session on Modulation of Gene Expression by Electromagnetic Fields. FASEB Experimental Biology 93 Meeting, March 30, 1993, New Orleans, LA.

Invited Participant, Workshop: ELF Electric and Magnetic Fields and Gene Activity, Sponsored by The U.S. Department of Energy and The Electric Power Research Institute, June 10-11, 1993, Los Angeles, CA.

Invited Speaker, Loma Linda University School of Medicine, Department of Microbiology, September 29, 1993.

Invited Speaker, American College of Toxicology Annual Meeting, Symposium on Selected Topics in the Exposure and Biology of Low-Level Electromagnetic Fields, "Mechanisms of in vitro molecular and cellular effects of EMF," October 3-6, 1993, New Orleans, LA.

Invited Speaker, Eidgenössische Technische Hochschule Zürich (Swiss Federal Institute of Technology), "Biological Effects Induced by Electromagnetic Field Exposure: The Issues of Threshold and Credibility," June 20, 1994, Zürich, Switzerland.

Invited Participant and speaker, Joint FDA/NIEHS/DOE/NIOSH Gene Transcription Workshop, August 31, 1994, Rockville, MD.

Invited participant and speaker, Motorola Bioeffects Symposium '96, January 28-30, 1996, Plantation, FL.

Invited speaker, EMC Zurich 1997 Symposium, February 18-20, 1997, Zurich, Switzerland.

Invited to serve as co-organizer and speaker for mini-symposium, Biological Signal Transduction II, to be held at the Second World Congress for Electricity and Magnetism in Biology and Medicine, Bologna, Italy, June 8-13, 1997.

Member, International Advisory Committee, Fourteenth International Symposium on Bioelectrochemistry and Bioenergetics, May 23-29, 1998, Vingstedcentret, Denmark.

Invited speaker, Fourteenth International Symposium on Bioelectrochemistry and Bioenergetics, May 23-29, 1998, Vingstedcentret, Denmark.

Invited to present testimony before the Health and Human Services Committee of the California State Senate in support of SB1699 sponsored by Senator Tom Hayden, April 5, 2000.

Invited speaker, Keys to Science Summer Institute, offering training in molecular biology, professional development, and curriculum implementation for high school teachers, June, 2001, Biological Sciences Curriculum Study, Colorado Springs, CO.

Invited speaker, Keys to Science Summer Institute, offering training in molecular biology, professional development, and curriculum implementation for high school teachers, June, 2002, Biological Sciences Curriculum Study, Colorado Springs, CO.

Invited speaker, Keys to Science Summer Institute, offering training in molecular biology, professional development, and curriculum implementation for high school teachers, June, 2003, Biological Sciences Curriculum Study, Colorado Springs, CO.

Invited speaker, Keys to Science Summer Institute, offering training in molecular biology, professional development, and curriculum implementation for high school teachers, June, 2004, Biological Sciences Curriculum Study, Colorado Springs, CO.

Member, External Advisory Committee, National Institute for Diabetes and Digestive and Kidney Diseases, Diabetes Education for Tribal Schools, 2004-2005.

Consultant to Northwest Indian College, Stone Child College, Southwestern Indian Polytechnic Institute, Leach Lake Tribal College, and Candeska Cikana Community College, Diabetes Education for Tribal Schools project, 2004-2006.

Workshop leader, Evolution and the Environment, National Association for Biology Teachers, October, 2005, Milwaukee, WI.

Invited speaker (could not attend), Precautionary EMF Approach: Rationale, Legislation And Implementation, 5th ICEMS International Workshop, Benevento, Italy, February 22-25, 2006.

Invited speaker, Colorado Bioneeers Conference 2008, "Electromagnetic Factors in health: What Do Scientists Know About the Effects of Wireless Technologies on Humans, Animals, and the Environment?" Boulder, CO, November 18, 2008.

Invited member, DETS (Diabetes Education for Tribal Schools) Curriculum Development Group, 2009.

Invited Speaker and Panel Member, Radiation Impacts on Human Health, a conference sponsored by the EMR Policy Alliance and held at the Colorado School of Mines, Golden, CO, November 8, 2009.

Invited interviewee, twice (30 min each show) on Sunday Edition, Canadian radio, 2011.

Invited interviewee, Italian TV show, "Report," interviewed by Sabrina Giannini, October, 2011.

Invited speaker, Café Scientifique, Such a headache—is it my cell phone (or just from worrying about it)? University of Colorado Colorado Springs, November 8, 2011.

Invited to Review Board, Journal of Pediatric Biochemistry, 2011-present

BIBLIOGRAPHY

ABSTRACTS/PRESENTATIONS

1. J.L. Phillips and P. Azari. On the Structure of Ovotransferrin. 160th American Chemical Society National Meeting. September, 1970, Chicago, IL.

2. J.L. Phillips, P.J. Sheridan, K.R. Simmons, J.H. Abel, and G.D. Niswender. Modulation by Luteinizing Hormone of Estradiol Uptake and Retention by the Corpus Luteum of the Ewe in vitro Endocrine Society. June, 1974, Atlanta, GA.

3. K.R. Simmons, J.L. Caffrey, and J.L. Phillips. The Isolation of Ovine Luteal Cells and their Production of Progesterone. Society for the Study of Reproduction. September, 1974, Ottawa, Canada.

4. J. Kuhn, D. Von Hoff, J. Phillips, M. Schick, G. Clark, D. Kisner, G. Weiss, T. Melink, D. Boldt, and J. Hutton. Phase I Trial of 2-Fluoro-ARA-AMP (NSC - 312887), Fourth NCI-EORTC Symposium on New Drugs in Cancer Therapy. December, 1983, Brussels, Belgium.

5. M. Hersh, J. Kuhn, J.L. Phillips, T. Ludden, G. Clark, J. Hutton, and D. Von Hoff. Pharmacokinetic Study of Fludarabine. American Society of Clinical Oncology. May, 1984, Toronto, Canada.

6. W.D. Winters and J.L. Phillips. Enhancement of Tumor Cell Growth by Electromagnetic and Magnetic Fields. Bioelectromagnetics Society. July, 1984, Atlanta, GA.

7. W.D. Winters and J.L. Phillips. Monoclonal Antibody Detection of Tumor Antigens in Human Colon Cancer Cells Following Electromagnetic Field Exposures. Bioelectromagnetics Society. July, 1984, Atlanta, GA.

8. W.D. Winters, M.P. Moyer, and J.L. Phillips. Antigen Detection by Monoclonal Antibodies Following Electromagnetic Field Exposures of Human Colon Cancer Cell. Tissue Culture Association. June, 1984, Houston, TX.

9. W.D. Winters and J.L. Phillips. Electromagnetic Field Induced Bioeffects in Human Cells In Vitro. Twenty-third Hanford Life Sciences Symposium. October, 1984, St. Louis, MO.

10. W.D. Winters and J.L. Phillips. The Search for Cells Sensitive to Electromagnetic Fields. U.S.D.O.E. and E.P.R.I. Contractors Review. November, 1984, St. Louis, MO.

11. G. Weiss, J. Phillips, R. Schwartz, H. Gaskill, J. Kuhn, D. Von Hoff, and C. Osborne. Phase I and Pharmacokinetic Study of Intraperitoneal (I.P.) Fludarabine Phosphate (2 FAMP: NSC 312887). American Society of Clinical Oncology. May, 1985, Houston, TX.

12. O. Alcanatara, J. Phillips, and D. H. Boldt. Differential Effects of Phorbol Esters and Phytohemagglutinin on Transferrin Receptor Expression by Lymphocytes. American Society of Clinical Investigation, 1985.

13. W.D. Winters, R. Crawley, R.J. Young, and J.L. Phillips. Biological Responses of Canine Leukocytes After Exposure to 60 Hz Electromagnetic Fields In Vitro. Bioelectromagnetics Society. June, 1985, San Francisco, CA.

14. W.D. Winters, G.F. Guest, B.T. Winters, and J.L. Phillips. Human Leukocyte Responses After Exposure to 60 Hz Electromagnetic Fields In Vitro. Bioelectromagnetics Society. June, 1985, San Francisco, CA.

15. D.H. Boldt, O. Alcantara, M. Tran, and J. Phillips. Effect of Protein Kinase C Activators on Transferrin Receptor Expression by Lymphoblastoid T-Cells. American Society of Hematology, 27th Annual Meeting. December, 1985, New Orleans, LA.

16. G. Weiss, J. Phillips, and D. Von Hoff. A Clinical-Pharmacological Comparison of Hepatic Arterial (HA) and Peripheral Vein (PV) Infusion of Cytarabine (ARAC) for Liver Cancer. American Society of Clinical Oncology. May, 1986, Los Angeles, CA.

17. T. Melink, D. Von Hoff, J. Phillips, G. Sarosy, M. Grever, H. Jayaram, and J. Whitecar. Phase I Trial and Biochemical Evaluation of Tiazofurin on a Weekly Schedule. American Association of Cancer Research. May, 1986, Los Angeles, CA.

18. J.L. Phillips, O. Alcantara, and D. H. Boldt. Modulation of Transferrin Receptor Expression by Two Different Mechanisms. American Federation for Clinical Research/American Society for Clinical Research, Washington, DC May, 1986.

19. C.A. Denham, O. Alcantara, J.L. Phillips, and D.H. Boldt. Transcriptional Regulation of the Transferrin Receptor Gene in Lymphoblastic Leukemia Cells Treated with Phorbol Diesters. American Society of Hematology, Washington, DC December, 1987.

20. J.L. Phillips and L. McChesney. Effect of Extremely Low Frequency Electromagnetic Fields on Gene Transcription in Human Leukemia Cells. Bioelectromagnetics Society. June, 1988, Stamford, CT.

21. K. Havlin, J. Koeller, J. Craig, G. Weiss, J. Kuhn, J. Phillips, G. Harman, J. Hardy, D. Von Hoff. Phase I Clinical and Pharmacokinetic Study of Deoxyspergualin. American Society of Clinical Oncology. May, 1988.

22. J.L. Phillips and L. McChesney. Effect of Pulsed Magnetic Field Exposure on Cellular Levels of RAS p21 in a Human Leukemia Cell Line. Bioelectromagnetics Society. June, 1989, Tucson, AZ.

23. W. Haggren, J.L. Phillips, and W.R. Adey. Effects of 60 Hz Magnetic Field Exposure on Genomic Rearrangement and Mating in the Yeast, Saccharomyces cerevisiae. Annual Review of Research on Biological Effects of 50/60 Hz Electric and Magnetic Fields. November, 1990, Denver, CO.

24. J.L. Phillips, W. Haggren, and W.R. Adey. Effects of 60 Hz Magnetic Field Exposure on Gene Transcription in T-Lymphoblastoid Cells. Annual Review of Research on Biological Effects of 50/60 Hz Electric and Magnetic Fields. November, 1990, Denver, CO.

25. W. Haggren, J.L. Phillips, and W.R. Adey. Effects of 60 Hz Magnetic Field Exposure on Genomic Rearrangement and Mating in the Yeast Saccharomyces Cerevisiae. 13th Annual Meeting of the Bioelectromagnetics Society. June, 1991, Salt Lake City, UT.

26. J.L. Phillips, W. Haggren, and W.R. Adey. Effects of 60 Hz Magnetic Field Exposure on Specific Gene Transcription in CEM-CM3 Human T-Lymphoblastoid Cells. 13th Annual Meeting of the Bioelectromagnetics Society. June, 1991, Salt Lake City, UT.

27. J.L. Phillips, W. Haggren, W.J. Thomas, T. Ishida-Jones, and W.R. Adey. Effects of 60 Hz Magnetic Field Exposure on Specific Gene Transcription and Transcript Level in Human T-Lymphoblastoid Cells. Annual Review of Research on Biological Effects of 50/60 Hz Electric and Magnetic Fields. November, 1991, Milwaukee, WI.

28. W.J. Thomas, T. Ishida-Jones, W. Haggren, W.R. Adey, and J.L. Phillips. Toward Understanding 60 Hz Magnetic Field Exposure-Induced Changes in Gene Transcription: Magnetic Field Effects on Cyclic AMP and Protein Kinase C in a T-lymphoblastoid Cell Line. Annual Review of Research on Biological Effects of 50/60 Hz Electric and Magnetic Fields. November, 1991, Milwaukee, WI.

29. J.L. Phillips, W. Haggren, W.J. Thomas, T. Ishida-Jones, and W.R. Adey. Effects of 60 Hz Magnetic Field Exposure on c-Fos Transcription in CCRF-CEM Human T-Lymphoblastoid Cells. First World Congress for Electricity and Magnetism in Biology and Medicine. June, 1992, Lake Buena Vista, FL.

30. W. Haggren, S.M. Yellon, J.L. Phillips, and W.R. Adey, Effect of Magnetic Field Exposure in Adult Djungarian Hamsters on Melatonin Rhythms and Molecular Markers. First World Congress for Electricity and Magnetism in Biology and Medicine. June, 1992, Lake Buena Vista, FL.

31. T. Ishida-Jones, W. Haggren, W.R. Adey, and J.L. Phillips, Effect of Exposure to a Radio Frequency Field on Specific Gene Expression in Glial Cells Obtained from Rats Exposed *In Utero* to Ethyl Nitrosourea. First World Congress for Electricity and Magnetism in Biology and Medicine. June, 1992, Lake Buena Vista, FL.

32. J.L. Phillips, Molecular Biology in Bioelectromagnetics: The Road to the Future. First World Congress for Electricity and Magnetism in Biology and Medicine. June, 1992, Lake Buena Vista, FL.

33. J.L. Phillips, W. Haggren, W.J. Thomas, T. Ishida-Jones, and W.R. Adey, Effects of 60 Hz Magnetic Field Exposure on Transcription Factor AP-1 Binding Activity in Human T-Lymphoblastoid Cells. Annual Review of Research on the Biological Effects of 60 Hz Electric and Magnetic Fields. November, 1992, San Diego, CA.

34. N. Bournias-Vardiabasis, P. Nguyen, W. Haggren, W.R. Adey, and J.L. Phillips, Teratogenic Response of Drosophila Embryonic Cells to 60 Hz Magnetic Field Exposure With and Without Chemical Teratogens. Annual Review of Research on the Biological Effects of 60 Hz Electric and Magnetic Fields. November, 1992, San Diego, CA.

35. W. Haggren, S.M. Yellon, W.J. Thomas, T. Ishida-Jones, J.L. Phillips, and W.R. Adey, Effects of Light and Magnetic Field Exposure on Immediate Early Gene Expression and AP-1 Binding Activity in the Djungarian Hamster Retina, Hypothalamus, and Pineal Gland. Annual Review of Research on the Biological Effects of 60 Hz Electric and Magnetic Fields. November, 1992, San Diego, CA.

36. W.J. Thomas, N. Bournias-Vardiabasis, and J.L. Phillips, Influence of a 60 Hz, 1 Gauss Magnetic Field on Neuropeptide Y Gene Expression. Fifth Annual CSU Biotechnology Symposium, California State Polytechnical University Pomona, January 15, 1993, Pomona, CA.

37. P.H. Nguyen, N. Bournias-Vardiabasis, J.L. Phillips, and W. Haggren, Teratogenic Response of *Drosophila* Embryonic Cells to 60 Hz Magnetic Field Exposure With and Without Chemical Teratogens. Fifth Annual CSU Biotechnology Symposium, California State Polytechnical University Pomona, January 15, 1993, Pomona, CA.

38. N. Bournias-Vardiabasis, P. Nguyen, W. Haggren, W.R. Adey, and J.L. Phillips, Teratogenic Response of Drosophila Embryonic Cells to 60 Hz Magnetic Field Exposure With and Without Chemical Teratogens. Drosophila Research Conference, March 31 - April 4, 1993, San Diego, CA.

39. J.L. Phillips, W. Haggren, W.J. Thomas, T. Ishida-Jones, and W.R. Adey, Effects of 60-Hz Magnetic Field Exposure on the DNA Binding Activity of Specific Transcription Factors in Human T-Lymphoblastoid Cells. 15th Annual Meeting of The Bioelectromagnetics Society, June 13-17, 1993, Los Angeles, CA.

40. W. Haggren, S.M. Yellon, W.J. Thomas, T. Ishida-Jones, J.L. Phillips, and W.R. Adey, Effects of Light and Magnetic Field Exposure on the Expression of Genes Comprising the Djungerian Hamster Biological Clock. 15th Annual Meeting of The Bioelectromagnetics Society, June 13-17, 1993, Los Angeles, CA.

41. W.J. Thomas, N. Bournias-Vardiabasis, J.L. Phillips, and W.R. Adey, Influence of a 60-Hz, 1-Gauss Magnetic Field on Neuropeptide Y Gene Expression. 15th Annual Meeting of The Bioelectromagnetics Society, June 13-17, 1993, Los Angeles, CA.

42. N. Bournias-Vardiabasis, P. Nguyen, W. Haggren, W.R. Adey, and J.L. Phillips, Teratogenic Response of Drosophila Embryonic Cells to 60 Hz Magnetic Field Exposure With and Without Chemical Teratogens. Teratology Society Annual Meeting, June 26 - July 1, 1993, Tucson, AZ.

43. J.D. Hoeschle, L.R. Whitfield, W.R. Leopold, W. McNally, J. Nawarocki, and J.L. Phillips, Studies of the Adduct Formed on Interacting Cisplatin with Human Apotransferrin: Synthesis, In Vitro Binding Kinetics, In Vivo Pharmacokinetics and Biodistribution in the Rat. International Conference on Bioinorganic Chemistry, August, 1993, San Diego, CA.

44. N. Bournias-Vardiabasis, P. Nguyen, W. Haggren, W.R. Adey, and J.L. Phillips, Teratogenic Response of Drosophila Embryonic Cells to 60 Hz Magnetic Field Exposure With and Without Chemical Teratogens. 13th European Drosophila Research Conference, September 12-17, 1993, Aghia Pelaghia, Crete, Greece.

45. N. Bournias-Vardiabasis, P. Nguyen, W. Haggren, W.R. Adey, and J.L. Phillips, Teratogenic Response of Drosophila Embryonic Cells to 60 Hz Magnetic Field Exposure With and Without Chemical Teratogens. World Congress on Alternatives and Animal Use in the Life Sciences: Education, Research and Testing, November 14-19, 1993, Baltimore, MD.

46. W. Haggren, J.L. Phillips, T. Ishida-Jones, S. Hilliker, O. Ivaschuk, S.M. Yellon, and W.R. Adey, RNAmap™: A Powerful Technique to Detect Differential Gene Expression. Annual Review on the Biological Effects of 60 Hz Electric and Magnetic Fields, October 31-November 4, 1993, Savannah, GA.

47. J.L. Phillips, W. Haggren, T. Ishida-Jones, M. Campbell-Beachler, O. Ivaschuk, and W.R. Adey, Effects of 60 Hz Magnetic Field Exposure on Transcriptional and Pre-Transcriptional Events: Developing a Biological Mechanism. Annual Review on the Biological Effects of 60 Hz Electric and Magnetic Fields, October 31-November 4, 1993, Savannah, GA.

48. J.L. Phillips, P. Nguyen, W. Haggren, W.R. Adey, and N. Bournias-Vardiabasis, Exposure of Drosophila Embryonic Cells to a 60 Hz Sinusoidal Magnetic Field: Effect of Teratogenesis and Heat Shock Protein 70 Expression. Annual Review on the Biological Effects of 60 Hz Electric and Magnetic Fields, October 31-November 4, 1993, Savannah, GA.

49. J.L. Phillips, W. Haggren, T. Ishida-Jones, O. Ivaschuk, and W.R. Adey, Differential Gene Expression in Nerve Growth Factor-Treated PC12 Cells Exposed to a 1 Gauss Sinusoidal Magnetic Field at 60 Hz. 16th Annual Meeting of The Bioelectromagnetics Society, June 12-17, 1994, Copenhagen, Denmark.

50. J.L. Phillips, O. Ivaschuk, T. Ishida-Jones, W. Haggren, and W.R. Adey, Exposure of Nerve Growth Factor-Treated PC12 Cells to a Radio Frequency Field: Effect on Expression of c-*fos* and c-*jun*. 16th Annual Meeting of The Bioelectromagnetics Society, June 12-17, 1994, Copenhagen, Denmark.

51. N. Bournias-Vardiabasis, P. Nguyen, E. Koundakjian, and J.L. Phillips, The Effect of Magnetic Fields on Drosophila in vitro development: molecular and cellular observations. Teratology Society 34th Annual Meeting, June 25-30, 1994, San Juan, Puerto Rico.

52. O. Ivaschuk, T. Ishida-Jones, W. Haggren, W.R. Adey, and J.L. Phillips, Differential Gene Expression in Nerve Growth Factor-Treated PC12 Cells Exposed to a 1 Gauss Sinusoidal Magnetic Field at 60 Hz: Identification of an MF Exposure-Specific Gene. Annual Review on the Biological Effects of 60 Hz Electric and Magnetic Fields, November 6-10, 1994, Albuquerque, NM.

53. J.L. Phillips, M. Campbell-Beachler, T. Ishida-Jones, W. Haggren, and W.R. Adey, Expression of c-fos In Nerve Growth Factor-Treated PC12 Cells Exposed to 60 Hz Magnetic Fields of 0 - 1000 mGauss. Annual Review on the Biological Effects of 60 Hz Electric and Magnetic Fields, November 6-10, 1994, Albuquerque, NM.

54. J.L. Phillips, M. Campbell-Beachler, T. Ishida-Jones, W. Haggren, O.I. Ivaschuk, and W.R. Adey, Expression of c-*fos* in Stimulated PC12 Cells Exposed to 60 Hz Magnetic Fields of 0 - 1000 mG. 17th Annual Meeting of the Bioelectromagnetics Society, June 12-17, 1995, Boston, MA.

55. W. Haggren, J.L. Phillips, T.E. Mekonnen, M. Campbell-Beachler, T. Ishida-Jones, O.I. Ivaschuk, and W.R. Adey, Effects of 60 Hz Magnetic Field Exposure *In Vitro* and *In Vivo* on the Expression of the Transcriptional Repressor, ICER. 17th Annual Meeting of the Bioelectromagnetics Society, June 12-17, 1995, Boston, MA.

56. J.L. Phillips, M. Campbell-Beachler, T. Ishida-Jones, W. Haggren, and W.R. Adey, Exposure of PC12 Cells to a 1 G Sinusoidal Magnetic Field at 60 Hz: Effect on the Activity of the DNA Repair Enzyme Poly(ADP-Ribose) Polymerase. Annual Review on the Biological Effects of 60 Hz Electric and Magnetic Fields, November 12-16, 1995, Palm Springs, CA.

57. W. Haggren, J.L. Phillips, T.E. Mekonnen, T. Ishida-Jones, M.C. Beachler, and W.R. Adey, Is the Transcriptional Repressor "ICER" Involved in the Early Evening Light- and Magnetic Field Exposure-Induced Decrease of c-*fos* Expression in the Djungarian Hamster Pineal Gland? Annual Review on the Biological Effects of 60 Hz Electric and Magnetic Fields, November 12-16, 1995, Palm Springs, CA.

58. O. Ivaschuk, T. Ishida-Jones, W. Haggren, W. R. Adey, and J.L. Phillips, Exposure of Nerve Growth Factor-Treated PC12 Cells to an 836.55 MHz Frequency-Modulated Radio Frequency Field: Effect on Expression of c-*fos* and c-*jun*. 18th Annual Meeting of the Bioelectromagnetics Society, June 9-14, 1996, Victoria, British Columbia, Canada.

59. J.L. Phillips, M. Campbell-Beachler, T. Ishida-Jones, W. Haggren, O.I. Ivaschuk,, and W.R. Adey, Expression of c-fos in PC12 Cells Treated with NGF, Forskolin, and TPA: MF Exposure Simulates Superinduction. 18th Annual Meeting of the Bioelectromagnetics Society, June 9-14, 1996, Victoria, British Columbia, Canada.

60. W.R. Adey, C.V. Byus, C.D. Cain, W. Haggren, R.J. Higgins, R.A. Jones, C.J. Kean, N. Kuster, A. MacMurray, J.L. Phillips, R. B. Stagg, and G. Zimmerman, Brain Tumor Incidence in Rats Chronically Exposed to Digital Cellular Telephone Fields in an Initiation-Promotion Model. 18th Annual Meeting of the Bioelectromagnetics Society, June 9-14, 1996, Victoria, British Columbia, Canada.

61. J.L. Phillips, M. Campbell-Beachler, T. Ishida-Jones, W. Haggren, and W.R. Adey, Exposure of Molt 4 T-Lymphoblastoid Cells to a 1G Sinusoidal Magnetic Field at 60 Hz: Effects on the DNA Repair Enzyme Poly(ADP-Ribose) Polymerase and on DNA Fragmentation. Annual Review on the Biological Effects of 60 Hz Electric and Magnetic Fields, November 17-21, 1996, San Antonio, TX.

62. J.L. Phillips, M. Campbell-Beachler, T. Ishida-Jones, W. Haggren, and W.R. Adey, Exposure of Molt-4 T-Lymphoblastoid Cells to a 1G Sinusoidal Magnetic Field at 60 Hz: Effects on Cellular Events Related to Apoptosis. 2nd World Congress for Electricity in Biology and Medicine, June 8-13, 1997, Bologna, Italy.

63. W.R. Adey, C.V. Byus, C.D. Cain, W. Haggren, R.J. Higgins, R.A. Jones, C.J. Kean, N. Kuster, A. MacMurray, J.L. Phillips, R. B. Stagg, and G. Zimmerman, Brain Tumor Incidence in Rats Chronically Exposed to Frequency-Modulated (FM) Cellular Phone Fields. 2nd World Congress for Electricity in Biology and Medicine, June 8-13, 1997, Bologna, Italy.

64. J.L. Phillips, M. Campbell-Beachler, O. Ivaschuk, T. Ishida-Jones, and W. Haggren, Exposure of Molt-4 Cells T-Lymphoblastoid Cells to a 1 G Sinusoidal Magnetic Field at 60 Hz: Effects on Cellular Events Related to Apoptosis. Annual Review on the Biological Effects of 60 Hz Electric and Magnetic Fields, November 9-13, 1997, San Diego, CA.

65. W. Haggren, T.E. Mekonnen, T. Ishida-Jones, M. Campbell-Beachler, J.L. Phillips, and W.R. Adey, Effects of Magnetic Field Exposure on Expression of Genes Encoding Transcriptional Regulatory Proteins in the Dwarf Siberian Hamster. Annual Review on the Biological Effects of 60 Hz Electric and Magnetic Fields, November 9-13, 1997, San Diego, CA.

66. J.L. Phillips, M. Campbell-Beachler, T. Ishida-Jones, and W. Haggren, Exposure of Molt-4 T-Lymphoblastoid Cells to a 1G Sinusoidal Magnetic Field at 60 Hz: Effects on DNA Damage and Repair. Annual Review on the Biological Effects of 60 Hz Electric and Magnetic Fields, September 13-17, 1998, Tucson, AZ.

67. J.L. Phillips and A. Gardner, Using Technology to Bring Inquiry to the Classroom. National Science Teachers Association Meeting, April, 2004, Atlanta, GA.

68. J.L. Phillips, Using an Inquiry-based Curriculum to address Childhood Obesity. National Association of Biological Teachers, November, 2004, Chicago, IL.

69. M.V. Bloom and J.L. Phillips, Making Best Use of Technology in the Inquiry Classroom, National Association of Biological Teachers, November, 2004, Chicago, IL.

70. J.L. Phillips, Using the World Wide Web to Bring Inquiry to the Classroom, National Science Teachers Association, April, 2005, Dallas, TX.

71. J.L. Phillips, Evolution, Why Bother?, National Association of Biology Teachers, October, 2005, Milwaukee, WI.

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