

JOEL S. GREENBERGER, M.D., F.A.C.R.O., F.A.C.R.

Education and Training:

- 1964 - 1967 Columbia University, New York, B.A. (Music)
- 1967 - 1971 Harvard Medical School, Boston, M.D. (cum laude thesis in a special field)

Professional Appointments:

- 1971 - 1972 Intern, Medicine II and IV (Harvard), Medical Service, Boston City Hospital, Boston
- 1972 - 1974 Staff Associate, Viral Carcinogenesis Branch, National Cancer Institute
- 1974 - 1976 Resident, Joint Center for Radiation Therapy, Harvard Medical School
- 1976 - 1979 Instructor in Radiation Therapy, Sidney Farber Cancer Institute
- 1976 - 1979 Research Associate in Microbiology, Harvard School of Public Health
- 1979 - 1982 Assistant Professor of Radiation Therapy, Harvard Medical School
- 1982 - 1984 Associate Professor of Radiation Therapy, Harvard Medical School
- 1982 - 1984 Associate Director of Research, Joint Center for Radiation Therapy, Dept. of Radiation Therapy, Harvard Medical School
- 1984 - 1993 Professor and Chairman, Dept. of Radiation Oncology, University of Massachusetts Medical School, Worcester, MA.
- 1993-Present Claude Worthington Benedum Professor and Chairman, Dept. of Radiation Oncology, University of Pittsburgh Medical Center/Co-Director of the Lung Cancer Center of the University of Pittsburgh Cancer Institute, Pittsburgh, PA.

Editorial Appointments:

- 1983 - 1991 Associate Editor, *Cancer Research*
- 1983-85;89-91 Associate Editor, *Experimental Hematology*
- 1992 - Present Associate Editor, *Radiation Oncology Investigations, Clinical and Basic Research*
- 1995 - Present Editorial Board, *Biology of Blood and Bone Marrow Transplantation*
- 1997 - Present Editorial Board, *In vivo, International Journal for In vivo Research*
- 2000 - Present Editorial Board, *Human Tissue Engineering*
- 2011 – Present Editorial Board, *Fractions in Radiation Biology*
- 2011 – 2013 Associate Editor, “Frontiers in Radiation Oncology” 2010 – Present, Editor-in-Chief, Timothy Kinsella, M.D., Associate Editor, Anatoly Dritschillo, Joel Greenberger
- 2014 – Present Associate Editor, *Frontiers in Radiation Oncology*
- 2015 – Present Editorial Board Member, *Journal of Lung Diseases & Treatment*

Administrative Appointments:

- 1979 - 1982 Chairman of committee for selection of Fuller Junior Research Fellows, American Cancer Society, Massachusetts Division
- 1983 - 1988 Research Grant Scientific Advisory Committee, American Cancer Society, Massachusetts Division, Inc.

Honors And Awards:

Harvard Medical School Scholarship Honors Thesis: "*Two approaches to the quantitation of leukemic leukocyte functions in clinical disease*".

Sara Stone Burns Award of the Massachusetts Cancer Society (1977)

Claude Worthington Benedum Professorship of Radiation Oncology University of Pittsburgh Medical Center (1993)

National Institutes of Health Merit Award, Hematology II Study Section (1985 - 1993)

John M. Yuhas Award, University of Pennsylvania, Dept. of Radiation Oncology, May, 2012

Fellow, American College of Radiation Oncology, February, 2012

Fellow, American College of Radiology, May, 2013

Professional Societies:

American Medical Association; National Association Of Residents And Interns; Commissioned Officer's Association, USPH; Massachusetts Medical Society; Middlesex Central District Medical Society (Legislative Committee); American Physicians' Fellowship For The Israel Medical Association; American Association For The Advancement Of Science; American Society For Microbiology; American Federation For Clinical Research; Tissue Culture Association; American Society of Hematology; International Association For Comparative Research In Leukemia And Related Diseases; Radiation Research Society; International Association For Experimental Hematology; American Society For Clinical Oncology; Society For Experimental Biology And Medicine; Reticuloendothelial Society; International Society For Hematology; American Radium Society; American Society of Gene Therapy; Pennsylvania Radiological Society (1993-present).

TEACHING AND COMMITTEE EXPERIENCE (1977-1984):

Teaching Responsibilities:

National and International

Educational session of American Society for Hematology annual meeting, December 1983. Lecture on "*Hematopoiesis and the Microenvironment*," given to entire society, The American Society for Hematology, attended in three separate sessions over two days by over 600 hematologists, radiation therapists, and practitioners.

American Society of Therapeutic Radiology, Radiation Biology Lectures, October 1983, San Diego, CA.

International Association for Experimental Hematology, Plenary Session, Organization of lectures on the Hematopoietic Microenvironment, 1982-83 for national meeting. Organizer of KROC Foundation and National Heart, Lung, and Blood Institute Symposium on Long-Term Bone Marrow Cultures, September 12-16, 1983, in Santa Ynez, CA; co-organizer with Dr. Daniel Wright and George Nemo (NHLBI and Walter Reed Institute); organization of program, editing and collating manuscripts for book.

Local Teaching Experience

Radiation Biology course for first year residents at Joint Center for Radiation Therapy. Organized 32 lectures for first year residents, July 1982, July 1983, July 1984. Overall lecture course on radiation biology, radiation side effects, radiation carcinogenesis and mutagenesis, and related areas of basic science.

Medical Oncology Fellows Orientation Lecture Series, Dana-Farber Cancer Institute. July-September 1979, 1980, 1981, 1982, 1983. Weekly Tuesday lectures given on Dana-12 to incoming DFCI fellows. Orientation lectures on approach to cervix cancer, bladder cancer, prostate cancer, interdisciplinary conference discussion on treatment of lymphomas, solid tumors, and organization of protocols from standpoint of radiation therapy. Lecture series last 12-16 weeks each year.

Committee and Administrative Responsibilities

National

Editorial Committee for *Journal of Experimental Hematology*, 1983-present.

Chairman, Nomination Committee, *International Society of Experimental Hematology*, 1987-1989.

Local Committee and Administrative Responsibilities

American Cancer Society, Massachusetts Division. Participants on Committee for selection of Fuller Junior Research Fellows of the American Cancer Society, Massachusetts Division, 1981-1982.

Chairman of the committee for selection of Fuller Fellows. Review and determine award of \$1200 fellowships for the summer research experience for college juniors and seniors and placement of individuals who receive the award into research laboratories throughout Boston and the outlying areas. Personally interviewed the recipients of awards and matched them with research laboratories, 1982-1987.

American Cancer Society, Massachusetts Division, Scientific Advisory Board, 1983-84. Reviewed research grants and made recommendation letters on the funding of grants for individual post-doctoral fellows, start-up research grants, and continuation grants.

Joint Center for Radiation Therapy, executive Committee. Meetings four times per year to coordinate activities for Joint Center for Radiation Therapy under Dr. Samuel Hellman, 1980-83. Organized education retreats to develop the radical radiation therapy of breast cancer, and to organize new treatment guidelines for Hodgkin's disease. Associate Director, Research Administration, Joint Center for Radiation Therapy. Administrator of the Program Project Grant at the Joint Center with designation of specific projects, and interaction of interdisciplinary research grants in the Longwood Area. Coordinating individual research budgets and the administration of monies to investigators at Beth Israel Hospital, Children's Hospital, and Brigham and Women's Hospital for collaboration with scientific interaction of other projects in the Program Project Grant (1983-86).

Clinical Responsibilities Involving Teaching

Teaching residents in radiation therapy at the Joint Center from 1977-1984. Instructed residents on the rotation of the Dana-Farber Cancer Institute in intraoperative therapy procedures including gold seed implantation of pleura and retroperitoneal areas, intracavitary radium techniques, breast implants for primary treatment of breast cancer, and use of treatment planning and linear accelerator for the radical radiotherapy and palliative radiotherapy of human cancer. Teaching residents in the area and science of conference preparation, basic medical oncology, and radiation therapy teaching of residents on the rotation. One to two residents have always been at the DFCI rotation since 1977 when I joined the staff (1977-84).

ADMINISTRATIVE AND TEACHING RESPONSIBILITIES

1984 - 1993

Administration

Member - Faculty Executive Committee, University of Massachusetts Medical School.

- Member - Group Practice Advisory Committee.
- Member - UMass Medical Center Hospital Executive Council.
- Member - Chancellor/Dean Advisory Committee
- Member - UMass Medical School Quality Assurance/Risk Management Committee

Teaching Local

1990-1993 Director of Radiation Biology Course (22 weeks) yearly for students in UMMC Department of Radiation Oncology School For Radiation Therapy Technologists (Radiation Therapists

Deliver 22 lectures per year with mid-term and final examination.

This curriculum is unique for radiation therapist training in that it is the only program with tissue culture laboratory (hands on) experience for clinical radiation therapists. The students carry out radiation survival curves on mammalian cell lines, plot the data, calculate linear regression and linear quadratic models of radiation survival curves using computer facilities and analyze their data relative to published data in the their textbooks.

Faculty Member of the University of Massachusetts Medical Center Graduate School - deliver 2-3 lectures per year to Ph.D. candidate graduate students in cell biology, biochemistry, and molecular genetics. With the Hospital Director of Risk Management, Hospital Chief of Staff, and other faculty, design lecture and interactive courses for second and third year medical students for all aspects of quality assurance/risk management including appropriate charting of data, patient and family interview techniques, communication skills, and design new techniques for analysis of outcomes establishing standards of care for a variety of subspecialties. This course is designed to prepare medical students for patient encounters in a technically complex teaching hospital.

Teaching - National

(National) organizer of American Society Of Hematology Educational Session Program on Hodgkin's disease 1988 - 1990.

Participant and speaker, American Society of Hematology Educational Session Program on "*The Hematopoietic Microenvironment*" 1982 - 1984.

Teaching - Thesis Advisor

Thesis advisor for Shevde, Rupa, Harvard School of Dental Medicine, for a Ph.D. in biomedical sciences and thesis: "*Effect of cytokines and bone marrow stromal cells on putative osteoclast progenitor cells in vitro*" 1990 - 1993.

Thesis advisor for Jason Bush, Carnegie Mellon University, Department of Chemical Engineering, for a Ph.D. degree in chemical engineering and thesis: "*Design of a single cell bioreactor*" 1997 - Present.

ADMINISTRATIVE AND TEACHING RESPONSIBILITIES (1993 - PRESENT)

- Member, University of Pittsburgh Medical Center (UPMC) Radiation Safety Committee - 1993 - Present
- Member, UPMC Technology Transfer Committee - 1993 - Present

Member, University of Pittsburgh Medical Center (UPMC) Transplantation Council - 11/93 - Present
President, University Radiotherapy Associates, Practice Plan, 5/93 - 12/31/98.
Member, Executive Committee, Practice Plan Joint Federation, UPMC, 1994 - Present.
Member, Executive Steering Committee, UPMC, 1995 - 1997.
Member, Finance Committee, UPMC/S Oncology Network System. Co-Chair, Financial Integration Subcommittee, Unified Practice Plan, University Physicians Plan (UPP).
Member, Search Committee for Chair of Ophthalmology, UPMC, 1996.
Member, Search Committee for Chair of Neurosurgery, UPMC, 1997.
Member, Search Committee for Chair of Medicine, UPMC, 1997.
Member, Search Committee for Senior Vice Chancellor for Health Sciences, 1997-1998.
Department Coordinator, DOE Fellowship Program in the Radiation Sciences Program, 1997 - Present.
Member, Board of Directors, University of Pittsburgh Physicians (UPP) - (consolidated practice plan), 1/99 - Present.
Member, Compensation and Productivity Committee of UPP, 1/99 - Present.

PROGRAMMATIC GRANT INVESTIGATOR REPRESENTATIVE

Director of the Program Project Grant of the Joint Center of Radiation Therapy, 1983 - 1984 (PO1-CA12662)

Principal Investigator of SPOR Grant on Lung Cancer at the Pittsburgh Cancer Institute, 1994 - 1995 (P20-CA58235-02).

Organizer, with Armand Keating, M.D., of Keystone Symposium on the Hematopoietic Microenvironment, Taos, NM, 2/16/96 - 2/22/96.

Board of Directors (Positions)

ALG Company, 734 Forest Street, Marlborough, MA 01572 (1993 – 1998).

Pittsburgh Tissue Engineering Initiative - Board Member (1997 - 2000).

Automated Cell Technologies, Inc., 390 William Pitt Way, Pittsburgh, PA 15238 (1997 - 2000).

Scientific Advisory Board (Positions)

Automated Cell Technologies, Inc., 390 William Pitt Way, Pittsburgh, PA 15238 (1996 - Present).

National Institutes of Health (Positions)

Ad Hoc Member, Hematology II Study Section, 1982, 1984, 1987.

Ad Hoc Member, Radiation Study Section, 1999.

Permanent Member, Radiation Study Section, 9/99 - Present.

Administrative Positions:

1993 – Present Pennsylvania Radiological Society, Committee on Radiologic Aspects of Disaster Planning
(Environmental Radiology & Occupational Health)

PATENTS: JOEL S. GREENBERGER, M.D.

1. Inventors: Joel S. Greenberger and Peter H. Levine
Organization: Independent
Title: ***“Gene Therapy Using Stromal Cells”***
J. Peter Fasse, Esquire
Fish & Richardson, P.C., Boston, MA
European Patent #0-081-490, Application #90301044.5 issued 09/21/94 – Joel S. Greenberger
USA Serial Patent #08/408,536 allowed 6/6/96 - filing date: 3/22/95 issued 12/15/98, #5,849,287.
Issued in Japan, 12/18/98, #2,865,354.
Serial #: #08/001,461. Cont.3 = #08/166,595. Cont #08/408,536, #5,681,592, issued.
Filing Date: January 7, 1993 - (Refiling - original date, 1989), Cont.3 #, 12/13/93. Countries: Europe - 7 countries, and Japan

2. Inventor: Joel S. Greenberger and Peter Levine
Organization: Independent
Title: ***“A Method For Homing Hematopoietic Stem Cells To Bone Marrow Stromal Cells”***
J. Peter Fasse, Esquire
Fish & Richardson, P.C., Boston, MA
Reference File #05349002001
USA Serial Patent #07/415,186; Art. Unit #1806, Cont. filed 5/26/92, USA
Serial Patent #07/888203
Filing Date: September 29, 1989. Countries: USA, allowed 12/29/00. Issued 07/10/01, Patent #6,258,354.

3. Inventor: Joel S. Greenberger
Organization: University of Pittsburgh Medical Center
Title: ***“Protection From Ionizing Irradiation Or Chemotherapeutic Drug Damage By In vivo Gene Therapy”***
Michelle Marks, Ph.D., J.D.
Foley & Lardner, P.C.
Reference File #76333/101UNOF; Refiled #76333/108/UNOF; Refiled 10/13/96,
USA Serial Patent #08/136,079; Refiled 6/7/95, USA Serial #08/484,836
USA Patent #08/136,079 issue notice 7/10/96 in the USA; USA Patent #5,599,712, officially issued 2/4/97. 8/907/041 filed 08/6/97 divisional.
Filing Date: 10/15/93, 11/16/95 - Substitute declaration. Countries: USA

4. Inventors: Joel S. Greenberger and Nadia Jahroudi
Organization: University of Pittsburgh Medical Center
Title: ***“Transient Expression of Foreign Gene Targeted to Endothelial Cells”***
Michelle Marks, Ph.D., J.D.
Foley & Lardner, P.C.
Reference File #76333/106/UNOF
USA Serial Patent #08/487,996, 8/874,884 filed 06/13/97 wrapper.
Filing Date: June 7, 1995. Countries: USA

5. Inventors: John Bayouth, Morthy Muthuswamy, M.M. Izndbakhsh, Andre Kalend, Joel S. Greenberger
Organization: University of Pittsburgh Medical Center
Title: ***“A Collision Avoidance Algorithm For Megavoltage Linear Accelerator Used In Dynamic Radiotherapy”***
Richard V. Westerhoff, Esquire, Eckert, Seamans, Cherin & Mellott,
Attorneys At Law
Reference File #124552
USA Serial Patent #08/507,937
Filing Date: 7/27/95. Countries: USA

6. Inventors: David Hurwitz and Joel S. Greenberger
Organization: ALG Company, Marlborough, MA
Title: ***“Expansion Of Bone Marrow Stromal Cells”***
J. Peter Fasse, Esquire
Fish & Richardson, P.C., Boston, MA
Reference File #07787/003001
USA Patent Serial #08/581,059, allowed 12/18/97, issued 6/16/98.
US Patent #5,766,950
Filing Date: 12/29/95, US Patent #5,962,323, issued USA 10/5/99.
European Patents Serial No. 95944686.5, Ref. 077/87/003EP1, allowed 1/6/2000

7. Inventors: David Hurwitz and Joel S. Greenberger
Organization: ALG Company, Marlborough, MA
Title: ***“Methods Of Preparing Bone Marrow Stromal Cells For Use In Gene Therapy”***
J. Peter Fasse, Esquire
Fish & Richardson, P.C., Boston, MA.
Reference File #07787/004001
USA Serial Patent #08/581,053, US Patent #5,962,323. Issued USA 10/5/99.
Filing Date: 12/29/95

8. Inventors: Kristin L. Goltry and Joel S. Greenberger
Organization: University of Pittsburgh Medical Center
Title: ***“Detection of prior ionizing irradiation exposure by RT-PCR detection of RNA fragments identified by differential display”***
Michelle Marks, Ph.D., J.D.
Foley & Lardner, P.C.
Reference File #76333/112/UNOF
USA Serial Patent #08/602,145, issued 2/13/2000 #6,025,336, allowed 1/13/2000
Filing Date: 02/15/96. Countries: USA

9. Inventors: Andre Kalend, Joel S. Greenberger, Takeo Kanade Karun B. Shimoga, Charalambos N. Athanassiou
Organization: University of Pittsburgh Medical Center and Carnegie Mellon University
Title: ***“Apparatus for automatically positioning a patient for treatment/diagnosis”***
Richard V. Westerhoff, Esq., Eckert, Seamans, Cherin & Mellott, Attorneys At Law
Reference File #127443
USA Serial Patent #08/690,521; International filing, 07/29/97, #PCT/US/13366.
Filing Date: 07/31/96. Countries: USA allowed 10/01/97, issued 10/20/98, #5,823,192.

10. Inventors: Andre Kalend, Joel S. Greenberger, Takeo Kanade Karun B. Shimoga, Charalambos N. Athanassiou
Organization: University of Pittsburgh Medical Center and Carnegie Mellon University
Title: ***“Apparatus responsive to movement of a patient during treatment/diagnosis”***
Richard V. Westerhoff, Esquire, Eckert, Seamans, Cherin & Mellott, 600 Grant St., 42nd Floor, Pittsburgh, PA, 15219, (412-566-6000)
Reference File #127444 and #127443
USA Serial Patent #08/715/834, US Patent #5,727,554.
Filing Date: 9/19/96. Countries: USA allowed 10/21/97, issued 3/17/98.
International Patent #W0/98/11822; Application #PCT/US97/16633, published 3/26/98.

11. Inventors: Andre M. Kalend, Joel S. Greenberger, Karun B. Shimoga, Charalambos N. Athanassiou, Takeo Kanade
Organization: University of Pittsburgh Medical Center and Carnegie Mellon University
Title: ***“Apparatus For Matching X-Ray Images With Reference Images”*** Richard V. Westerhoff, Esquire, Eckert, Seamans, Cherin, Mellott, Attor. At Law
Reference File #127442
USA Serial Patent #08/739,622, issued 7/21/98, #5,784,431.
Filing Date: 10/29/96. Countries: USA, allowed 2/10/98.

12. Inventors: Joel S. Greenberger, Paul A. DiMilla, Michael Domach, Raymond K. Houck
Organization: University of Pittsburgh Medical Center, Carnegie Mellon University, and Automated Cell Technology
Title: ***“A method and apparatus for holding cells”***
Ansel M. Schwartz, Attorney,
425 North Craig St., Suite #301, Pittsburgh, PA 15213
Application Serial #08/741,628
Filing Date: 11/1/96; Countries: USA
International Application Filed: 10/31/97, PCT/US97/19834, allowed USA, 6/15/99. Issued 12/28/99, USA Patent Serial #08/741/628; Patent #6,008,010.
13. Inventors: David R. Hurwitz, Theodore Galanopoulos, Van Cherington, Peter Levine, and Joel S. Greenberger
Organization: ALG Company, Marlborough, MA
Title: ***“Methods for reducing adverse side effects associated with cellular transplantation”***
Lee Crews, Esquire
Fish & Richardson, P.C., Boston, MA.
Reference File #
USA Serial Patent # 6,387,366
Filing Date: Issue Date: 5/14/02
14. Inventors: James F. Antaki, Joel S. Greenberger, John A. Holmes, and Philip Schauer.
Organization: University of Pittsburgh
Title: ***“Apparatus and a method for automatically introducing implants into soft tissue with adjustable spacing”***
Richard V. Westerhoff, Esquire, Eckert, Seamans, Cherin & Mellott, 600 Grant St., 42nd Floor, Pittsburgh, PA, 15219, (412-566-6000)
Reference File #214001-00689
USA Serial Patent #6,270,472
Filing Date: 12/29/98, issued 08/07/01
15. Inventor: Joel S. Greenberger
Organization: University of Pittsburgh Medical Center
Title: ***“Protection of esophagus from chemotherapeutic or irradiation damage by some gene therapy”***
Barbara A. McDowell, Foley & Lardner Attorneys At Law, Washington, DC.
Reference File #00237
USA Serial Patent #09/075/532, Patent #6,221,848
Filing Date: 1998, Allowed 10/17/00. Issued USA 04/24/01.

16. Inventor: Joel S. Greenberger, M.D., (Lincoln, MA), and Peter H. Levine, M.D. (Worcester, MA)
Organization: ALG Company, Marlborough, MA.
Title: ***“Gene Therapy Using Stromal Cells”***
Attorney:
Reference File #
Application #914631, Issued 11/30/99, US.A.
USA Serial Patent #5,993,801
Filing Date: 8/19/97
17. Inventor: Luketich JD, Greenberger JS.
Organization: University of Pittsburgh Medical Center
Title: ***“Protection of esophagus from PDT damage by MnSOD-PL gene therapy”***
Barbara A. McDowell, Foley & Lardner Attorneys At Law, Washington, DC.
Reference File #
USA Serial Patent # Provisional filed 01/16/01 – have one year to convert.
Filing Date: 01/05/01
18. Inventor: Joel S. Greenberger, M.D., Michael W. Epperly, Ph.D.
Organization: University of Pittsburgh Cancer Institute
Title: ***“Isolation of a transplantable esophageal/intestinal stem cell and methods of use thereof”***
Leslie Serunian, Esquire, Morgan & Finnegan, L.L.P., 345 Park Avenue, New York, NY, 10154-0053
Client Reference File#540; Attorney Reference File #2710-4009
USA Serial Patent #
Filing Date:
19. Inventor: Joel S. Greenberger, M.D.
Organization: University of Pittsburgh Cancer Institute
Title: **“Protection from ionizing irradiation or chemotherapeutic drug damage by in vivo gene therapy”** (Continuation – In – Part = CIP)
Attorney: Foley & Lardner Attorneys at Law, Washington, D.C.
Reference File #:
Filing Date: 8/6/1997 C/P, Allowed 12/29/2004, Issued: 5/3/2005
USA Patent Application No.: 08/907,041 reassigned #6,887,856
Our Ref.: 076333-0108
Your Ref.: 556-PITT
20. Inventor: Mitchell Fink, M.D., Joel Greenberger, M.D., Michael Epperly, Ph.D.
Title: **“Provisional patent application entitled “Radioprotective Agents”**
Patent Application for Novel Radioprotective Agents
Our Ref: 027704.00027, Serial # PCT/USOG/28530, JH ref. 002.00B1PCT, Pitt Ref. 01007
Filing Date: 7/27/2005
21. Inventor: Anthony Kanai, Ph.D., Mark Zeidel, Ph.D., Michael Epperly, Ph.D., Joel S. Greenberger, M.D.

Title: “Inhibition of Mitochondrial Nitric Oxide Synthase protects the bladder urothelium against radiation damage”

Our Ref.:

Filing Date: 9/30/05

Date Occurred: 2/1/03

22. Inventor: Joel Greenberger, M.D.
Title: Provisional Patent “**Emergency Management System**” U.S. Patent Application No. **60/820,116, refilled as No. 11/780, 042**
Our Ref.: 06-0059-02
Filing Date: 7/24/06
Notice of Allowance: 6/30/12, 10/15/12 issued
Issued: #8, 289, 152
23. Inventors: Peter Wipf, Natalia A. Belikova, Jianfei Jiang, Joel S. Greenberger, Joshua G. Pierce, and Michael Wayne Epperly
Title: “**Use of Targeted Nitroxide Agents in Preventing, Mitigating, and Treating Radiation Injury**”
Pitt Ref.: 01734
JH Ref.: 0002.0145P
Serial # 61/081,573, #13/006, 640
Jurisdiction: Provisional, full
Issued: 7/14/11 US#2011/0172214A, issued 9/2/14 US# 8, 822.541
24. Inventors: Michael W. Epperly, Joel S. Greenberger, Jianfei Jiang, Valerian E. Kagan, John S. Lazo, and Peter R. McDonald
Title: “**Radioprotective Agents**”
Pitt Ref.: 01830 0002.0158PCTUS, Webb reference: 6527-112733
JH Ref.: 0002.0158
Appl. # 61/107,394, Pub# 2011/0288178A (11/24/11) Appl. # 13/124, 924, filled 8/8/11
Filed: 10/22/08
Allowed: 10/7/14 Issued: 11/11/14 13/124,924
25. Inventors: Michael W. Epperly, Abhay Gokhale, Joel S. Greenberger, Peter Wipf, and Julie Glowacki
Title: “**GS-Nitroxide Stimulation of Bone Wound and Fracture Healing**”
Current Status: Submitted
Submitted: 4/27/09, Filing Date: 6/4/10
Pitt Ref.: 01966
KS Ref. #: 8123-88711-03
Appl. #: 13/32A, 999
Filed: 4/30/12
Allowed: 2/4/14 Patent date: 6/10/14
Publication No.: US8748369
26. 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

Allowed: 3/26/14 US Patent #2014/0199368A1

Issued: 7/17/14

27. Inventors: Michael W. Epperly and Joel S. Greenberger
Title: “Carbamazepine is a Radiation Protector and Radiation Mitigator”
Pitt Ref: 02293
Current Status: Submitted
Submitted: 11/12/10
28. Inventors: Louis D. Falco, Jr., Joel S. Greenberger, and Peter Wipf
Title: “Topical Formulations of Targeted Nitroxide Agents”
Pitt Ref: 02340
KS Ref. No.: 8123-86407-01
Application No.: 61/433,111
Filed: 01/14/2011
29. Inventors: Valerian E Kagan, Jeffrey Atkinson, Detcho A. Stoyanovsky, Michael Epperly, Joel Greenberger.
Title: “Mitochondria-Targeted Specific Inhibitors of Cytochrome C Peroxidase Activity and Cardiolipin Oxidation as Protectors and Mitigators of Irradiation Injury”
Pitt Ref No.: 02602
KS Ref. No.:
Application No.:
Filed: 10/31/11
30. Inventors: Peter Wipf, Michael Epperly, Joel S. Greenberger, Natalia Belikova, Jianfei Jiang, Joshua Pierce, Valerian Kagan.
Title: “Use of Targeted Nitroxide Agents in Preventing, Mitigating, and Treating Radiation”
Pitt Ref. No.: #01734
Application No.: #13/006, 640
Filed: 1/14/11
31. Inventors: Peter Wipf, Joel S. Greenberger, Michael W. Epperly, Melissa M. Sprachman, Julie Goff
Title: “Bifunctional Compounds” “MMS350: A Novel Bifunctional Sulfoxide with Radioprotective Effects”
Pitt Ref No.: 02601
Karlquist Ref. #8123-90010-05
Application No.: PCT/US2012/061109, No. 14/352,891
Filed: 10/19/12, 4/18/14
Allowed: 7/21/15, US Patent No. 14/352,891

Publication No.: W0Z013059651

32. Inventors: John S. Lazo, Joel S. Greenberger, Michael W. Epperly, Elizabeth R. Sharlow, Peter Wipf, and Erin M. Skoda
Title: **“Identification of Phosphoinositide-3-Kinase Inhibitors as Mitigators of Ionizing Radiation”**
Pitt Ref No.: 02624
Filed: 05/30/13
33. Inventors: Xiang Gao, Song Li, Peter Wipf, Michael W. Epperly, Joel S. Greenberger
Title: **“Formulations and Carrier Systems Including Compound Interactive Domains”**
Pitt Ref. No.: 02645
Attorney Ref. No.: 12-041P (Bartony & Hare)
KS Ref No.:
Application No.: PCT/US2013/74684
Filed: 12/12/13
34. Inventors: Kagan Valerian, Epperly Michael W, Greenberger Joel S.
Title: **“Selective Delivery of Radiation Protectors/Mitigators Into Mitochondria of Non-Malignant Cells”**
Pitt Ref. No.: 03305
Application No.:
Filed:
35. Inventors: Michael Epperly, Joel Greenberger, Valerian Kagan, Hulya Bayir
Title: **“Radioprotective Agents”**
Pitt Ref. No.: 01830 0002.0158PCTUS
Serial No.: 13/124,924
Webb Ref.: 6527-112733
Filed:
36. Inventors: Valerian Kagan, Detcho Stoyanovsky, Michael W. Epperly, Joel S. Greenberger
Title: **“Mitochondria-Targeted Inhibitors of Cytochrome C Peroxidase for Protection from Apoptosis”**
Pitt Ref. No.: 02481
Attorney Ref.: 5743-P40589US01
Application No.: 13/675,208
Jurisdiction: U.S.
Filed:
37. Inventors: Peter Wipf, Joel S. Greenberger, Michael Wayne Epperly, Melissa M. Sprachman, Julie Goff
Title: **“Bifunctional Compounds”**
Pitt Ref. No.: W02013059651
Serial No.:
Application No.: PCT/US2012/061109
Filed: 10/19/12

38. 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.:
Application No.: US8748369
Patent Date: 6/10/14
Filed: 6/4/10

SUMMARY OF CURRENT RESEARCH FUNDING

ACTIVE

(1U19 A1068021 05-10) **Mitochondrial Targets for Radiation Protection (Project 1) CMCR**

NIH/NIAID 5 yrs. 9/30/10 – 8/31/2015

Principal Investigator: Joel S. Greenberger, M.D. \$10,000,000.00 (25% effort)

This is a Programmatic Grant with four projects, 6 Cores, and a Pilot Projects and one for Fellowships on Radiation Biology.

1U19AI68021-06 (Greenberger) 9/01/11 – 8/31/16 1.8 calendar months
 NIH/NIAID \$1,476,981

CMCR “Center for Medical Countermeasures Against Radiation” 9/1/05-8/31/10

“Mitochondrial Targets Against Radiation Damage (CMCR)”

Project I, Administrative Core, and Pilot Project. The goal of this is 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.

P30 CA047904-22 (Davidson) 09/10/10 – 07/31/15 0.60 calendar months
 NIH/NCI \$12,172 DC/year (Greenberger)

“Cancer Center Support Grant (Program Co-Leader)

The goal of this project is to work with other members of UPCI Lung Cancer Center to determine the most effective way for combined modality support of non-small cell lung cancer patients using radiation therapy, chemotherapy, and surgical approaches.

RFA A1-04-045 09/01/12 – 08/31/13 1.2 calendar months
 NIH/NIAID \$600,000 (Greenberger)

“Center for Medical Counter Measures Against Radiation Supplemental Grant”

1-P50-CA090440-06 - Lung Cancer SPORE (J. Siegfried) Clinical Trial in Progress

(Project #4: Principal Investigator: \$75,000/yr. support

Joel S. Greenberger, M.D.)

“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. This grant does not address the mechanism or cellular targets of x-ray damage to the esophagus.

COMPLETED:

1-RO1-CA101837-01A2 MnSOD-PL Irradiation Protection of the Oral Cavity

NIH/NCI 1/1/05 – 12/31/08

Principal Investigator: Joel S. Greenberger, M.D. \$1,250,000.00 (25% effort)

Competitive Renewal submitted.

1-RO1-AG025015-01 Effect of Aging and Vitamin D Status on Osteoblastogenesis (Subcontract)

NIH/NIA 9/30/04 – 7/31/09

Principal Investigator: Julie Glowacki, Ph.D.

Principal Investigator (Subcontract): Joel S. Greenberger, M.D. \$100,000/yr. sub-contract from B.W.H., Boston (10% effort)

Competitive Renewal being prepared.

HHS0100200800062C BARDA Contract Award

09/16/08 – 09/15/11

Biomedical Advanced Research & Development Authority/Dept. of Health & Human Services

Principal Investigator: Joel S. Greenberger, M.D.

BARDA Contract Award \$2.9 million dollars for Year 1 (renewable for 2 more years)

R01CA119927-11 (Greenberger) 07/01/08 - 05/31/13 1.80 calendar months

NIH/NCI \$186,604 DC/year

“Mechanism of Irradiation Pulmonary Fibrosis”

The goal of this grant is to 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.

U01 DK085570-02 (Yu) 09/30/09 – 08/31/14 0.60 calendar months

NIH/NIDDK \$12,172 DC/year (Greenberger)

“Intestinal Stem Cell Survival and Renewal Coordinately Regulated by PUMA and p21”

The goal of this project is to determine whether p53 upregulated modulator of apoptosis (PUMA) and its interaction with p21 mediates normal irradiation responses of intestinal stem cell crypt cells, and endothelial cells to irradiation damage, and how these modulations can be altered by inhibitors of PUMA.

1RO1-CA83876-01A2 – NIH, -06 Renewed. Renewed 7/1/07 – 6/30/12

Principal Investigator: Joel S. Greenberger, M.D. \$1,250,000.00 (15% Effort)

“Gene Therapy Reduction Of Radiotherapy Esophagitis”

The goal of this grant is to expand the molecular mechanism of esophageal radiation protection by MnSOD plasmid/liposome administration.

1-R01-HL60132 – 4 – 8 - DRG/NIH 12/01/01 – 11/30/06, Renewed 2RO1-CA119927-08A 5 yrs. 8/1/08 – 7/30/2013 \$1,250,000.00

Principal Investigator: Joel S. Greenberger, M.D. (25% Effort)

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

“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.

PENDING

R24-AR4659-01 (BRP) 12/01/02 – 11/30/07

Principal Investigator: Joel S. Greenberger, M.D. \$816,438

(Subcontract – Univ. of Pittsburgh)

“Quantitation of Protein Production In Real Time”

The goal of this project is to study osteoblast differentiation capacity of bone marrow stromal cells using new software and technology developed by Automated Cell, Inc.

Principal Investigator: Joel S. Greenberger, M.D. 07/01/01 – 06/30/06

Co-Investigator: Julie Goff, M.A. \$1,497,500

“Expansion of Human Totipotential Hematopoietic Stem Cell Culture”

1-RO1-AG20942-01 - RFA-AG-01-006 04/01/02 – 03/31/07

Principal Investigator: Joel S. Greenberger, M.D. \$694,554

Co-Investigator: Julie Goff, M.A. and Donna Shields

“Effects of Aging on Human Marrow Osteoblast Differentiation”

RFA-CA-02-002 10/01/02 – 09/30/07

Principal Investigator: David Stefanik, M.D. \$2,007,185

Co-Investigator: Joel S. Greenberger, M.D.

“Cooperative Planning Grant for Cancer Disparities”

1-RO1-AR049680-01 09/30/02 – 09/29/06

Principal Investigator: Julie Glowacki, Ph.D. and Joel S. Greenberger, M.D. \$593,473

Co-Investigator: Julie Goff, M.A. and Donna Shields

“Formation of Bone Tissue from Marrow

(RFA AR-02-003) “Basic and Applied Stem Cell Research for Musculoskeletal Diseases”

#PA-00-087 Head & Neck Cancer SPORE (Project #5) 07/01/02 – 06/30/07

Principal Investigator: Dong M. Shin, M.D. and Joel S. Greenberger, M.D. \$1,494,665

Co-Investigator: Michael Epperly, Ph.D.

“Protection of the Oral Cavity and Oropharynx from Chemoradiotherapy Toxicity by Manganese Superoxide Dismutase-Plasmid/Liposome (MnSOD-PL) Gene Therapy”

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