**10/18/2024**

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**Education and Training:**

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**UNDERGRADUATE:**

1969-1973 West Virginia Institute of Technology B.S., 1973 Biology

Montgomery, WV

**GRADUATE:**

1973-1980 West Virginia University Ph.D., 1980 W. Kaczmarczk, Ph.D.

Morgantown, WV Genetics

**POSTGRADUATE:**

1980-1982 Mayo Foundation Post-Doc Carlo Veneziale, M.D., Ph.D.

Rochester, MN Biochemistry

1982-1984 Mayo Clinic Post-Doc Henry Homburger, M.D.

Rochester, MN Clinical Immunology

**Appointments and Positions:**

**ACADEMIC:**

1987-1989 University of Pittsburgh Research Associate in

Pittsburgh, PA Radiation Oncology

1989-1990 University of Pittsburgh Research Instructor in

Pittsburgh, PA Radiation Oncology

1990-2000 University of Pittsburgh Research Assistant Professor

Pittsburgh, PA Research Division

Radiation Oncology

2000 - 2010 University of Pittsburgh Research Associate Professor

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2010 – Present University of Pittsburgh Research Professor

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**NON-ACADEMIC:**

1980-1982 Mayo Foundation Postdoctoral Fellow in Cell Biology

Rochester, MN

1982-1984 Mayo Foundation Special Projects Associate in Clinical Rochester, MN Immunology

1984-1987 Allegheny-Singer Research Foundation Immunochemist

Pittsburgh, PA

**Memberships In Professional And Scientific Societies:**

American Association of Cancer Research 1989

American Society of Gene Therapy 1998

American Society of Hematology 1995

American Society for Therapeutic Radiology and Oncology 2003

International Society of Hematology 1995

Radiation Research Society 1989

**Honors:**

Alumnus of the year, West Virginia University 1996

Institute of Technology

**Publications:**

***Peer Reviewed Articles:***

1. **Epperly MW**, Donofrio J, Barham S, Veneziale CM. Nuclear protein matrix of seminal vesicle epithelium. J Steroid Biochem 20:691-697, 1984.
2. Veneziale C, **Epperly MW**, Barham S, Norvitch ME, Moore JT. Seminal vesicle epithelial individual cell growth and cell replenishment. In: Control of Growth and Proliferation. Carlo Veneziale (ed), Van Nostrand Reinhold, New York, NY, pp. 1-10, 1984.
3. **Epperly MW**, Barham S, Norvitch M, Holicky E, Moore J, Veneziale CM. The growth of individual seminal vesicle epithelial cells and their proliferation. Proc Soc Exp Biol Med 178:443-456, 1985.
4. **Epperly MW**, Bloomer WD. Systemic radiotherapy using auger and alpha emitting radionuclides. Chemtech 21:744-749, 1991.
5. **Epperly MW**, Damodaran KM, McLaughlin WH, Pillai KMR, Bloomer WD. Radiotoxicity of 17a[125]iodovinyl-11B-methoxyestradiol in MCF-7 human breast cancer cells. J Steroid Biochem Molec Biol 39:729-734, 1992.
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7. Prezioso J, **Epperly MW**, Bloomer WD. Effects of tyrosine activity on the cytoxicity of 4-S-cysteaminyl phenol and N-acetyl-4-S-cysteaminyl phenol in melanoma cells. Cancer Letters 63:73-79, 1992.
8. Ranadive GN, Rosenzweig HS, **Epperly MW**, S Bloomer WD. A technique to prepare boronated B72.3 monoclonal antibody for boron neutron capture therapy. Nucl Med Biol 20:1-6, 1993.
9. Ranadive GN, Rosenzweig HS, **Epperly MW**, Sesky T, Bloomer WD. A new method of technetium-99m labelling of monoclonal antibodies through sugar residues. A study with TAG-72 specific CC49 antibody. Nucl Med Biol, 20:719-726, 1993.
10. Koros AMC, Tobin MJ, **Epperly MW**, Levine G, McGinley JR. 186-Rhenium monoclonal antibody targets human small cell lung cancer cells in athymic nude mice: rapid screening model for therapy. Anticancer Res 13:1953-1956, 1993.
11. Damodaran KM, **Epperly MW**, Pillai KMR, Bloomer WD. A facile and improved synthesis of 17a-(2-[E]-{125-I}-iodovinyl)-19-nortestosterone, a no-carrier added ligand for progesterone receptor analyses. J Labelled Compounds Radiopharm 34:17-26, 1994.
12. **Epperly MW**, Deutsch M. 5-Iodo-2-deoxyuridine as cytotoxic chemotherapy and as a possible radiosensitizer in a mouse ovarian ascites tumor model. Radiation Oncol Invest 1:334-338, 1994.
13. Rosenzweig HS, Ranadive GN, Sesky T, **Epperly MW**, Bloomer WD. A novel method for the non-chromatographic purification of technetium-99m-labelled monoclonal antibodies: a study with B72.3 monoclonal antibody. Nucl Med Biol 21:171-178, 1994.
14. Jonnalagadda SS, Mokotoff M, Swanson DP, Brown ML, **Epperly MW**. 111-Indium-labelled laminin peptide fragments as potential diagnostic agents for metastatic cancers. Proc 13th Am Peptide Symp, Peptides: Chemistry, Structure, and Biology. RS Hodges and JA Smith (eds) ESCOM: Leiden, pp. 854-856, 1994.
15. Papdopoulou MV, Miller A, Sesky T, **Epperly MW**, Bloomer WD. Potentiation of antineoplastic drugs in vitro and in vivo by DNA intercalating bioreductive agents. Radiat Oncol Invest 1:206-217, 1994.
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22. Greenberger JS, **Epperly MW**, Zeevi A, Brunson KW, Goltry KL, Pogue-Geile KL, Bray J, Berry LA. Stromal cell involvement in leukemogenesis and carcinogenesis. In Vivo 10:1-18, 1996.
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463A. **Epperly Michael W**, Dixon Tracy, Li Song, Wipf, Peter, and Greenberger Joel S. Effects of radiation mitigator JP4-039 on total body irradiation (TBI) induced proinflammatory proteins in bone marrow. Radiation Research Society Meeting, Weston, Florida, 2015, (PS2-03), P. 130.

464A. **Epperly MW**, Rigatti L, Dixon TM, Li S, Wipf P, and Greenberger JS. JP4-039/F14 treatment of E13 pregnant mice 24 hours after total body irradiation (TBI) improves survival, growth, and development of fetal mice. American Association for Cancer Research (AACR), New Orleans, LA, 2016.

465A. Greenberger JS, Rigatti L, Sivanathan A, Cao S, Zhang X, Shields D, Franicola D, and **Epperly MW**. Expression of the HPV E7 oncogene in K14E7 Fancd2-/- mouse long term bone marrow culture derived hematopoietic cells produces malignant plasmacytomas. American Association for Cancer Research (AACR), New Orleans, LA, 2016.

466A. Greenberger J, Rigatti L, Hou W, Sivanathan A, Zhang X, Shields D, Franicola D, and **Epperly M**. The Human papilloma virus (HPV) E7 oncogene reverses the radioresistance of Fancd2-/- mouse hematopoietic progenitor cells, and generates malignant plasmacytomas. Poster Presentations/Experimental Hematology, 44:S56-S110, 2016. ISEH, San Diego, CA, 2016.

467A. **Epperly M**, Shen H, Zhang X, Franicola D, Shields D, and Greenberger J. Radiation fibrosis resistant SMAD3-/- mice demonstrate superior donor bone marrow stem cell transplantation capacity by competitive repopulation assay. Poster Presentations/Experimental Hematology, 44:S56-S110, 2016. ISEH, San Diego, Ca, 2016.

468A. **Epperly MW**, Krainz T, Zhang X, Li S, Wipf P, and Greenberger JS. Novel small molecule mitochondrial targeted nitroxides mitigate total body irradiation. ASTRO, Boston, MA, 2016.

469A. Greenberger JS, Rigatti L, Hou W, Sivanathan A, Zhang X, Shields D, Franicola D, and **Epperly MW**. Human papilloma virus (HPV) E7 oncogene mediated squamous cell malignancy of the oropharynx and cervix in K14E7 Fancd2-/- mice also causes hematopoietic cell radiosensitivity and malignant B cell transformation. ASTRO, Boston, MA, 2016.

470A. **Epperly MW**, Rigatti L, Li S, Wipf, P, and Greenberger JS. Small molecule GS-nitroxide radiation mitigator, JP4-039/F14, is safe and effective in pregnant E13.5 mice. ASTRO, Boston, MA, 2016.

471A. Franicola D**, Epperly MW**, Wipf P, and Greenberger JS. The small molecule GS-nitroxide radiation mitigator, JP4-039, alters total body irradiation (TBI) induced gene expression in bone marrow of C57BL/6NTac mice. ASTRO, Boston, MA, 2016.

472A. Rigatti L, **Epperly MW**, Li S, Wipf, P, and Greenberger JS. Total body irradiation killing of fetal mice in E13.5 pregnant C57BL/6 females is mitigated by the GS-nitroxide JP4-039 delivered 24 hrs after exposure. Radiation Research Society Annual Meeting, Hawaii, 2016.

473A. **Epperly MW**, Shen HM, Zhang X, Franicola D, Shields D, and Greenberger JS. Radiation fibrosis resistant Smad3-/- mice demonstrate superior donor bone marrow stem cell transplantation capacity by competitive repopulation assay. Radiation Research Society Annual Meeting, Hawaii, 2016.

474A. Greenberger JS, Rigatti L, Hou W, Sivanathan A, Zhang X, Shields D, Franicola D, and **Epperly MW**. The human papilloma virus (HPV) E7 oncogene reverses the radioresistance of Fancd2-/- mouse hematopoietic progenitor cells and generates malignant plasmacytomas. Radiation Research Society Annual Meeting, Hawaii, 2016.

475A. Franicola Darcy, **Epperly Michael W**, Bayir Hulya, Kagan Valerian E, and Greenberger Joel S. Necrostatin-1 is a potent radiation mitigator which decreases total body irradiation induced signatures of inflammatory cell recruitment. Radiation Research Society Annual Meeting, Hawaii, 2016.

476A. Greenberger Joel S, Rigatti Lora, Hou Wen, Zhang Xichen, Shields Donna, Sivanathan Aranee, Franicola Darcy, and **Epperly Michael W**. Effects of the human papillomavirus (HPV) E7 oncogene on Fancd2-/- mouse marrow hematopoiesis, radiation sensitivity of different cell lineages, and generation of malignant plasmacytomas, Fanconi Anemia Research Fund Annual Meeting, Seattle, Washington, September, 2016.

477A. Greenberger Joel S, Cao Shaonan, Dixon Tracy, Shields Donna, Zhang Xichen, and **Epperly Michael W**. Marrow from a second strain of double knockout (DKO) SMAD3-/- Fancd2-/- mice (Uniform 129/Sv background) shows marked reduction of duration of hematopoiesis in continuous bone marrow cultures. Fanconi Anemia Research Fund Annual Meeting, Seattle, Washington, September, 2016.

478A. Willis J, **Epperly MW**, Zhang X, Fisher R, Liang M, Wipf P, and Greenberger JS. Amelioration of irradiation induced oral cavity mucositis in Fanca-/- mice using JP4-039 in a novel oral emulsion. Fanconi Anemia Research Fund (FARF) Meeting, Seattle, WA, September, 2016.

479A. Thermozier S, **Epperly MW**, Franicola D, Zhang X, Fisher R, Shields D, Wang H, Willis JA, Luke C, Silverman GA, and Greenberget JS. Hematopoietic progenitor cells from the bone marrow of Serpin3A-/- mice are radioresistant. ASH Meeting, San Diego, CA, December, 2016, Blood, 128:2680, 2016.

480A. Keppel K, **Epperly MW**, Shields D, Hou W, Franicola D, Zhang X, Fisher R, and Greenberger JS. Radiation resistance of double knockout (DKO) Smad3-/- Fancd2-/- (129/Sv) mouse bone marrow stromal cell lines. ASH Meeting, San Diego, CA, December, 2016, Blood, 128:3901, 2016.

481A. O’Connor KW, Vidal-Cardenas S, Zhang H, Rodrigues A, Moreau L, Yang C, **Epperly M**, Grompe M, Shimamura A, Greenberger J, Parmar K, and D’Andrea AD. Hyperactive non-canonical TGF-β pathway signaling in Fanconi anemia bone marrow stromal cells contributes to growth suppression. ASH Meeting, San Diego, CA, December, 2016, Blood, 128:1039, 2016.

482A. Steinman Justin, **Epperly Michael**, Willis John, Wang Hong, Fisher Renee, Kagan Valerian, Bayir Hulya, Yu Jian, Wipf Peter, Li Song, Huq M Saiful, and Greenberger Joel S. Sequential delivery of ionizing radiation mitigators based on plasma, intestine, and bone marrow protein signatures. ASTRO, San Diego, CA, September, 2017.

483A. Tyurina Yulia Y, Tyurin Vladimir A, Amoscato Andrew A, Anthonymuthu Tami, **Epperly Michael W**, Watkins Simon S, Greenberger Joel S, Bayir Hulya, and Kagan Valerian E. Identification and quantification of esterified hepoxillin A3 in the ileum of mice after total body irradiation using oxidative phospholipidomics. ASMS, Indianapolis, IN, 2017.

484A. Glowacki Julie, Bellare Anuj, Greenberger Joel, Fisher Renee, Wipf Peter, **Epperly Michael W**. A murine combined injury model of total body irradiation and skin wound is mitigated using MMS350. ASTRO, San Diego, CA, September, 2017.

485A. **Epperly Michael W**, Fisher Renee, Rigatti Lora H, Garman Robert, Li Song, Wipf Peter, and Greenberger Joel S. Total body irradiation induced fetal brain developmental retardation in E13.5 pregnant C57BL/6Tac mice is mitigated by delayed maternal administration of JP4-039. ASTRO, San Diego, CA, September, 2017.

486A. Greenberger Joel S, Willis John, Hou Wen, Shields Donna, Zhang Xichen, and **Epperly Michael W**. Mouse Fanconi Anemia (FA) Fancd2-/- bone marrow stromal cells demonstrate ionizing irradiation induced senescence. ASTRO, San Diego, CA, September, 2017.

487A. Willis John, **Epperly Michael W**, Fisher Renee, and Greenberger Joel S. Amelioration of radiation induced oral cavity mucositis and bone marrow suppression in Fanca-/- and Fancg-/- mice using JP4-039 in novel oral liposomes. ASTRO, San Diego, CA, September, 2017.

480A. Steinman Justin, **Epperly Michael**, Willis John, Wang Hong, Fisher Renee, Yu Jian, Wipf Peter, Li Song, Huq M Saiful, Bayir Hulya, Kagan Valerian, and Greenberger Joel S. Optimal time of delivery of two radiation mitigators JP4-039 and Necrostatin-1 based on modification of irradiation induced plasma, intestine, and bone marrow protein by the first drug. Radiation Research Society, Can Cun, Mexico, October, 2017.

481A. **Epperly Michael W**, Bellare Anuj, Greenberger Joel, Fisher Renee, Wipf Peter, and Glowacki Julie. A murine combined injury model of total body irradiation and skin wound for evaluation of radiation mitigators. Radiation Research Society, Can Cun, Mexico, October, 2017.

482A. Morgan Gina M, Kutschke William, Matasic Daniel, **Epperly Michael W**, Greenberger Joel S, Kalen Amanda, Waldron Timothy, Schoenfield Joshua, McCormick Michael, Yoon Jin-Young, Spitz Douglas, and London Barry. The radiation mitigator MMS350 prevents bradyarrhythmias in irradiated mice. Am Soc Cardiology, 3/17 (submitted).

483A. Willis John, **Epperly Michael W**, Fisher Renee, Wipf Peter, Li Song, and Greenberger Joel S. Intraoral GS-nitroxide (JP4-039) ameliorates radiation induced oral mucositis and distant (abscopal) bone marrow suppression in head and neck irradiated Fanconi Anemia (FA) Fanca-/- and Fancg-/- mice. Radiation Research Society Annual Meeting, Cancun, Mexico, October 17, 2017.

484A. Rigatti Lora H, **Epperly Michael W**, Bayir Hulya, Fisher Renee, Garman Robert, Wipf Peter, Li Song, and Greenberger Joel S. Mitigation of 3 Gy total body irradiation (TBI) induced E13.5 mouse fetal brain damage by maternal administration of JP4-039 on E14.5. Radiation Research Society Annual Meeting, Cancun, Mexico, October 17, 2017.

485A. Greenberger Joel S, Willis John, Hou Wen, Shields Donna, Zhang Xichen, and **Epperly Michael W**. Irradiation accelerated senescence in mouse Fanconi Anemia (FA) Fancd2-/- bone marrow stromal cells. Radiation Research Society Annual Meeting, Cancun, Mexico, October 17, 2017.

486A. Willis John, **Epperly Michael W**, Fisher Renee, Wipf Peter, Li Song, Parmar Kalindi, Guinan Eva, Greenberger Joel S. Amelioration of radiation induced oral mucositis and distant (abscopal) bone marrow suppression by intraoral mitochondria-targeted GS-nitroxide (JP4-039) in head and neck irradiated Fanconi Anemia (FA) Fanca-/- and Fancg-/- mice. Fanconi Anemia Scientific Symposium, Atlanta, GA, September, 2017.

487A. Greenberger Joel S, Willis John, Hou Wen, Shields Donna, Zhang Xichen, **Epperly MW**. Fanconi Anemia (FA) mouse bone marrow stromal cells demonstrate increased irradiation induced senescence. Fanconi Anemia Scientific Symposium, Atlanta, GA, September, 2017.

488A. Franicola Darcy, **Epperly Michael W**, Zhang Xichen, Fisher Renee, Greenberger Joel S. Bone marrow stromal cell lines from Fanconi Anemia (FA) Fancg-/- and Fanca-/- as well as Fancd2-/- mice have abnormal mitochondria. Fanconi Anemia Scientific Symposium, Atlanta, GA, September, 2017.

489A. Greenberger Joel S, Fisher Renee, Zhang Xichen, Rodriguez Alfredo, D’Andrea Alan, Parmar Kalindi, Guinan Eva, **Epperly Michael W**. Reduced breeding frequency of Smad3-/- (C57BL/6) Fancd2-/- (C57BL/6) and Smad3-/- (C57Bl/6) Fancd2-/- (129/Sv) double knockout (DKO) mice compared to other breeding combinations. Fanconi Anemia Scientific Symposium, Atlanta, GA, September, 2017.

490A. Zhang Xichen, **Epperly Michael W**, Shields Donna, Fisher Renee, Greenberger Joel S. A single HPV E6 or E7 oncogene transforms Fancd2-/- (129/Sv) but not Fancd2+/+ IL-3 dependent hematopoietic cell lines to factor independence. Fanconi Anemia Scientific Symposium, Atlanta, GA, September, 2017.

491A. Hou Wen, **Epperly Michael W**, Zhang Xichen, Shields Donna, and Greenberger Joel. Metformin is a radioprotector of Fancd2-/- (129/Sv and C57BL/6) bone marrow stromal cell lines in vitro. Fanconi Anemia Scientific Symposium, Atlanta, GA, September, 2017.

492A. Ejaz A, **Epperly MW**, Fisher R, Zhang X, Johngrass M, Schusterman MA, Kokai LE, Greenberger JS, and Rubin JP. Molecular basis of adipose-derived stem cell (ASC) therapy for management of radiation-induced fibrosis (RIF). International Federation for Adipose Therapeutics and Sicence (IFATS) Meeting, Miami, FL, 11-30-17 – 12-3-17.

493A Sivananthan AP, Zhang X, Hou W, Shields DS, Fisher R, Epperly M, Greenberger JS. Increased irradiation-induced senescence in Fanconi Anemia (FA) mice. AACR Annual Meeting. Chicago, IL, April 14-18, 2018.

494A. Ejaz A, Epperly M, Fisher R, Zhang X, Johngrass M, Schusterman A, Kokai L, Greenberger JS, and Rubin JP. Molecular basis of adipose-derived stem cells therapy for management of radiation induced fibrosis (RIF). AACR Annual Meeting, Chicago, IL, April 14-18, 2018.

495A. Epperly MW, Zhang X, Wipf P, and Greenberger JS. Fancd2-/- (129/Sv) IL-3 Dependent Hematopoietic Progenitor Cells, and HPV (E6) Transformed Malignant Cell Lines in a Novel Assay for Normal Stem Cells Specific Metformin-Analogue Induced Cell Cycle Arrest. FARF Annual Meeting, Newport Beach, California. Sept 27-30, 2018.

496A. Zhang X, Rigatti L, Epperly MW, and Greenberger JS. Malignant Transformation of IL-3 Dependent Fancd2-/- Hematopoietic Progenitor Cells by Single Human Papillomavirus E6 or E7 Oncogene, FARF Annual Meeting, Newport Beach, California. Sept 27-30, 2018.

497A. Quinn TJ, Ding X, Wilson GD, Sivananthan A, Thermozier S, Henderson A, Epperly MW, Franicola D, Wipf P, Greenberger JS, Stevens CW, and Kabolizadeh P. Intraoral JP4-039/Miglyol-812-N Amelioration of Proton Irradiation Induced Oral Cavity Toxicity in Fanca-/- Mice. FARF Annual Meeting, Newport Beach, California. Sept 27-30, 2018.

498A. Ejaz A, Epperly MW, Greenberger JS, Huq MS, and Rubin P. Adipocyte Stem Cells Ameliorate Total Body Irradiation Induced Hematopoietic Syndrome and Late Radiation Fibrosis. ASTRO Annual Meeting. San Antonio, TX, Oct. 21-24, 2018. IJROBP, 102:35, PS187, #1060, 2018

499A. Greenberger JS, Fisher R, Donnelly C, Watkins S, Ross M, Rigatti R, and Epperly MW. Total Body Irradiation and Bone Marrow Transplant Significantly Extends the Paralysis Free Interval in Amyotrophic Lateral Sclerosis Mice (SOD1G93A), ASTRO Annual Meeting. San Antonio, TX, Oct. 21-24, 2018. IJROBP, 102:35, PS73, #145, 2018

500A. Epperly MW, Wipf P, Fisher R, and Greenberger JS. Ionizing Irradiation Mitigator GS-nitroxide (JP4-039) is Deliverable in an I.M. Formulation Suitable for Self-Administration, ASTRO Annual Meeting. San Antonio, TX, Oct. 21-24, 2018. 102:35, SU40, #2393, 2018.

501A. Kabolizadeh P, Ding X, Quinn T, Wilson G, Sivananthan A, Epperly MW, Franicola D, Greenberger JS and Stevens C. ASTRO Annual Meeting. San Antonio, TX, Oct. 21-24, 2018.

502A Thermozier S, Epperly MW, Franicola D, Zhang X, Fisher R, Shields D, Wang H, Willis JA, Luke C, Silverman GA, and Greenberger JS. Bone Marrow Hematopoietic Progenitor Cells from Serpinb3A-/- Mice Are Radioresistant, ASTRO Annual Meeting. San Antonio, TX, Oct. 21-24, 2018.

503A. Greenberger JS, Fisher R, Donnelly C, Watkins S, Ross M, Rigatti L, and Epperly MW. Total Body Irradiation and Bone Marrow Transplant Significantly Extends the Paralysis Free Interval in Amyotrophic Lateral Sclerosis Mice (SOD1G93A). ASTRO Annual Meeting. San Antonio, TX, Oct. 21-24, 2018.

504A. Tyurin Vladimir, Ting Hsiu-Chi, Reynolds Christian A, Tyurina Yulia Y, Yu Wenxi, Liang Zhuqing, Stoyanovsky Detcho A, Greenberger Joel S, Bayir Hulya, Anthonymuthu Tamil S, Greenberg Miriam L, Kagan Valerian E. Differential LC-MS study of CLD1-driven diversification of cardiolipins inΔ12-desaturasetransfected yeast cells. ASMS Society Meeting, San Diego, CA, June 3-7, 2018.

505A. Sivananthan AP, Shields DS, Fisher R, Franicola D, Hou W, Zhang X, Wipf P, Epperly M, Greenberger JS. Effects of total body irradiation and the radiation mitigator MMS350 on senescence in Fanconi Anemia, Fanca-/- mice. ASTRO Annual Meeting, San Antonio, TX, October 21-24, 2018. IJROBP, 103(3), SU40, #2397, 2018

506A.Ejaz A, Epperly MW, Greenberger JS, Huq MS, and Rubin P. Enhanced total body irradiation mitigation by adipocyte stem cells (ASCs) added to JP4-039. Radiation Research Society Annual Meeting. Chicago, IL, September 23-26, 2018.

507A. Greenberger JS, Fisher R, Donnelly C, Watkins S, Ross M, Rigatti L, and Epperly MW. Significant amelioration of paralysis in Amyotrophic Lateral Sclerosis mice (SOD1G93A) by total body irradiation and bone marrow transplant Radiation Research Society Annual Meeting. Chicago, IL, September 23-26, 2018.

508A Epperly MW, Wipf P, and Greenberger JS.Ionizing irradiation mitigation by intramuscular (I.M.) delivered GS-nitroxide (JP4-039) in a self-administration formulation, Radiation Research Society Annual Meeting. Chicago, IL, September 23-26, 2018.

509A Quinn TJ, Ding X, Wilson GD, Sivananthan A, Epperly MW, Franicola D, Wipf P, Greenberger JS, Stevens CW, and Kabolizadeh P. The mitochondrial targeted GS-nitroxide JP4-039 protects Fanconi Anemia (Fanca-/-) mouse marrow stromal cell lines from proton irradiation, Radiation Research Society Annual Meeting. Chicago, IL, September 23-26, 2018

510A. Ejaz A, Epperly MW, Greenberger JS, Huq MS, and Rubin P. Late radiation fibrosis is reduced by injection of adipocyte stem cells, Radiation Research Society Annual Meeting. Chicago, IL, September 23-26, 2018.

511A. Sivananthan A, Fisher R, Shields D, Zhang X, Franicola D, Epperly MW, Wipf P, and Greenberger JS. The Radiation Mitigator, MMS350, Ameliorates Irradiation Induced Senescence in Fanconi Anemia, Fanca-/-, mice, Radiation Research Society Annual Meeting. Chicago, IL, September 23-26, 2018

512A. Thermozier S, Epperly MW, Franicola D, Zhang X, Fisher R, Shields D, Wang H, Willis JA, Luke C, Silverman GA, and Greenberger JS. Hemopoietic progenitor cells from the bone marrow of Serpinb3A-/- mice are radioresistant. Radiation Research Society Annual Meeting. Chicago, IL, September 23-26, 2018.

513A. Rodriguez Alfredo, Yang Chunyu, Epperly Michael, Sambel Larissa, Grompe Markus, Parmar Kalindi, Greenberger Joel, and D’Andrea Alan. Hyperactive TGF-β pathway signaling is required for viable gestation during the development of Fanconi Anemia mice. 30th Fanconi Anemia Research Fund Scientific Symposium, Newport Beach, CA, 9/27 – 9/30/18.

514A: Henderson Andrew, Epperly Michael W, Fisher Renee, Shields Donna, Zhang Xichen, Rigatti Lora, Donnelly Christopher, Watkins Simon, and Greenberger Joel S. Increased longevity of continuous bone marrow cultures and radioresistance of bone marrow stromal cells from SODG93A ALS (Amyotrophic Lateral Sclerosis) mice. American Society of Hematology (ASH) 60th Annual Meeting, San Diego, CA, December 1-4, 2018.

515A. Henderson A, Epperly MW, Fisher R, Shields D, Zhang X, Rigatti L, Donnelly C, Watkins S and Greemberger JS. Increased Longevity of Continuous Bone Marrow Cultures and Radioresistance of Bone Marrow Stromal Cells from SOD1G93A ALS (Amyotrophic Lateral Sclerosis) Mice. AACR Annual Meeting, Atlanta, GA March 29-April 3, 2019,

516A. Thermozier S, Epperly M, Franicola D, Zhang X, Fisher R, Shields D, Wang H, Willis J, Luke C, Silverman G, and Greenberger J. Serpinb3a-/- mice are radioresistant. AACR Annual Meeting, Atlanta, GA, March 29-April 3, 2019.

517A. Tyurin Vladimir, Tyurina Yulia, Amoscato Andrew, Sparovero Louis J, Epperly Michael, St. Croix Claudette, Watson Alan, Watkins Simon, Greenberger Joel, Bayir Hulya, and Kagan Valerian. An inhibitor of iPLA2ƴ, R-BEL, prevents lipid mediator generation in the ileum and leads to radiomitigation after total body irradiation. ASSMS Annual Meeting, Atlanta, GA, June 2 – 6, 2019, Submitted 1/28/19.

518A: Epperly Michael W, Thermozier Stephanie, Fisher Renee, Hou Wen, Wipf Peter, Bayir Hulya, Kagan Valerian, and Greenberger Joel S. Mitigation of total body irradiation by small molecule mitigators that target 3 distinct cell death pathways. ASTRO Annual Meeting, Chicago, IL, September 15-18, 2019.

519A: Ejaz Asim, Epperly Michael W, Greenberger Joel S, Huq M Saiful, and Rubin Peter. Adipocyte stem cells ameliorate total body irradiation induced hematopoietic syndrome and late radiation fibrosis. ASTRO Annual Meeting, Chicago, IL, September 15-18, 2019.

520A: Tyurin Vladimir, Tyurina Yulia, Amoscato Andrew, Sparovero Louis J, Epperly Michael W, St. Croix Claudette, Watson Alan, Watkins Simon, Greenberger Joel, Bayir Hulya, and Kagan Valerian. R-BEL mitigates total body irradiation by inhibiting iPLA2ƴ which prevents lipid mediator generation in the ileum. ASTRO Annual Meeting, Chicago, IL, September 15-18, 2019.

521A: Thermozier Stepanie, Epperly Michael W, Franicola Darcy, Zhang Xichen, Fisher Renee, Shields Donna, Wang Hong, Luke Cliff, Silverman Gary, and Greenberger Joel S. Radioresistance of Serpinb3a-/- mice and derived hematopoietic and marrow stromal cell lines. ASTRO Annual Meeting, Chicago, IL, September 15-18, 2019.

522A: Tian J, Rogers M, Epperly MW, Firek B, Fisher R, Novak EA, Mollen KP, Greenberger JS, and Morowitz MJ. The gut microbe Akkermansia muciniphilia increases after radiation injury and can be supplemented by gavage to improve survival in radiated mice. ASTRO Annual Meeting, Chicago, IL, September 15-18, 2019.

523A: Quinn Thomas J, Ding Xuanfeng, Li Xiaoqiang, Wilson George D, Buelow Katie, Sivananthan Aranee, Thermozier Stephanie, Henderson Andrew, Epperly Michael W, Franicola Darcy, Wipf Peter, Greenberger Joel S, Stevens Craig W, and Kabolizadeh Peyman. JP4-039 induced amelioration of mucositis and abscopal bone marrow suppression in Fanconi Anemia Fanca-/- mice during pencil beam scanning proton therapy. ASTRO Annual Meeting, Chicago, IL, September 15-18, 2019.

524A: Eller Andrew, Thermozier Stephanie, Epperly Michael W, Fisher Renee, Hou Wen, Hug Saiful, Wipf Peter, Haley Marsha, Sahel Jose-Alain, and Greenberger Joel S. Intraocular injection of JP4-039 protects the retina from radiation induced apoptosis. ASTRO Annual Meeting, Chicago, IL, September 15-18, 2019.

525A: Greenberger Joel S, Fisher Renee, Zhang Xichen, Hou Wen, Shields Donna, Wipf Peter, and Epperly Michael. Mitochondrial targeted GS-nitroxide, JP4-039, mitigates total body irradiation (TBI) of Fanca-/- mice. Fanconi Anemia Research Fund Annual Meeting, Chicago, IL, September, 2019.

526A: Li Kelvin, Fisher Renee, Epperly Michael, Methe Barbara, and Greenberger Joel S. Stabilization of intestinal *Lactobacillus* correlates with successful total body irradiation mitigation. Radiation Research Society Annual Meeting, San Diego, CA, November, 2019.

527A: Greenberger Joel S, Fisher Renee, Hou Wen, Zhang Xichen, Shields Donna, van Pijkeren Jan-Peter, Yu Jian, Bayir Hulya, Kagan Valerian, Wipf Peter, Watkins Simon, and Epperly Michael W. Total body irradiation mitigation by enteric administration of *Lactobacillus reuteri* secreting IL-22. Radiation Research Society Annual Meeting, San Diego, CA, November, 2019.

528A: Tyurin Vladimir, Tyurina Yulia, Amoscato Andrew, Sparvero Louis J, Epperly Michael W, St. Croix Claudette, Watson Alan, Watkins Simon, Greenberger Joel, Bayir Hulya, and Kagan Valerian. Inhibition of neutrophil migration into the irradiated intestine by calcium independent phospholipase A2 gamma inhibitor, R-Bel, mitigates ionizing irradiation-induced damage. Radiation Research Society Annual Meeting, San Diego, CA, November, 2019.

529A: Eller Andrew, Thermozier Stephanie, Epperly Michael, Wipf Peter, Huq M Saiful, Haley Marsha, and Greenberger Joel S. Intravitreous administration of JP4-039 ameliorates ionizing irradiation-induced apoptosis of the retina. Radiation Research Society Annual Meeting, San Diego, CA, November, 2019.

530A: Thermozier Stephanie, Epperly Michael Hou Wen, Zhang Xichen, Fisher Renee, Shields Donna, Yu Jian, Bayir Hulya, Kagan Valerian, and Greenberger Joel S. Radiation mitigation by signature (biomarker) directed sequential administration of three drugs, which block ferroptosis, necroptosis, and apoptosis. Radiation Research Society Annual Meeting, San Diego, CA, November, 2019.

531A: Bayir Hulya, Epperly Michael, Fisher Renee, Zhang Xichen, Hou Wen, Shields Donna, Greenberger Joel S, Wipf Peter, and Kagan Valerian. Ionizing irradiation-induced parthanatos, a second mitochondrial-based cell death pathway. Radiation Research Society Annual Meeting, San Diego, CA, November, 2019.

532A: Greenberger Joel S, Fisher Renee, Zhang Xichen, Hou Wen, Shields Donna, Wipf Peter, and Epperly Michael W. Mitochondrial targeted GS-nitroxide, JP4-039, mitigates total body irradiation (TBI) of Fanca-/- mice. Radiation Research Society Annual Meeting, San Diego, CA, November, 2019.

533A: Beumer Jan H, Guo Jianxia, Christner Susan M, Parise Robert A, Wipf Peter, Epperly Michael W, Greenberger Joel S, Eiseman Julie L. Bioavailability and tissue distribution of JP4-039 after intramuscular administration to female C57BL/6 mice. Radiation Research Society Annual Meeting, San Diego, CA, November, 2019.

534A: Adeghate Jennifer, Fisher Renee, Hou Wen, Davoli Katherine, Epperly Michael W, Hug Mohammed Saiful, Wipf Peter, Sahel Jose-Alain, Greenberger Joel S, and Eller Andrew W. A novel agent in prevention of Acute Radiation Toxicity in the Mouse Retina. ARVO Annual Meeting Abstract, June 2021.

535A. MukherjeeA, Epperly, MW, Shields D, Hou W, Fisher R, Hamade DF, and GreenbergerJS. Radiation Induced and FACS-Sorted Senescent tdTOMp16+ Cells Upregulate Profibrotic Gene Expression in Mesenchymal Stem Cells (Stromal Cells). ASTRO Annual Meeting, Chicago, IL. September 2021.

536A. Hamade DF, Epperly MW, Fisher R, Hou W, Mukherjee A, and Greenberger JS. ***Second-***Generation Probiotic *Lactobacillus reuteri* producing IL-22 (LR-IL-22) Protects the Intestine to Facilitate Whole Abdomen Irradiation (WAI) in Ovarian Cancer. ASTRO Annual Meeting, Chicago IL September 2021.

537A. Hamade DF, M.D., Hou W, Fisher R, Mukherjee A, Epperly MW, Ph.D., Espinal A, and Greenberger JS, M.D. Second-Generation Probiotic *Lactobacillus reuteri* producing IL-22 (LR-IL-22) Protects the Intestine and Facilitates Whole Abdomen Irradiation (WAI) for Diffuse Widespread Ovarian Cancer. Radiation Research Annual Meeting, San Juan, Puerto Rico October 2021.

538A. Mukherjee A, Epperly M, Shields D, Hou W, Fisher R, Hamade D and Greenberger JS. Radiation induced and FACS-sorted senescent tdTOMp16+ cells upregulate profibrotic genes in target cell lines via induction of Fgr tyrosine kinase. Radiation Research Annual Meeting San Juan, Puerto Rico, October 2021.

539A. Rogers CJ, Epperly MW, Whitener R, Miller T, Axtelle J, Greenberger JS, Menon N. Development of a long-term release radiation protector and mitigator suitable for austere environments. Radiation Research Society, San Juan, Puerto Rico, October, 2021.

540A: Rogers CJ, Epperly MW, Ho M-H, Whitener R, Axtelle J, Greenberger JS, Menon N. An orally administered GI-ARS mitigator to target delivery of therapeutic cytokines to the intestine. Radiation Research Society, San Juan, Puerto Rico, October, 2021.

541A: Wu Y, Epperly M, Fisher R, Greenberger JS, Lo C. Probing mitochondrial function in intact fetal brains with in vivo gating-free motion-and-time-resolved 4D oxy-wavelet MRI in a fetal irradiation injury mouse model. ISMRM and SMRT Annual Meeting & Exhibition, May 15-20, 2021, Virtual Meeting.

542A: Adeghate J, Fisher R, Hou W, Davoli K, Epperly MW, Huq MS, Wipf P, Sahel J-A, Greenberger J, Eller AW. A novel agent in prevention of acute radiation toxicity in the mouse retina. ARVO Annual Meeting, June 2021. Investigative Ophthalmology & Visual Science, 62:3290, 2021.

543A: Mukherjee A, Epperly MW, Shields D, Hou W, Fisher R, Greenberger JS. Fancd2-/- mice demonstrate increased chemical carcinogen and ionizing irradiation induced epithelial cell senescence and OSM. Fanconi Anemia Research Fund Symposium 2022, Austin, Texas, September 8-11, 2022.

544A: Mukherjee A, Epperly MW, Shields D, Hou W, Fisher R, Greenberger JS. Induction of Fgr in senescent cells, mediates radiation-induced pulmonary fibrosis. Radiation Research Society Annual Meeting, Waikoloa Village, Hawaii, October 16-19, 2022.

545A: Rogers C, Ko M-H, Menon N, Epperly M, Greenberger JS. An orally administered GI-ARS mitigator to target delivery of therapeutic IFN-β to the intestine. Radiation Research Society Annual Meeting, Waikoloa Village, Hawaii, October 16-19, 2022.

546A: Epperly MW, Espinal A, Hamade DF, Shields D, Fisher R, Hou W, Wang H, Mukherjee A, Yu J, van Pijkeren JP, Greenberger JS. Oral administration of *Lactobacillus reuteri* releasing Interleukin-22 (LR-IL-22) ameliorates radiation induced loss of endothelial and Lgr5+GFP+ epithelial stem cells. Radiation Research Society Annual Meeting, Waikoloa Village, Hawaii, October 16-19, 2022.

547A: Greenberger JS, Epperly MW, Mukherjee A, Shields D, Fisher R, Pennathur A, Luketich J, Hou W. Expression of OSM in senescent esophageal cells during gastroesophageal carcinogenesis. Radiation Research Society Annual Meeting, Waikoloa Village, Hawaii, October 16-19, 2022.

548A: Dierdorff JM, Mehdi H, Elmonzer M, Greiner A, Kutschke WJ, Yoon J-Y, Prathivadhi-Bhayankaram S, Morgan GM, Wipf P, Epperly MW, Greenberger JS, London B. Sex difference following cardiac-targeted irradiaton in mice. AHA Annual Meeting 2022, Chicago, IL, November 5-7, 2022.

549A: Dutt S, Soto L, Viswanathan V, Melemenidis S, Grover V, Natarajan S, Loo P, Lau B, Kapadia N, Lee HCR, Ashraf MR, Manjappa R, Skinner L, Surucu M, Yu AS, Casey K, Greenberger JS, Epperly M, Graves EE, Rankin EB, Loo, Jr. BW. Abdominal FLASH irradiation spares radiation-induced intestinal injury in mice with impaired double strand DNA break repair. FRPT (Flash Radiotherapy and Particle Therapy) Meeting, Barcelona, Spain, November 30, 2022 – December 2, 2022.

550A: Mukherjee A, Epperly MW, Shields D, Hou W, Fisher R, Greenberger JS. Fancd2-/- mice demonstrate increased chemical carcinogen and irradiation induced epithelial cell senescence and OSM. FARF, San Antonio, TX, Septembe, 2022.

551A: Epperly MW, Espinal A, Hamade DF, Shields D, Fisher R, Hou W, Wang H, Mukherjee A, Yu J, van Pijkeren JP, Greenberger JS. Oral administration of Lactobacillus reuteri releasing interleukin-22 (LR-IL-22) ameliorates radiation induced loss of endothelial and Lgr5+GFP+ epithelial stem cells. Hillman Cancer Center Retreat, Pittsburgh, PA, August, 2022.

552A: Hamade DF, Epperly MW, Fisher R, Hou W, Shields D, van Pijkeren J-P, Mukherjee A, Yu J, Leibowitz BJ, Vlad AM, Coffman L, Wang H, Huq MS, Huang Z, Rogers CL, Greenberger JS. Intraoral gavage of second generation probiotic Lactobacillus reuteri releasing IFN-β (LR-IFN-β) mitigates intestinal irradiation toxicity and improves survival during whole abdomen irradiation (WAI). ASTRO, San Diego, CA, 10/1/23 – 10/4/23.

553A: Hamade DF, Epperly MW, Fisher R, Hou W, van Pijkeren J-P, Mukherjee A, Yu J, Leibowitz BJ, Vlad AM, Coffman L, Wang H, Huq MS, Huang J, Rogers C, Greenberger JS. Second generation probiotic Limosilactobacillus reuteri delivering IFN-β (LR-IFN-β) decreases radiation toxicity and improves survival after whole abdomen irradiation (WAI). Radiation Research Society Meeting, 4/23, Montreal, Canada.

554A: Dierdorff JM, Mehdi H, Elmonzer M, Greiner A, Current K, Yoon J-Y, Prathivadhi-Bhayankaram SV, Morgan GM, Kutschke WJ, Wipf P, Epperly MW, Allen BG, Spitz DR, Greenberger JS, London B. Susceptibility to cardiac-targeted irradiation in wild-type and NOS1 haploinsufficient mice. American Heart Association, 6/9/23.

***Presentations***

1. **Epperly MW**, Jahroudi N, Rosenstein M, Shields D, Engelhardt J, Huang L, Greenberger JS. Protection of the lung from ionizing irradiation damage by inhalation gene therapy. The 37TH Annual Scientific Meeting of the American Society for Therapeutic Radiology & Oncology, Miami Beach, FL (October 8-11, 1995).
2. **Epperly MW**, Shiffer C, Escobar P, Bray JA, Watkins SC, Bigbee WL, Greenberger JS. Overexpression of MnSOD *in vitro* increases the radioresistance of 32D cl 3 hematopoietic progenitor cells. The 89TH Annual Meeting of the AACR, New Orleans, LA (March 28 - April 1, 1998).
3. **Epperly MW**, Bray JA, Escobar P, Bigbee WL, Watkins SC, Greenberger JS. Overexpression of the human MnSOD transgene in vitro protects 32D cl 3 murine hematopoietic progenitor cells from irradiation-induced apoptosis. The 40TH Annual Scientific Meeting of ASTRO, Phoenix, AZ (October 25-29, 1998).
4. **Epperly MW**, Bray JA, Defilippi S, Greenberger JS. Overexpression of manganese superoxide dismutase in the 32D cl 3 murine hematopoietic progenitor cell line prevents apoptosis induced by ionizing irradiation, IL-3 withdrawal, or exposure to TNF-. The 28TH Annual Meeting of the International Society of Experimental Hematology, Monte Carlo, Monaco (July 10-14, 1999).
5. **Epperly MW**, Defilippi S, Sikora C, Gretton J, Greenberger JS. Radioprotection of lung and esophagus by overexpression of the human MnSOD transgene. International Conference on Low-Level Radiation Injury and Medical Countermeasures. Sponsored by the Armed Forces Radiobiology Research Institute, Bethesda, MD, November 8-10, 1999. LLR-99 (Session 2. Prevention and Treatments; Session 2B. Protective Devices and Strategies, p. 33.
6. **Epperly MW**, Defilippi SJ, Sikora CA, Gretton JE, Pierce L, Peterson J, Kagan V, Greenberger JS. Overexpression of the human MnSOD transgene prevents irradiation apoptosis of 32D cl 3 hematopoietic progenitor cells by stabilization of the mitochondria. The 29th Annual Scientific Meeting of the International Society Of Experimental Hematology, Tampa, FL, July 8-11, 2000. Exp. Hematol., 28(7):Suppl. #1:35 (Abstract #14), 2000.
7. **Epperly MW**, Sikora CA, Gretton JE, DeFilippi SJ, Greenberger JS. Late upregulation of VCAM-1 and ICAM-1 in irradiated murine pulmonary endothelial and lung parenchymal cells precedes recruitment of bone marrow-derived macrophages and fibrosis. The 43rd Annual Meeting of the American Society for the Therapeutic Radiology and Oncology (ASTRO), San Francisco, CA, November 4-8, 2001.
8. **Epperly MW**, Greenberger JS, Gretton JE, Jefferson M, Bernarding M. Title: The importance of mitochondrial localization for the prevention irradiation-induced apoptosis by manganese superoxide dismutase. 31st. Annual Meeting International Society for Experimental Hematology, Montreal, Canada, July 5 – 9, 2002.
9. **Epperly MW**, Jefferson M, Guo HL, Gretton JE, Bernarding M, Greenberger JS. Title: Pre-but not post irradiation intratracheal injection of manganese superoxide dismutase-plasmid/liposomes (MnSOD-PL) protects the lung from irradiation damage. The 44th Annual Meeting of the American Society for the Therapeutic Radiology and Oncology, New Orleans, La, October 6 – 10, 2002.

**Professional Activities:**

**TEACHING:**

Dr. Epperly is the Course Director for the Radiobiology Course taught to the Radiation Oncology residents. Dr. Epperly was involved with establishment of the Radiobiology Course since the inception of the Radiation Oncology Residency Program in 2000. Dr. Epperly has been involved in the laboratory training of three medical students who have taken a one-year leave of absence between their third and fourth year of medical school to work in his lab to gain research experience before completing medical school. Other medical students have spent one rotation of their medical school experience in his laboratory to determine whether they wanted to pursue further research opportunities. Dr. Epperly has been involved in the training of two Ph.D. students and two postdoctoral fellows. Dr. Epperly has also been responsible for the Radiation Oncology Research Seminars.

**SUMMARY OF CURRENT RESEARCH FUNDING**

**ACTIVE**

2U19AI068021-11(Greenberger) 09/01/15-08/31/20 3.6 calendar months

NIH/NIAID

CMCR “**Signature-Directed, Sequential Delivery of Radiation Mitigators**”

Project I

The goal of Project 1 of the CMCR grant is to develop new drugs to mitigate irradiation damage by targeting antioxidant and other small molecules to the mitochondria.

2U19AI068021-11 (Greenberger) 09/01/15-08/31/20 3.0 calendar months

NIH/NIAID

CMCR “**Signature-Directed, Sequential Delivery of Radiation Mitigators**”

Core C

The goal of Core C of the CMCR grant is to support the four projects in the CMCR grant by in vitro and in vivo analysis of the ability of the new compounds to mitigate against irradiation damage.

2RO1 DK071085 (Kanai) 04/01/13 – 03/31/18 0.86 calendar months

NIH **“Roles of Nitric Oxide”** The goal of this grant is to investigate the role of nitric oxide in

radiation damage to the urinary bladder.

RO1 GM102989-01 (Li) 07/01/13 – 04/30/17 0.96 calendar months

NIH “**Rational Design of Lipidic Vectors for Mitochondria-Targeted Antioxidants**” The goal of this project is to design new liposomal vector for the delivery of antioxidants to the mitochondria.

**PRIOR**

RO1 GM102989-01 (Li) 07/01/13 – 04/30/17 0.96 calendar months

NIH “**Rational Design of Lipidic Vectors for Mitochondria-Targeted Antioxidants**” The goal of this project is to design new liposomal vector for the delivery of antioxidants to the mitochondria.

1U19A168021-01 (PI: Joel S. Greenberger, M.D.) 09/01/10-08/31/15

Co-Investigator Project 1 and Director of Core F: Michael W. Epperly, Ph.D. 20% Effort

**“Mitochondrial Targets Against Radiation Damage”**

NIH/NIAID Center for Medical Countermeasures Against Radiation (CMCR)

The goal of this project is to develop radioprotector/mitigator drugs focused on neutralizing mitochondrial specific steps in early response to irradiation damage which will prevent irreversible cell death.

NIH-2R01CA119927-08A1 (PI: Joel S. Greenberger, M.D.) 02/01/06-01/31/11

Co-Investigator: Michael W. Epperly, Ph.D. 15% Effort

**“Mechanism of Irradiation Pulmonary Fibrosis”**

The goal of this grant is define critical steps in irradiation pulmonary fibrosis and identify new targets for therapeutic intervention, thereby decreasing patient side effects and facilitating dose escalation in the initial treatment or retreatment of recurrent thoracic cancers.

BARDA/HHS HHS0100200800062C (PI: Joel S. Greenberger, M.D.) 09/16/08-09/15/09

Co-Investigator: Michael W. Epperly, Ph.D. 20% effort

**“Novel Mitochondrial Targeted Drugs for Treatment of the Irradiation-Induced Hematopoietic Syndrome”**

This contract will develop the optimal GS-nitroxide drug (JP4-039) from a library of novel small molecules to be a new mitigator when delivered 24 hours after irradiation to enhance bone marrow stromal cell recovery and improve engraftment of circulating marrow stromal and hematopoietic stem cell progenitors in the irradiation damaged hematopoietic microenvironment.

NIH-1-R01-DK071085-1-DRG/NIH (PI: Anthony Kanai, Ph.D.) 4/01/05-03/31/10

Co-Investigator: Michael W. Epperly, Ph.D. 10% effort

**“Roles of Nitric Oxide and Superoxide in Cystitis”**

The goal of this project is to investigate the production of nitric oxide and superoxide in the bladder following irradiation and their involvement in irradiation-induced cystitis of the bladder.

NIH-RC1-A1081284 (PI: Louis D. Falo, M.D.) 09/10/08-09/10/10

Co-Investigator: Michael W. Epperly, Ph.D. 10% effort

**“Novel Cutaneous Radiation Injury Countermeasures”**

The goal of this project is do develop new small molecule drugs and delivery systems to deliver the drugs to the skin to prevent irradiation induced damage to the skin.

NIH-R01-CA83876-06 (PI: Joel S. Greenberger, M.D.) 08/02/06-06/30/11

Co-Investigator: Michael W. Epperly, Ph.D. 25% Effort

**“Gene Therapy Reduction of Radiotherapy Esophagitis”**

The goal of this grant is to expand the molecular mechanism of esophageal radiation protection by MnSOD-PL administration.

1-R01-HL60132 – Competitive Renewal – DRG/NIH 2/01/02 - 1/31/07

PI: Joel S. Greenberger, M.D. $39,056

Co-Investigator: Michael W. Epperly, Ph.D. (15% effort)

**“Lung Radiation Protection by MnSOD-Transgene Therapy”**

The goal of this grant will be to use validated, genetically modified animal models along with quantitative

molecular methods to elucidate the cellular mechanism of irradiation lung fibrosis and the level(s) at which

epitope-hemagglutinin (HA)-tagged manganese superoxide dismutase (MnSOD) transgene therapy protects.

1-R01-CA92389-01A1 04/01/03 - 03/31/07

PI: Andrew A. Amoscato, M.D. $28,752

Co-Investigator: Michael W. Epperly, Ph.D. (5% effort)

“**Radiation-Induced Ceramide Generation”**

The goal of this grant is to look at the effect of irradiation on mitochondrial ceramide and its role in irradiation-induced apoptosis.

1-R01-CA83876-02 07/01/02 - 06/30/06

PI: Joel S. Greenberger, M.D. $30,158

Co-Investigator: Michael W. Epperly, Ph.D. (27.5% effort)

**“Gene Therapy Reduction of Radiotherapy Esophagitis”**

The goal of this grant is to expand the molecular mechanisms of esophageal radiation protection by MnSOD-PL and the involvement of esophageal stem cells in irradiation protection.

1-RO1-CA-101837-01A2-DRG/NIH 1/01/05 - 12/31/08

**“MnSOD-PL Irradiation Protection of the Oral Cavity”** $9,847

PI: Joel S. Greenberger, M.D. (10% effort)

Co-Investigator: Michael W. Epperly, Ph.D.

The goal of this grant is to investigate the protection of the oral cavity from irradiation damage by administration of MnSOD-PL, and to determine the effects of increased expression of MnSOD in on the antioxidant levels in tumors of the head and neck and normal tissue of the oral cavity.

NIH 1R01-CA92389-01A1

Lung Cancer SPORE (PI: Jill Siegfried, Ph.D.) 04/01/01 – 01/01/05

(Project #4: PI: Joel S. Greenberger, M.D., Co-I: Michael Epperly, Ph.D.) $17,145 (20% effort)

**"Protection of esophagus and normal lung from chemoradiotherapy (CRT) damage with radiosensitization of tumor in non-small cell lung carcinoma (NSCLC) patients by manganese superoxide dismutase-plasmid/liposome (MnSOD-PL) gene therapy."**

The goal of this project is to demonstrate in clinical trials that overexpression of MnSOD in normal tissue

protects against irradiation and chemotherapy (chemoradiotherapy - CRT)-induced damage; demonstrate in a

clinical trial that MnSOD-PL administration to the esophagus will result in decreased esophagitis in lung

cancer patients undergoing CRT; that the optimal biological effective dose, safety of MnSOD-PL, and

prevention of esophagitis will be evaluated; and that the studies in this project should lead to an improved

quality of life for lung cancer patients requiring CRT.

# LIST OF CURRENT RESEARCH INTERESTS

1. Use of gene therapy for protection of normal tissue from irradiation damage.

2. Development of new small molecules to protect tissue from irradiation damage.

3. Effects of irradiation on bone healing.

4. Use of antioxidant diets to protect astronauts from irradiation exposure during space travel.

5. Use of stem cells in repair of irradiation damage.

**RESEARCH PLANS**

Irradiation exposure has a dramatic effect of tissues in the body. It can result in alteration of many cellular activities such as development of fibrosis or cancer, premature aging or death. Currently, there is little that can be done to protect people from irradiation. Development of new methods of treating people exposed to irradiation needs to be intensified. To effectively develop ways to prevent the effects of irradiation, we must understand the mechanism of irradiation induced damage. In the past we have demonstrated the importance of stabilizing the mitochondria in the protection of the cell from irradiation. Many of the methods for preventing tissue damage from irradiation will use modalities which will protect the mitochondria. This may involve gene therapy techniques using plasmids carrying transgenes for proteins such as manganese superoxide dismutase or catalase as well as development of new small molecules that will deliver antioxidants to the mitochondria. We will also be investigating new diets which contain high levels of antioxidants to see if these diets can lead to increased concentrations of antioxidants in cells accompanied by increased survival following irradiation. The use of stem cells may have a profound effect on the repair of irradiated tissues. We have already demonstrated that increased expression of MnSOD at the time of irradiation results in increased migration of bone marrow stem cells to the irradiated damage resulting in increased survival. We will continue to investigate how hematopoietic stem cells or tissue specific stem cells can aid in the repair of irradiation damage. The overall objective of the lab will be to better understand the effects of irradiation on tissues and the development of new modalities to prevent the irradiation damage.

**Patents:**

1. Inventors: Drs. G. Ranadive, H.S. Rosenzweig, **M. W. Epperly**, and W.D. Bloomer

Organization: University of Pittsburgh

Title: “**Regioselective chemical modification of monoclonal antibodies**”

Frederick H. Colen, Esquire

Reed, Smith, Shaw & McClay

435 Sixth Street

Pittsburgh, PA 15219-1996

US Patent Application Serial No. 07/613,127, Filed 11/14/90

US Patent #5,208,008; Issued 5/4/93

2. Inventor: Maria Papadopoulou-Rosenzweig, **Michael W. Epperly**, William D. Bloomer.

Title: **Acridine-Intercalator Based Hypoxia Selective Cytotoxins**.

US Patent: US 5,294,715

Issued: March 15, 1994.

3. Inventor: **Michael W. Epperly, Ph.D**., Joel S. Greenberger, M.D., Jianfei, Jiang, Ph.D., Valerian

E. Kagan, Ph.D., John S. Lazo, Ph.D., and Peter R. McDonald, Ph.D.

Title: “**Radioprotective Agents**”

United States Patent Application No. 8,883,852

Issued November 11, 2014

Webb reference:6527-112733

Pitt Reference: 01830 0002.0158PCTUS.

4. Inventor: Peter Wipf, Ph.D., Natalia A. Belikova, Ph.D., Jianfei Jiang, Ph.D., Joel S. Greenberger, M.D., Joshua G. Pierce, Ph.D., and **Michael W. Epperly, Ph.D.**

Title: **“Use of Targeted Nitroxide Agents in Preventing, Mitigating and Treating Radiation Injury”**

US Patent Number: 8,822,541

Issued September 2, 2014

Pitt Reference number: 01734

Klarquist Reference number 8123-88710-03

5. Inventors: **Michael W. Epperly**, Abhay Sudhir Gokhale; Joel S. Greenberger, Peter Wipf;

Julianne Glowacki.

Title: **“Use of Targeted Nitroxide Agents in Bone Healing”**

Pitt Ref. No 01966

Application No. 13/320,999 filed April 30, 2012

US Patent No. 8,748,369 issued Date June 10, 2014.

6. Inventors: Michael W. Epperly, Joel S. Greenberger, Xiang Gao, Song Li, and Peter Wipf

Title: **“Intraesophageal Administration of Targeted Nitroxide Agents for Protection Against Ionizing Irradiation-Induced Esophagitis”**

Pitt Ref.: 02294

JH Ref.: 0002.0233P

Current Status: Submitted

Submitted: 11/12/10, filed: 1/4/2019

Allowed: 3/26/14 US Patent #2014/0199368A1, 16/240, 595

Issued: 7/17/14

7. Inventors: Valerian E Kagan, Jeffrey Atkinson, Detcho A. Stoyanovsky, **Michael Epperly**, and Joel Greenberger.

Title: **“Mitochondria-Targeted Specific Inhibitors of Cytochrome C Peroxidase Activity and Cardiolipin Oxidation as Protectors and Mitigators of Irradiation Injury”**

US Patent: US9,365,597

Date Issued: 7/14/16

8. Inventors: Peter Wipf, Joel S. Greenberger, **Michael W. Epperly**, and Melissa M. Sprachman

Title: **“ Bifunctional Compounds”**

Pitt Ref No.: 02601

KS Ref. No.: 8123-90010-04

Application No.: PCT/US2012/061109

US Patent Number: 9,200,035.

Date Issued 12/02/2015

9. Inventors: Peter Wipf, Joel S. Greenberger, **Michael W. Epperly**, Melissa M. Sprachman, Julie P. Goff,

Title: **Bifunctional Compounds**

US Patent 9,546,144

Date Issued: 1/17/17.

10. Inventors: Xiang Gao, Peter Wipf, Song Li, **Michael W. Epperly**, and Joel S. Greenberger

Title: **“Formulations and Carrier Systems Including Compound Interactive Domains”**

Pitt Ref. No.: 02645

Attorney Ref. No.: 12-041P (Bartony & Hare)

Patent Number 10,172,795

Awarded: 1/8/2019

11.Inventors: Michael W. Epperly, Joel S. Greenberger, Peter Wipf, Julianne Glowacki.

Title: Compounds for Bone Healing

Patent Number: US 10,251,860,B5

Awarded: 4/9/2019.

**Service**

Institutional Animal Care and Use Committee, University of Pittsburgh, (7/2015 to present).

DLAR Operations Committee, University of Pittsburgh, (9/2015 to Present).

National Organizations:

American Society for Radiation Oncology—Cancer and Radiation Biology Subcommittee (2006 to 2009).

Community Organizations:

Boy Scouts of America—Committee Member for Troop 36 (2004 to 2009).