

**CURRICULUM VITAE      RICHARD P. LEVY**

<b>Education</b>		
1969 – 1970	Queens College, Queens, NY	
1970 – 1973	Hofstra University, Hempstead, NY	B.A. (Biology) (magna cum laude)
1973 - 1975	Hofstra University, Hempstead, NY	M.A. (Biology)
1976 – 1980	Boston University, Boston, MA	M.D.
1983 - 1991	University California, Berkeley, CA	Ph.D. (Biophysics)

**Professional and Academic Appointments**

- 07/1980 - 06/1981 Dept. of Medicine, Childrens Hospital, San Francisco, CA: **Intern**
- 07/1981 - 06/1983 Dept. of Medicine, Childrens Hospital, San Francisco, CA: **Resident**
- 07/1982 - 06/1983 Dept. of Medicine, Childrens Hospital, SF, CA: **Chief Resident**
- 11/1982 - 06/1995 Dept. of Medicine, Laguna Honda Hosp, SF, CA: **Attending Physician**
- 07/1983 - 01/1991 Dept. of Emergency Medicine, Davies Med Cntr, SF, CA: **Attending Physician**
- 06/1987 - 06/1995 Research Medicine & Radiation Biophysics, Lawrence Berkeley National Laboratory, University of California, Berkeley, CA: **Medical Scientist**
- 08/1990 - 12/1998 Department of Radiology, School of Medicine, University of California, San Francisco, CA: **Assistant Adjunct Professor**
- 07/1994 - 06/1998 Department of Neurosurgery, Stanford University School of Medicine, Palo Alto, CA: **Assistant Clinical Professor**
- 08/1994 - 03/2000 Department of Radiation Medicine, Loma Linda University Medical Center, Loma Linda, CA: **Assistant Clinical Professor**
- 07/1995 - 12/1997 Department of Radiation Medicine, Loma Linda University Medical Center, Loma Linda, CA: **Resident & Chief Resident**
- 07/1995 - 12/2000 Division of Molecular Biology, Lawrence Berkeley National Laboratory, University of California, Berkeley, CA: **Guest Scientist**
- 06/1998 - 01/2004 Department of Neurosurgery, Stanford University School of Medicine, Palo Alto, CA: **Associate Clinical Professor**

03/2000 - 01/2009 Department of Radiation Medicine, Loma Linda University Medical Center, Loma Linda, CA: **Professor**

**Recent Radiation Oncology Work Assignments (selected)**

- 08/2012 - 12/2012 **Attending Physician, Radiation Oncology:** Yuma Oncology Center, Yuma, AZ. Working with IMRT/IGRT TomoTherapy and Xofigo brachytherapy equipment, and with PET-CT scanner.
- 02/2013 - 03/2013 **Attending Physician, Radiation Oncology:** Arizona Dermatology Center, Show Low, AZ. Working with Xofigo brachytherapy equipment.
- 05/2013 - 07/2013 **Attending Physician, Radiation Oncology:** RBGB Dermatology Center, Santa Ana, CA. Working with Xofigo brachytherapy equipment.
- 05/2013 - 08/2013 **Attending Physician, Radiation Oncology:** California Skin Institute, Mountain View, CA. Working with Xofigo brachytherapy equipment at four affiliated clinics in Northern California.
- 07/2013 - 08/2013 **Attending Physician, Radiation Oncology:** Mercy Cancer Center, Merced, CA. Working with IMRT/IGRT irradiation.
- 09/2013 - 11/2013 **Attending Physician, Radiation Oncology:** Havasu Regional Medical Center, Lake Havasu City, AZ. Working with IMRT/IGRT irradiation.
- 11/2013 – 06/2015 **Attending Physician, Radiation Oncology:** Western Radiation Oncology, Mountain View, CA (associated with AKSM, Columbus, OH). Working with Xofigo and Esteya brachytherapy equipment at multiple affiliated clinics in Southern California.
- 02/2014 - 06/2015 **Attending Physician, Radiation Oncology:** Ahwatukee Skin & Laser, LLC, Phoenix, AZ. Working with Xofigo brachytherapy equipment (with HealthWest Partners, Inc).
- 10/2014 – 06/2015 **Attending Physician, Radiation Oncology:** Hawaii Skin Cancer Center, Honolulu, CA. Working with Xofigo brachytherapy equipment (with HealthWest Partners, Inc).
- 06/2015 - 07/2015 **Attending Physician, Radiation Oncology:** St. Joseph Hospital Medical Center, Phoenix, AZ. Working with IMRT/IGRT irradiation.
- 07/2015 - 09/2015 **Attending Physician, Radiation Oncology:** Marquette General Hospital, Marquette, MI. Working with IMRT/IGRT irradiation.
- 09/2015 - present **Attending Physician, Radiation Oncology:** Southwest Oncology Centers, Scottsdale, AZ. Working with IMRT/IGRT irradiation.  
(AZ Facilities in Kingman, Scottsdale, Glendale, Yuma)
- 11/2016 – 07/2020 **Attending Physician, Radiation Oncology:** Kingman Regional Medical Center, Kingman AZ. Working with IMRT/IGRT irradiation.

### Recent Foundation and Conference Positions (selected)

- 06/2005 - 2013      Advanced Beam Cancer Treatment Foundation, **Chief Medical Officer**  
Lake Arrowhead, CA
- 07/2008 – present    International Conference on the Application of    **Organizer & Director**  
Accelerators in Research and Industry (CAARI)    **(Medical Applications)**  
Fort Worth, TX

### Research Activities (selected)

1993 – 1995	Heavy-Ion Radiosurgery Program Research Medicine and Radiation Biophysics Lawrence Berkeley National Laboratory University of California, Berkeley Funded: United States Dept. of Energy	<b>Principal Investigator</b>
1993 – 2004	Stereotactic Proton Irradiation Program: Collaborative Program of the Departments of Radiation Medicine, Loma Linda University, Neurosurgery and Radiology, Stanford University, Research Medicine, Lawrence Berkeley Laboratory, University of California	<b>Director, Co-Investigator</b>
1995 – 2004	Stereotactic Proton Therapy for Brain Metastases Department of Radiation Medicine Loma Linda University Medical Center Loma Linda, CA	<b>Co-Investigator</b>
1998 – 2004	Stereotactic Proton Radiosurgery Program Department of Radiation Medicine Loma Linda University Medical Center Loma Linda, CA	<b>Director</b>
1998 – 2004	Functional Proton Radiosurgery Program Department of Radiation Medicine Loma Linda University Medical Center Loma Linda, CA Funded: H.L. Guenther Foundation: \$1.485M	<b>Principal Investigator</b>

### Academic Honors

- 1969 - 1973      Regents Scholarship: New York State

1991 Elizabeth Roboz Einstein Fellowship: Outstanding Graduate Student in  
Neurosciences, Graduate Division, University of California, Berkeley

### **Scientific Journal Review**

1989 - International Journal of Radiation Biology, Oncology and Physics

1993 - Radiation Research

1997 - Journal of Radiosurgery (Editorial Board)

1998 - Acta Oncologica

2008 - American Institute of Physics (Medical Applications Topic Editor: CAARI)

2009 - Reviews of Accelerator Science and Technology (RAST)

2012 - Translational Cancer Research

### **Certification**

1983 American Board of Internal Medicine

1999 American Board of Radiology (Therapy) (last re-certified: October, 2011)

### **Licensure**

1981 **National Board of Medical Examiners**

1981-2019 **California**

1981–present **Drug Enforcement Administration**

2013–present **Arizona**; AZ HCCC System

2013–2019 **Michigan**: Phmcy Board Contr Subst

2014-2019 **Hawaii**

**NPI (NPPES)** No. XXXXXX

**PTAN** No. XXXXXX

**CA DPH: X-RAY SUPERVISOR & OPERATOR PERMIT No. XXXXXX**

**LLUMC Committees**

1995 - 2004 Member, Radiation Medicine Research Committee

1998 – 2004 Member, Proton Safety Committee

**Immediate Family**

Donna M. Carpentier-Levy, wife (since 1980)  
B.A., Hofstra University, 1974  
M.A., Hofstra University, 1980

James D. Carpentier-Levy, son (born: August, 1982)

Victoria M. Carpentier-Levy (Sparkman), daughter (born: September, 1985)

Geoffrey P. Carpentier-Levy, son (born: January, 1989)

**Books and Chapters**

Fabrikant JI, Frankel KA, Phillips MH, **Levy RP**: Stereotactic heavy charged-particle Bragg peak radiosurgery for intracranial arteriovenous malformations. In Edwards MSB, Hoffman HJ (eds): *Cerebral Vascular Diseases in Children and Adolescents*, pp. 389-409, Williams & Wilkins, Baltimore, 1989.

**Levy RP**, Fabrikant JI, Frankel KA, Phillips MH, Lyman JT: Charged-particle radiosurgery of the brain. *Neurosurg Clin North Am* 1:955-990, 1990.

Rodriguez A, **Levy RP**, Fabrikant JI: Experimental central nervous system injury from charged particles. In Gutin PH, Leibel SA, Sheline GE (eds): *Radiation Injury to the Nervous System*, pp. 149-182, Raven Press, New York, 1991.

**Levy RP**: *Oligodendroglial Response to Ionizing Radiation: Dose and Dose-rate Response*. Ph.D. Thesis, University of California, Berkeley, 1991.

- Fabrikant JI, **Levy RP**, Steinberg GK, Phillips MH, Frankel KA, Lyman JT, Marks MP, Silverberg GD: Charged-particle radiosurgery for intracranial vascular malformations. *Neurosurg Clin North Am* 3:99-139,1992.
- Lyman JT, Frankel KA, Phillips MH, **Levy RP**, Fabrikant JI: Radiation physics for particle beam radiosurgery. *Neurosurg Clin North Am* 3: 1-7, 1992.
- Fabrikant JI, **Levy RP**: Radiation therapy of pituitary tumors. In Selman WR (ed): *Neuroendocrinology. Concepts in Neurosurgery Series No.5*, pp. 367-393, Williams & Wilkins, Baltimore, 1992.
- Levy RP**, Lo EH, Fabrikant JI: Biologic basis for stereotactic radiosurgery. In Phillips MH (ed): *Physical Aspects of Stereotactic Radiosurgery*, pp. 189-238, Plenum Publishing, New York, 1993.
- Levy RP**, Fabrikant JI: Medical applications of stereotactic radiosurgery. In Phillips MH (ed): *Physical Aspects of Stereotactic Radiosurgery*, pp 239-278, Plenum Publishing, New York, 1993.
- Levy RP**, Fabrikant JI: Frankel KA: Particle-beam irradiation of the pituitary gland. In Alexander E, Loeffler JS, Lunsford LD (eds): *Stereotactic Radiosurgery*, pp. 157-165, McGraw-Hill, New York, 1993.
- Frankel KA, **Levy RP**, Fabrikant JI, Phillips MH: Heavy-charged-particle radiosurgery: Rationale and method. In Alexander E, Loeffler JS, Lunsford LD (eds): *Stereotactic Radiosurgery*, pp. 87-103, McGraw-Hill, New York, 1993.
- Steinberg GK, **Levy RP**, Marks MP, Fabrikant JI: Vascular malformations: Charged-particle radiosurgery. In Alexander E, Loeffler JS, Lunsford LD (eds): *Stereotactic Radiosurgery*, pp. 122-135, McGraw-Hill, New York, 1993.
- Levy RP**, Frankel KA, Steinberg GK: Radiosurgery with ion beams. In Linz U (ed): *Ion Beams in Tumor Therapy*, pp. 142-154, Chapman & Hall, London, 1995.
- Levy RP**, Fabrikant JI, Steinberg GK, Frankel KA: Charged-particle irradiation of intracranial lesions. In Wilkins RH, Rengachary SS (eds): *Neurosurgery. Second Edition*, pp. 1867-1886, McGraw-Hill, New York, 1996.
- Steinberg GK, Marks MP, **Levy RP**: Intracranial Arteriovenous Malformation: Therapeutic Options. In Batjer HH (ed), *Cerebrovascular Disease*, pp. 727-742, Lippincott-Raven Press, New York, 1997.
- Chang SD, Steinberg GK, **Levy RP**, Marks MP, Frankel KA, Shuster DL, Marcellus ML: Microsurgical resection of incompletely obliterated intracranial arteriovenous malformations following stereotactic radiosurgery. In Fukui M (ed): *Recent Progress in Cerebrovascular Surgery: Proceedings of the 5th International Workshop on Cerebrovascular Surgery*, Fukuoka, Japan, *Neurologia Medico- Chirurgica*, 38:200-207, 1998.

Steinberg GK, Marks MP, **Levy RP**, Fabrikant JI: Multimodality treatment of vascular malformations in functional brain areas, using stereotactic radiosurgery, embolization and microsurgery. In Yamada S (ed): *Arteriovenous Malformations in Functional Areas of the Brain*, pp.181-196, Futura Publishing, Armonk, NY, 1999.

Chang SD, **Levy RP**, Marks MP, Marcellus M, Steinberg GK: The Role of Radiosurgery in the Treatment of Giant Arteriovenous Malformations, pp. 42-53. In Kondziolka D (ed), *Radiosurgery* (Vol. 4), Karger, Basel, 2002.

Chang SD, **Levy RP**, Martin DP, Steinberg GK, Adler JR Jr.: Cavernous malformation radiosurgery. In: Pollock BE (ed): *The Technique and Evaluation of Contemporary Stereotactic Radiosurgery*. Futura Publishing Co., Inc., Armonk, New York, 2002, pp 139–153.

**Levy RP**: *Ride The Storms: Lessons of the Journey Taken on a Road Less Traveled*. (Autobiographical Memoirs); Lulu Press: Raleigh, NC, 2011.

## **Publications**

Marks MP, DeLaPaz RL, Fabrikant JI, Frankel KA, Phillips MH, **Levy RP**, Enzmann DR: Imaging of charged-particle stereotactic radiosurgery for intracranial vascular malformations. Part I. Therapeutic Results. *Radiology* 168:447-455, 1988.

Marks MP, DeLaPaz RL, Fabrikant JI, Frankel KA, Phillips MH, **Levy RP**, Enzmann DR: Imaging of charged-particle stereotactic radiosurgery for intracranial vascular malformations. Part II. Complications. *Radiology* 168:457-462, 1988.

**Levy RP**, Fabrikant JI, Frankel KA, Phillips MH, Lyman JT: Stereotactic heavy-chargedparticle Bragg peak radiosurgery for the treatment of intracranial arteriovenous malformations in childhood and adolescence. *Neurosurgery* 24:841-852,1989.

Fabrikant JI, **Levy RP**, Phillips MH, Frankel KA, Lyman JT: Neurosurgical applications of ion beams. *Nucl Instrum Methods Phys Res B40/41*: 1376-1384, 1989.

Phillips MH, Frankel KA, Lyman JT, Fabrikant JI, **Levy RP**: Heavy-charged-particle stereotactic radiosurgery: Cerebral angiography and CT in the treatment planning of intracranial vascular malformations. *Int J Radiat Oncol BioI Phys* 17:419-426, 1989.

Fabrikant JI, Frankel KA, Phillips MH, **Levy RP**, Lyman JT: Heavy-charged-particle Bragg peak radiosurgery for intracranial arteriovenous malformations. In *Proceedings of EULIMA Workshop, Potential Value of Light Ion Beam Therapy*, pp 233-245, Nice, France, 1989.

Phillips MH, Frankel KA, Lyman JT, Fabrikant JI, **Levy RP**: Comparison of different radiation types and irradiation geometries in stereotactic radio surgery. In *Proceedings of EULIMA Workshop, Potential Value of Light Ion Beam Therapy*, pp 271-294, Nice, France, 1989.

**Levy RP**, Fabrikant JI, Lyman JT, Frankel KA, Phillips MH, Lawrence JH, Tobias CA: Clinical results of stereotactic helium-ion radiosurgery of the pituitary gland at Lawrence Berkeley

Laboratory. In Proceedings of *The International Workshop on Proton and Narrow Photon Beam Therapy*, pp. 38-42, Oulu, Finland, 1989.

Fabrikant JI, **Levy RP**, Frankel KA, Phillips MH, Lyman JT, Chuang FYS, Steinberg GK, Marks MP: Stereotactic helium-ion radiosurgery for the treatment of intracranial arteriovenous malformations. In Proceedings of *The International Workshop on Proton and Narrow Photon Beam Therapy*, pp. 33-37, Oulu, Finland, 1989.

Lyman, JT, Phillips MH, Frankel KA, Fabrikant JI, **Levy RP**: Heavy charged-particle beams for stereotactic radiosurgery. In Proceedings of *The International Workshop on Proton and Narrow Photon Beam Therapy*, pp. 43-47, Oulu, Finland, 1989.

Fabrikant JI, **Levy RP**, Phillips MH, Frankel KA, Lyman JT, Steinberg GK, DeLaPaz RL, Marks MP, Chuang FYS: Clinical results of stereotactic heavy-charged-particle radiosurgery for intracranial arteriovenous malformations. Lawrence Berkeley Laboratory Report No. 28252, 1989.

Phillips MH, Frankel KA, Lyman JT, Fabrikant JI, **Levy RP**: Comparison of different radiation types and irradiation geometries in stereotactic radio surgery. *Int J Radiat Oncol Bioi Phys* 18:211-220, 1990.

Steinberg GK, Fabrikant JI, Marks MP, **Levy RP**, Frankel KA, Phillips MH, Shuer LM, Silverberg GD: Stereotactic heavy-charged-particle Bragg-peak radiation for intracranial vascular malformations. *N Engl J Med* 323:96-101,1990.

Phillips MH, Frankel KA, Tjoa T, Lyman JT, Fabrikant JI, **Levy RP**: Effects of target size on the comparison of photon and charged particle dose distributions. In Proceedings of *The International Heavy Particle Therapy Workshop*, Paul Scherrer Institute, pp 24-26, Villigen, Switzerland, 1990.

Fabrikant JI, **Levy RP**, Steinberg GK, Silverberg GD, Frankel KA, Phillips MH, Lyman JT: Heavy-charged-particle radiosurgery for intracranial vascular disorders: Clinical results of 350 patients. In Proceedings of *The 2nd European Particle Accelerator Conference*, pp S61-S63, Nice, France, 1990.

**Levy RP**, Fabrikant JI, Frankel KA, Phillips MH, Lyman JT, Lawrence JH, Tobias CA: Heavy-charged-particle radiosurgery of the pituitary gland: Clinical results of 840 patients. In Proceedings of *The 2nd European Particle Accelerator Conference*, pp. S64-S66, Nice, France, 1990.

Lo EH, Fabrikant JI, **Levy RP**, Phillips MH, Frankel KA, Alpen EL: An experimental compartmental flow model for assessing the hemodynamic response of intracranial arteriovenous malformations to stereotactic radiosurgery. *Neurosurgery* 28:251-259, 1991.

Phillips MH, Kessler M, Chuang FYS, Frankel KA, Lyman JT, Fabrikant JI, **Levy RP**: Image correlation of MRI and CT in treatment planning for radiosurgery of intracranial vascular malformations. *Int J Radiat Oncol BioI Phys* 20:881-889, 1991.

Steinberg GK, Fabrikant JI, Marks MP, **Levy RP**, Frankel KA, Phillips MH, Shuer LM, Silverberg GD: Stereotactic helium ion Bragg peak radiosurgery for intracranial arteriovenous



malformations: Detailed clinical and neuroradiologic outcome. *Stereotact Funct Neurosurg* 57:36-49, 1991.

Steinberg GK, **Levy RP**, Fabrikant JI, Frankel KA, Phillips MH, Marks MP: Stereotactic helium ion Bragg peak radiosurgery for angiographically occult intracranial vascular malformations. *Stereotact Funct Neurosurg* 57:64-71, 1991.

**Levy RP**, Fabrikant JI, Frankel KA, Phillips MH, Lyman JT, Lawrence JH, Tobias CA: Heavy-charged-particle radiosurgery of the pituitary gland: Clinical results of 840 patients. *Stereotact Funct Neurosurg* 57:22-35, 1991.

Fabrikant JI, **Levy RP**, Steinberg GK, Phillips MH, Frankel KA, Lyman JT, Marks MP, Silverberg GD: Stereotactic charged-particle Bragg peak radiosurgery for the treatment of intracranial arteriovenous malformations. *Stereotact Funct Neurosurg* 57:50-63, 1991.

**Levy RP**, Fabrikant JI, Frankel KA, Phillips MH, Steinberg GK, Marks MP, DeLaPaz RL, Chuang FYS: Clinical-radiological evaluation of sequelae of stereotactic radiosurgery for intracranial arteriovenous malformations. In Steiner L (ed): *Radiosurgery Baselines and Trends*, Raven Press, New York, 1992, pp. 209-220.

**Levy RP**, Fabrikant JI, Phillips MH, Frankel KA, Steinberg GK, Marks MP, DeLaPaz RL, Chuang FYS, Lyman JT: Clinical results of stereotactic heavy-charged-particle radiosurgery for intracranial angiographically occult vascular malformations. In Steiner L (ed): *Radiosurgery Baselines and Trends*, Raven Press, New York, 1992, pp. 221-228.

**Levy RP**, Fabrikant JI, Lyman JT, Frankel KA, Phillips MH, Lawrence JH, Tobias CA: Clinical results of stereotactic heavy-charged-particle radiosurgery of the pituitary gland. In Steiner L (ed): *Radiosurgery. Baselines and Trends*, Raven Press, New York, 1992, pp. 149-154.

Frankel KA, Phillips MH, Lyman JT, Chuang FYS, Fabrikant JI, **Levy RP**, Rosander K: Treatment planning for stereotactic heavy-charged-particle radiosurgery of the brain. In Steiner L (ed): *Radiosurgery: Baselines and trends*, Raven Press, New York, 1992, pp. 75- 83.

Rosander K, Frankel KA, Cerda H, Phillips MH, Lo E, Fabrikant I, Fabrikant JI, **Levy RP**: DNA damage in mammalian cells after heavy-ion irradiation. In Steiner L (ed): *Radiosurgery: Baselines and Trends*, Raven Press, New York, 1992, pp. 121-127.

Fabrikant JI, **Levy RP**, Steinberg GK, Phillips MH, Frankel KA, Silverberg GD: Stereotactic charged-particle radiosurgery: Clinical results of treatment of 1200 patients with intracranial arteriovenous malformations and pituitary disorders. *Clin Neurosurg* 38:472- 492, 1992.

**Levy RP**, Fabrikant JI, Steinberg GK, Phillips MH, Frankel KA, Marks MP: Adverse clinical sequelae and complications following stereotactic charged-particle radiosurgery for intracranial arteriovenous malformations. In Lunsford LD (ed): *Stereotactic Radiosurgery Update*, pp. 195-201, Elsevier, New York, 1992.

**Levy RP**, Steinberg GK, Fabrikant JI, Frankel KA, Phillips MH, Marks MP: Stereotactic heavy-charged-particle radiosurgery for angiographically occult vascular malformations. In Lunsford LD (ed): *Stereotactic Radiosurgery Update*, pp. 177-183, Elsevier, New York, 1992.

- Fabrikant JI, **Levy RP**, Lyman JT, Lawrence JH, Tobias CA, Born JL, Phillips MH, Frankel KA: Stereotactic heavy-charged-particle radiosurgery for pituitary adenomas. In Lunsford LD (ed): *Stereotactic Radiosurgery Update*, pp 313-320, Elsevier, New York, 1992.
- Fabrikant JI, Steinberg GK, **Levy RP**, Phillips MH, Frankel KA, Lyman JT, Marks MP: Heavy-charged-particle radiosurgery of intracranial arteriovenous malformations: Clinical results and future research directions. In Lunsford LD (ed): *Stereotactic Radiosurgery Update*, pp. 103-111, Elsevier, New York, 1992.
- Phillips MH, Frankel KA, Lyman JT, **Levy RP**, Fabrikant JI: Charged particles: Bridging the gap between radiosurgery and radiotherapy. In Lunsford LD (ed): *Stereotactic Radiosurgery Update*, pp. 47-53, Elsevier, New York, 1992.
- Rosander K, Fabrikant JI, Frankel KA, Cerda H, Phillips MH, Fabrikant IB, **Levy RP**: DNA damage in mammalian brain cells following charged-particle irradiation: Implications for late radiation injury following stereotactic radiosurgery. In Lunsford LD (ed): *Stereotactic Radiosurgery Update*, pp. 295-300, Elsevier, New York, 1992.
- Levy RP**, Fabrikant JI, Alpen EL: Oligodendrocyte response to ionizing radiation: Evidence for biologic defense mechanisms in mammalian brain. In Sugahara T, Sagan LA, Aoyama T (eds): *Proceedings of International Conference on Low Dose Irradiation and Biologic Defense Mechanisms*, Kyoto, Japan, pp. 167-170, Elsevier Publishers, Amsterdam, 1992.
- Marks MP, Lane B, Steinberg GK, Fabrikant JI, **Levy RP**, Frankel KA, Phillips, MH: Endovascular treatment of cerebral AVMs following radiosurgery. *Am J Neuroradiol* 14:297-303, 1993.
- Levy RP**, Fabrikant JI, Frankel KA: Particle-beam irradiation of the pituitary gland. In Alexander E, Loeffler JS, Lunsford LD (eds): *Stereotactic Radiosurgery*, pp. 157-165, McGraw-Hill, New York, 1993.
- Frankel KA, **Levy RP**, Fabrikant JI, Phillips MH: Heavy-charged-particle radiosurgery: Rationale and method. In Alexander E, Loeffler JS, Lunsford LD (eds): *Stereotactic Radiosurgery*, pp. 87-103. McGraw-Hill, New York, 1993.
- Frankel KA, Steinberg GK, **Levy RP**, Marks MP, Lane B: Histologic response of helium-ion irradiated human endothelial cells. *Proceedings of The 1st International Workshop on Accelerator-Based Neutron Sources for Boron Neutron Capture Therapy*, pp. 177-196, Jackson, WY, 1994.
- Levy RP**, Schulte RWM, Frankel KA, Steinberg GK, Marks MP, Lane B, Heilbronn LH, Meinass HJ, Galindo RA, Slater JD, Slater JM: Computed tomography slice-by-slice target volume delineation for stereotactic proton irradiation of large intracranial arteriovenous malformations: An iterative approach using angiography, computed tomography, and magnetic resonance imaging. *Int J Radiat Oncol Biol Phys* 35:555-564, 1996.
- Levy RP**, Frankel KA, Ricciardi RA, Rhoades AE, Xu LL: Stereotactic helium-ion irradiation for Cushing's disease, prolactinoma and non-secreting adenoma: 36 years experience at Lawrence Berkeley Laboratory. In Kondziolka (ed): *Radiosurgery*, 1995, pp. 66-74, Karger, Basel, 1996.

- Steinberg GK, Chang SD, **Levy RP**, Marks MP, Frankel KA, Marcellus M: Surgical resection of large incompletely treated intracranial arteriovenous malformations following stereotactic radiosurgery. *J Neurosurg* 84:920-928, 1996.
- Chang SD, Shuster DL, Steinberg GK, **Levy RP**, Frankel KA: Stereotactic radiosurgery of arteriovenous of malformations: Pathologic changes in resected tissue. *Clin Neuropathol* 16:111-116, 1997.
- Gewirtz RJ, Steinberg GK, Crowley R, **Levy RP**: Pathologic changes in surgically resected angiographically occult vascular malformations after radiation. *Neurosurgery* 42:738-743, 1998.
- Thompson RC, Steinberg GK, **Levy RP**, Marks MP: Management of patients with arteriovenous malformations and associated aneurysms. *Neurosurgery* 43:202-212,1998.
- Chang SD, **Levy RP**, Adler JR, Martin DP, Krakovitz PR, Steinberg GK: Stereotactic radiosurgery of angiographically occult vascular malformations: 14-year experience . *Neurosurgery* 43:213-220,1998.
- Chang SD, Steinberg GK, **Levy RP**, Marks MP, Frankel KA, Shuster DL, Marcellus ML: Microsurgical resection of incompletely obliterated intracranial arteriovenous malformation following stereotactic radiosurgery. *Neurologia Medico-Chirurgica* 38 (suppl): 200-207, 1998.
- Chang SD, **Levy RP**, Adler JR Jr., Martin DP, Krakovitz PR, Steinberg GK: Stereotactic radiosurgery of angiographically occult arteriovenous malformations: Fourteen year experience. *Neurosurgery* 43(2):213-221, 1998.
- Levy RP**, Schulte RWM, Slater JD, Miller DW, Slater JM: Stereotactic Radiosurgery: The role of charged particles. *Acta Oncologica* 38(2): 165-169, 1999.
- Vatnitsky SM, Miller DW, Moyers MF, **Levy RP**, Schulte RW, Slater JD, Slater JM: Dosimetry techniques for narrow proton beam radiosurgery. *Phys Med Biol* 44:2789-2801, 1999.
- Chang, SD, **Levy, RP**, Marks, MP, Marcellus M., Steinberg, GK: The role of radiosurgery in the treatment of giant arteriovenous malformations. 5th Meeting of the International Stereotactic Radiosurgery Society (Karger), 2002: 42–53.
- Fleetwood IG, Marcellus ML, **Levy RP**, Marks MP, and Steinberg GK: Deep arteriovenous malformations the basal ganglia and thalamus: natural history. *J Neurosurg*, Apr 2003; 98(4): 747-50.
- Chang SD, Marcellus ML, Marks MP, **Levy RP**, Do HM, and Steinberg GK: Multimodality treatment of giant intracranial arteriovenous malformations. *Neurosurgery*, Jul 2003; 53(1): 1-11; discussion 11-3.
- Fleetwood IG, Marcellus ML, **Levy RP**, Marks MP, Steinberg, GK: Deep arteriovenous malformations of the basal ganglia and thalamus: natural history. *Neurosurgery* 98 (4): 747-750, 2003.

- Slater JD, Rossi Jr CJ, Yonemoto LT, Bush DA, Jabola BR, **Levy RP**, Grove RI, Preston W, and Slater JM: Proton therapy for prostate cancer: the initial Loma Linda University experience. *Int J Radiat Oncol Biol Phys*, Jun 2004; 59(2): 348-52.
- Rossi Jr CJ, Slater JD, Yonemoto LT, Jabola BR, Bush DA, **Levy RP**, Grove R, and Slater JM: Influence of patient age on biochemical freedom from disease in patients undergoing conformal proton radiotherapy of organ-confined prostate cancer. *Urology*, Oct 2004; 64(4): 729-32.
- Luu QT, **Levy RP**, Miller DW, Shahnazi K, Yonemoto LT, Slater JM, and Slater JD: A clinical interactive technique for MR-CT image registration for target delineation of intracranial tumors. *Technol Cancer Res Treat*, Jun 2005; 4(3): 275-81.
- Sinclair J, Marks MP, **Levy RP**, Adler Jr JR, Chang SD, Lopez JR, Do HM, Bell-Stephens TE, Lim M, and Steinberg GK: Visual field preservation after curative multi-modality treatment of occipital lobe arteriovenous malformations. *Neurosurgery*, Oct 2005; 57(4): 655-67; discussion 655-67.
- Levy RP**: PET-CT: Evolving role in 3-D radiation therapy. *Technol Cancer Res Treat*, Apr 2006; 5(2): 101-7.
- Massengale JL, **Levy RP**, Marcellus M, Moes G, Marks MP, and Steinberg GK: Outcomes of surgery for resection of regions of symptomatic radiation injury after stereotactic radiosurgery for arteriovenous malformations. *Neurosurgery*, Sep 2006; 59(3): 553-60; discussion 553-60.
- Chang SD, Marcellus ML, Marks MP, **Levy RP**, Do HM, and Steinberg GK: Multimodality treatment of giant intracranial arteriovenous malformations. *Neurosurgery*, Jul 2007; 61(1 Suppl): 432-42; discussion 442-4.
- Levy RP**: Evolving role of hadron irradiation: Potential and risks of hadrons heavier than protons. *Nucl Instrm Meth Phys Res B (American Institute of Physics Conference Proceedings: Applications of Accelerators in Research and Industry: 19th International Conference, CAARI 2006)*, 2007; 261: 763-767.
- Levy RP**: PET-CT: Evolving Role in Hadron Therapy. *Nucl Instrm Meth Phys Res B (American Institute of Physics Conference Proceedings: Applications of Accelerators in Research and Industry: 19th International Conference, CAARI 2006)*, 2007; 261: 782-785.
- Kelly ME, Guzman R, Sinclair J, Bell-Stephens TE, Bower R, Hamilton S, Marks MP, Do HM, Chang SD, Adler JR, **Levy RP**, and Steinberg GK: Multimodality treatment of posterior fossa arteriovenous malformations. *J Neurosurg*, Jun 2008; 108(6): 1152-61.
- Levy RP**, Blakely EA, Chu WT, Coutrakon GB, Hug EB, Kraft G, and Tsujii H: The Current Status and Future Directions of Heavy Charged Particle Therapy in Medicine. *American Institute of Physics Conference Proceedings (Applications of Accelerators in Research and Industry: 20th International Conference, CAARI 2008)*, 2009; 1099: 410-425.
- Darsaut TE, Guzman R, Marcellus ML, Edwards MS, Tian L, Do HM, Chang SD, **Levy RP**, Adler JR, Marks MP, Steinberg GK: Management of Pediatric Intracranial Arteriovenous Malformations: Experience with Multimodality Therapy. *Neurosurgery* 69 (3): 540-556, 2011.

Giap FN, **Levy RP**, Hiap HB: Summary of ongoing clinical protocols for proton and heavier-ion therapy. American Institute of Physics Conference Proceedings (Applications of Accelerators in Research and Industry: 22nd International Conference, CAARI 2012), 2013; 1525: 344-346.

**Levy RP**, Schulte RWM: Stereotactic radiosurgery with charged-particle beams: technique and clinical experience. *Transl Cancer Res*, 2012; 1(3): 159-172.

Giap FN, Giap HB, Mazal A, Jermann M, Giap B, **Levy RP**, Blomquist E: Clinical trials for charged particle beam therapy. *Transl Cancer Res*, 2013; 1(4): 276-278.

Madhugiri VS, Teo MC, Westbroek EM, Chang SD, Marks MP, Do HM, **Levy RP**, Steinberg GK: Multimodal management of arteriovenous malformations of the basal ganglia and thalamus: Factors affecting obliteration and outcome. *J Neurosurgery* 131 (2): 410-419, 2019.

### **Abstracts and Presentations**

Fabrikant JI, Frankel KA, Phillips MH, **Levy RP**, Lyman JT, Foster ML: Heavy charged particle Bragg peak stereotactic radiosurgery for intracranial arteriovenous malformations. *Third Workshop on Heavy Charged Particles in Biology and Medicine*, GSI, Darmstadt, Germany, 1987.

Marks MP, DeLaPaz RL, **Levy RP**, Fabrikant JI, Frankel KA, Phillips MH, Enzmann DR: Imaging of charged-particle stereotactic radiosurgery for intracranial vascular malformations. *The Radiological Society of North America, 73rd Assembly*, Chicago IL, 1987.

Steinberg GK, Silverberg GD, Fabrikant JI, Shuer LM, Frankel KA, Phillips MH, **Levy RP**, Marks MP: Preliminary results of heavy particle radiation for arteriovenous malformations of the brain. *American Association of Neurological Surgeons Program* (Toronto, Canada) 56:180,1988.

Steinberg GK, Silverberg GD, Fabrikant JI, Shuer LM, Frankel KA, Phillips MH, **Levy RP**, Marks MP: Preliminary results of heavy particle radiation for arteriovenous malformations of the brain. *13th International Joint Conference on Stroke and Cerebral Circulation*, San Diego CA, *Stroke* 19:149, 1988.

Steinberg GK, Silverberg GD, Fabrikant JI, Shuer LM, Frankel KA, Phillips MH, **Levy RP**, Marks MP: Preliminary results of heavy particle radiation for arteriovenous malformations of the brain. *Neurosurgery* 22:791, 1988.

Frankel KA, Phillips MH, Lyman JT, Fabrikant JI, **Levy RP**: Physical factors involved in response of brain to stereotactic heavy charged particle radiosurgery. *World Congress on Medical Physics and Biomedical Engineering*, San Antonio TX, 1988.

Phillips MH, Frankel KA, Lyman JT, Fabrikant JI, **Levy RP**: Comparison of various radiation modalities for use in stereotactic radiosurgery. *World Congress on Medical Physics and Biomedical Engineering*, San Antonio TX, 1988.

- Phillips MH, Frankel KA, Lyman JT, Fabrikant JI, **Levy RP**: Comparison of different radiation types and irradiation geometries in stereotactic radiosurgery. *EULIMA Workshop on The Potential Value of Light Ion Beam Therapy*, Nice, France, 1988.
- Fabrikant JI, Phillips MH, **Levy RP**, Frankel KA, Lyman JT: Results of heavy charged particle Bragg peak stereotactic radiosurgery of intracranial arteriovenous malformations. *EULIMA Workshop on the Potential Value of Light Ion Beam Therapy* Nice, France, 1988.
- Fabrikant JI, Frankel KA, Phillips MH, **Levy RP**: Neurosurgical applications of ion beams. Conference on the Application of Accelerators in Research and Industry, American Physical Society, Denton TX, 1988.
- Phillips MH, Frankel KA, Lyman JT, Fabrikant JI, **Levy RP**: Dose comparisons of photons and charged particles in stereotactic radiosurgery. *American Physical Society*, San Francisco CA, 1989.
- Levy RP**, Fabrikant JI, Frankel KA, Phillips MH, Steinberg GK, Marks MP, Chuang FYS: Clinical-radiological evaluation of sequelae of stereotactic radiosurgery. *Radiosurgery. A Neurosurgical Approach to Intracranial Lesions*, Charlottesville VA, 1989.
- Levy RP**, Fabrikant JI, Frankel KA, Phillips MH, Steinberg GK, Marks MP, Chuang FYS, Lyman JT: Clinical results of stereotactic radiosurgery for cryptic arteriovenous malformations. *Radiosurgery. A Neurosurgical Approach to Intracranial Lesions*, Charlottesville VA, 1989.
- Fabrikant JI, **Levy RP**, Phillips MH, Frankel KA, Lyman JT, Steinberg GK, Marks MP, Chuang FYS: Clinical results of stereotactic heavy-charged-particle Bragg peak radiosurgery for intracranial arteriovenous malformations. *Radiosurgery. A Neurosurgical Approach to Intracranial Lesions*, Charlottesville VA, 1989.
- Frankel KA, Phillips MH, Lyman JT, Fabrikant JI, **Levy RP**, Chuang FYS: Treatment planning for stereotactic radiosurgery of intracranial arteriovenous malformations. *Radiosurgery. A Neurosurgical Approach to Intracranial Lesions*, Charlottesville VA, 1989.
- Rosander K, Frankel KA, Phillips MH, Fabrikant JI, **Levy RP**: DNA damage in mammalian cells following heavy-ion irradiation. *Radiosurgery. A Neurosurgical Approach to Intracranial Lesions*, Charlottesville VA, 1989.
- Lo EH, Frankel KA, Poljak A, Phillips MH, Fabrikant JI, **Levy RP**, Woodruff K, Brennan K, DeLaPaz RL, Valk P: Focal heavy charged particle irradiation of the mammalian cortex: Temporal pattern of changes followed by magnetic resonance imaging and positron emission tomography. *Radiosurgery. A Neurosurgical Approach to Intracranial Lesions*, Charlottesville VA, 1989.
- Levy RP**, Fabrikant JI, Lyman JT, Frankel KA, Phillips MH, Lawrence JH, Tobias CA: Clinical results of stereotactic helium-ion radiosurgery of the pituitary gland at

Lawrence Berkeley Laboratory. *International Workshop on Proton and Narrow Photon Beam Therapy*, Oulu, Finland, 1989.

Fabrikant JI, **Levy RP**, Frankel KA, Phillips MH, Lyman JT, Chuang FYS, Steinberg GK, Marks MP: Stereotactic helium-ion radiosurgery for the treatment of intracranial arteriovenous malformations. *International Workshop on Proton and Narrow Photon Beam Therapy*, Oulu, Finland, 1989.

Lyman JT, Phillips MH, Frankel KA, Fabrikant JI, **Levy RP**: Heavy charged-particle beams for stereotactic radiosurgery. *International Workshop on Proton and Narrow Photon Beam Therapy*, Oulu, Finland, 1989.

**Levy RP**, Fabrikant JI, Steinberg GK, Frankel KA, Phillips MH, Marks MP, Chuang FYS. Stereotactic small field irradiation radiosurgery. Clinical studies: Results and complications. American Society for Therapeutic Radiology and Oncology, San Francisco CA, 1989 (invited paper).

Phillips MH, Frankel KA, Tjoa T, Lyman JT, Fabrikant JI, **Levy RP**: Effects of target size on the comparison of photon and charged particle dose distributions. International Heavy Particle Therapy Workshop, Paul Scherrer Institute, Villigen, Switzerland, 1989.

Lo EH, Frankel KA, Phillips MH, **Levy RP**, Fabrikant JI, Lyman JT: Focal heavy charged particle beams as neural probes of central nervous system physiology and pathology. *Society for Neuroscience*, Phoenix AZ, 1989.

Steinberg GK, **Levy RP**, Fabrikant JI, Frankel KA, Phillips MH, Marks MP: Stereotactic heavy-charged-particle Bragg peak radiosurgery for angiographically occult intracranial vascular malformations. 15th International Joint Conference on Stroke and Cerebral Circulation, Orlando FL, 1990.

Marks MP, Steinberg GK, Fabrikant JI, **Levy RP**, Frankel KA, Phillips MH: Clinical and radiological follow-up of patients with intracranial arteriovenous malformations treated with heavy particle Bragg peak radiosurgery. *American Society of Neuroradiology*, Los Angeles, CA, 1990.

Lo E, DeLaPaz RL, Frankel KA, Phillips MH, **Levy RP**, Poljak A, Fabrikant JI: MRI and PET of delayed CNS radiation injury in an animal model. *American Society of Neuroradiology*, Los Angeles CA, 1990.

Valk PE, **Levy RP**, Frankel KA, Roos MS, Fabrikant JI, Budinger TF: Positron emission tomography for prediction of late radiation injury of the brain. *Society of Nuclear Medicine 37th Annual Meeting*, Washington DC, 1990.

Steinberg GK, **Levy RP**, Fabrikant JI, Frankel KA, Phillips MH, Marks MP: Stereotactic heavy-charged-particle Bragg peak radiosurgery for angiographically occult intracranial vascular malformations. *American Association of Neurological Surgeons*, Nashville TN, 58:318, 1990.

Lo EH, Frankel KA, Phillips MH, **Levy RP**, Fabrikant JI, DeLaPaz RL, Poljak A: Radiation-induced injury and repair in the brain. First World Congress. Safety in

Medical Practice. International Society for the Prevention of Iatrogenic Complications (in collaboration with the World Health Organization), Elsinore, Denmark, 1990.

Fabrikant JI, **Levy RP**, Steinberg GK, Frankel KA, Phillips MH, Lyman JT: Heavy-charged particle radiosurgery for intracranial vascular disorders: Clinical results of 350 patients. *EULIMA workshop, Potential Value of Light Ion Beam Therapy*, Nice, France, 1990.

**Levy RP**, Fabrikant JI, Frankel KA, Phillips MH, Lyman JT: Heavy-charged-particle radiosurgery for pituitary disorders and other intracranial lesions: Clinical results of 840 patients. *The 2nd European Particle Accelerator Conference*, Nice, France, 1990.

Frankel KA, Phillips MH, Lyman JT, Chuang FYS, Fabrikant JI, **Levy RP**, Rosander K, Lo EH: Treatment planning for stereotactic heavy-charged-particle radiosurgery of pituitary disorders. *The 2nd European Particle Accelerator Conference*, Nice, France, 1990.

**Levy RP**, Fabrikant JI, Lyman JT, Frankel KA, Phillips MH, Lawrence JH, Tobias CA: Stereotactic helium-ion radiosurgery of the pituitary gland: Clinical results in 840 patients. *Harvard Radiosurgery Update*, Chestnut Hill MA, 1990.

Fabrikant JI, **Levy RP**, Steinberg GK, Phillips MH, Frankel KA, Lyman JT, Marks MP, Silverberg GD: Stereotactic charged-particle Bragg peak radiosurgery for the treatment of intracranial arteriovenous malformations: I. Method, patient selection criteria, radiation dose and dose-searching protocols. *Harvard Radiosurgery Update*, Chestnut Hill MA, 1990.

Fabrikant JI, **Levy RP**, Steinberg GK, Frankel KA, Phillips MH, Lyman JT, Marks MP, Silverberg GD: Stereotactic charged-particle Bragg peak radiosurgery for the treatment of intracranial arteriovenous malformations: II. Follow-up protocol: Clinical and neuroradiologic results, complications and sequelae. *Harvard Radiosurgery Update*, Chestnut Hill MA, 1990.

Fabrikant JI, Phillips MH, Lo EH, Rosander K, **Levy RP**, Manley NB, Frankel KA: Stereotactic charged-particle Bragg peak radiosurgery for the treatment of intracranial arteriovenous malformations: IIL Research and future trends, clinical trails and comparison of results. *Harvard Radiosurgery Update*, Chestnut Hill MA, 1990.

Steinberg GK, **Levy RP**, Fabrikant JI, Frankel KA, Phillips MH, Marks MP: Stereotactic helium-ion Bragg peak radiosurgery for angiographically occult intracranial vascular malformations. *Harvard Radiosurgery Update*, Chestnut Hill MA, 1990.

Steinberg OK, Fabrikant JI, Marks MP, **Levy RP**, Frankel KA, Phillips MH, Shuer LM, Silverberg GD: Stereotactic helium-ion Bragg peak radiosurgery for intracranial arteriovenous malformations. *Harvard Radiosurgery Update*, Chestnut Hill MA, 1990.



- Levy RP**, Fabrikant JI, Steinberg GK, Frankel KA, Phillips MH, Lyman JT, Marks MP, Silverberg GD: Particle-beam radiosurgery. American Association of Neurological Surgeons, New Orleans LA, 1991 (invited paper).
- Levy RP**, Fabrikant JI, Steinberg GK, Frankel KA, Phillips MH, Marks MP, Lyman JT: Stereotactic heavy-charged-particle Bragg peak radiosurgery for the treatment of intracranial arteriovenous malformations in childhood and adolescence. *International Stereotactic Radiosurgery Symposium*, Pittsburgh PA, 1991.
- Levy RP**, Fabrikant JI, Steinberg GK, Phillips MH, Frankel KA, Lyman JT, Marks MP: Adverse clinical sequelae and complications following stereotactic charged- particle radiosurgery for intracranial arteriovenous malformations. *International Stereotactic Radiosurgery Symposium*, Pittsburgh PA, 1991.
- Levy RP**, Steinberg GK, Fabrikant JI, Frankel KA, Phillips MH, Marks MP: Stereotactic heavy-charged-particle radiosurgery for angiographically occult vascular malformations. *International Stereotactic Radiosurgery Symposium*, Pittsburgh PA, 1991.
- Levy RP**, Fabrikant JI, Lyman JT, Frankel KA, Phillips MH, Lawrence JH, Tobias CA: Stereotactic charged-particle irradiation of the pituitary gland: Experience in 840 patients. *International Stereotactic Radiosurgery Symposium*, Pittsburgh PA, 1991.
- Fabrikant JI, **Levy RP**, Steinberg GK, Phillips MH, Frankel KA, Marks MP, Silverberg GD: Stereotactic heavy charged-particle radiosurgery for intracranial arteriovenous malformations: Clinical results in 400 patients. *International Stereotactic Radiosurgery Symposium*, Pittsburgh PA, 1991.
- Phillips MH, Lyman JT, Frankel KA, **Levy RP**, Fabrikant JI: Physical aspects of charged particles in stereotactic radiosurgery. *International Stereotactic Radiosurgery Symposium*, Pittsburgh PA, 1991.
- Frankel KA, Phillips MH, Lyman JT, Fabrikant JI, **Levy RP**: Treatment planning for stereotactic heavy-charged-particle radiosurgery. *International Stereotactic Radiosurgery Symposium*, Pittsburgh PA, 1991.
- Lo EH, Fabrikant JI, Steinberg GK, Frankel KA, Phillips MH, **Levy RP**: Charged- particle effects on cerebrovascular flow dynamics: A arteriovenousmalformations. *International Stereotactic Radiosurgery Symposium*, Pittsburgh PA, 1991.
- Steinberg GK, **Levy RP**, Marks MP, Fabrikant JI: Surgical resection of intracranial arteriovenous malformations following Bragg-peak, helium-ion radiosurgery. *Congress of Neurological Surgeons Annual Meeting Program*, Orlando FL, 41:233, 1991.
- Steinberg GK, **Levy RP**, Marks MP, Fabrikant JI: Surgical resection of intracranial arteriovenous malformations following Bragg-peak, helium-ion radiosurgery. *Annual Meeting of Western Neurosurgical Society Program* 37:44, 1991.

- Levy RP**, Fabrikant JI, Steinberg GK, Frankel KA, Phillips MH, Marks MP, Force DA: Charged-particle radiosurgery for intracranial vascular malformations: Clinical results, sequelae and current directions. *Proton Therapy Co-operative Group* (PTCOG XVI), Vancouver, Canada, 1992.
- Levy RP**, Fabrikant JI, Alpen EL: Oligodendroglial response to ionizing radiation: Dose and dose-rate response. Third Annual Investigators' Meeting on Space Radiation Research, Houston, TX, 1992.
- Steinberg GK, Marks MP, **Levy RP**, Fabrikant JI: Radiosurgery and multimodality therapy for intracranial vascular malformations. *Management of Cerebrovascular Malformations*, Verona, Italy, 1:160, 1992.
- Levy RP**, Fabrikant JI, Alpen EL: Oligodendroglial response to ionizing radiation: Evidence for biologic defense mechanisms in mammalian brain. *International Conference on Low Dose Irradiation and Biologic Defense Mechanisms*, Kyoto, Japan, 1992.
- Levy RP**, Fabrikant JI, Alpen EL, Frankel KA: Oligodendroglial response to ionizing radiation: Dose and dose-rate response. *Proton Therapy Cooperative Group* (PTCOG XVII), Loma Linda, CA, 1992.
- Frankel KA, Brennan KM, Fabrikant JI, Gilbert JC, **Levy RP**, Lo EH, Steinberg GK, Woodruff KH: Delayed functional, radiologic and histologic changes in rabbit brain following helium-ion and X-irradiation. *Proton Therapy Cooperative Group* (PTCOG XVII), Loma Linda, CA, 1992.
- Frankel KA, Anderson BD, Baldwin AR, Elaasar M, Fabrikant JI, Gong W, Heilbronn L, Htun M, Jiang J, Keane D, **Levy RP**, McMahan MA, Madey R, Miller J, Rathbun WH, Scott A, Shao Y, Watson JW, Westfall GD, Yennello S, Zeitlin C, Zhang WM. A model to determine the neutron dose from heavy-charged-particle radiotherapy. *Proton Therapy Cooperative Group* (PTCOG XVII), Loma Linda, CA, 1992.
- Levy RP**, Frankel KA, Krakovitz PR, Fabrikant JI, Alpen EL: Oligodendroglial response to <sup>56</sup>Fe irradiation *in vitro*. *Fourth Annual Investigators' Meeting on Space Radiation Research*, Dallas, TX, 1993.
- Steinberg GK, Marks MP, **Levy RP**: Treatment of thalamic and basal ganglia AVMs. *Western Neurosurgical Society Annual Meeting*, San Diego, CA, 40:34, 1994.
- Frankel KA, Steinberg GK, **Levy RP**, Marks MP, Lane B: Histologic response of helium-ion irradiated human endothelial cells. First International Workshop on Accelerator-Based Neutron Sources for Boron Neutron Capture Therapy, Jackson, WY, 1994.
- Levy RP**, Schulte RWM, Frankel KA, Steinberg GK, Marks MP, Lane B, Slater JD, Slater JM: CT slice-by-slice target volume delineation for stereotactic proton irradiation of large intracranial arteriovenous malformations: An iterative approach using angiographic, CT and MRI data. *American Society for Therapeutic Radiology and Oncology, 36th Annual Meeting*, San Francisco, CA, 1994.

Slater JM, **Levy RP**, Steinberg GK, Schulte RWM, Frankel KA, Miller DA, Marks MP, Slater JD, Lane B, Heilbron L: A multi-institutional interactive network for stereotactic proton irradiation of intracranial arteriovenous malformations: Design, implementation and initial experience. *American Society for Therapeutic Radiology and Oncology, 36th Annual Meeting*, San Francisco, CA, 1994.

**Levy RP**, Frankel KA, Schulte RWM, Steinberg GK, Marks MP: Iterative target delineation for stereotactic irradiation of AVMs using angiography, CT and MRI. *American Association of Neurological Surgeons, 63rd Annual Meeting*, Orlando, FL, 63:95, 1995.

**Levy RP**: Radiosurgery spanning the millennium: The role of charged particles. *International Stereotactic Radiosurgery Society, 2nd Congress*, Boston, MA, 1995.

**Levy RP**, Frankel KA, Ricciardi RA, Rhoades AE: Stereotactic helium-ion irradiation for Cushing's disease, prolactinoma and non-secreting adenoma: 36 years experience at Lawrence Berkeley Laboratory. *International Stereotactic Radiosurgery Society, 2nd Congress*, Boston MA, 1995.

Chang SD, Steinberg GK, **Levy RP**, Marks MP, Frankel KA: Surgical resection of large, complex, intracranial arteriovenous malformations following stereotactic radiosurgery. *International Stereotactic Radiosurgery Society, 2nd Congress*, Boston, MA, 2:29, 1995.

Steinberg GK, Marks MP, **Levy RP**, Frankel KA: Multimodality treatment of thalamic AVMs using radiosurgery, embolization and microsurgery. *International Stereotactic Radiosurgery Society, 2nd Congress*, Boston, MA, 2:32, 1995.

Chang SD, Steinberg GK, **Levy RP**, Marks MP, Frankel KA: Surgical resection of large, complex intracranial arteriovenous malformations following stereotactic radiosurgery. *Annual Meeting of Congress of Neurological Surgeons Program 45*: 171-172, 1995.

Marks MP, Steinberg GK, Norbash AM, **Levy RP**: Multimodality treatment of basal ganglia and thalamic AVMs. *Annual Meeting of Western Neuroradiological Society*, Victoria, British Columbia, 1995.

**Levy RP**: The Loma Linda University Medical Center and Stanford University Medical Center collaborative A VM proton program: Historical background. *Proton Therapy Cooperative Group*, Detroit, MI, 1996.

**Levy RP**: Future steps toward a multi-institutional AVM proton treatment protocol. *Proton Therapy Cooperative Group*, Detroit, MI, 1996.

Gewirtz RJ, Crowley R, **Levy RP**, Steinberg GK: Pathologic changes in surgically resected angiographically occult vascular malformations after radiation. *Annual Meeting of the Joint Section of Cerebrovascular Surgery of the AANS and CNS Program 1*:139, 1996.

- Chang SD, Schuster DL, Steinberg GK, **Levy RP**, Frankel KA: Pathological changes in resected arteriovenous malformation following stereotactic radiosurgery. *Annual Meeting, American Association Neurological Surgeons Program* 64(1): 180, 1996.
- Gewirtz RJ, Crowley R, **Levy RP**, Steinberg GK: Pathological changes in surgically resected angiographically occult vascular malformations after radiation. *Annual Meeting, American Association Neurological Surgeons Program*: 64(2): 82, 1996.
- Levy RP**, Schulte RWM, Frankel KA, Steinberg GK, Marks MP, Lane B, Slater JD, Slater JM: CT slice-by-slice target-volume delineation for stereotactic proton irradiation of large intracranial arteriovenous malformations: An iterative approach using angiographic, CT and MRI data. *Proton Therapy Cooperative Group*, Detroit, MI, 1996.
- Levy RP**, Steinberg GK, Schulte RWM, Frankel KA, Miller DW, Marks MP, Slater JD, Lane B, Heilbron L, Slater JM: A multi-institutional interactive network for stereotactic proton irradiation of intracranial arteriovenous malformations: Design, implementation and initial experience. *Proton Therapy Cooperative Group*, Detroit, MI, 1996.
- Levy RP**, Schulte RWM, Frankel KA, Steinberg GK, Luchin YI, Miller DW, Marks MP, Slater JD, Lane B, Heilbro III L, Slater JM: A multi-institutional interactive network for proton radiosurgery of intracranial A VMs: Design, implementation, and initial experience. *LINAC Radiosurgery - 1996*, Lake Buena Vista, FL, 1996.
- Levy RP**, Schulte RWM, Iacono R, Vatnitsky S, Moyers M, Miller D, Slater JD, Slater JM: Functional radiosurgery with proton beams: Background, rationale, and development. *Proton Therapy Cooperative Group*, Boston, MA, 1997.
- Schulte RWM, **Levy RP**, Iacono R, Vatnitsky S, Moyers M, Miller D, Slater JD, Slater JM: Functional radiosurgery with proton beams. *Free Electron Laser Conference*, Nashville, TN, 1997.
- Levy RP**, Organizer: Workshop on the Development of Stereotactic Proton Radiosurgery for Functional Disorders at Loma Linda University Medical Center. Loma Linda, CA, 1997.
- Levy RP**, Schulte RWM, Frankel KA, Steinberg GK, Marks MP, Lane B, Slater JD, Slater JM. Stereotactic proton beam therapy of AVMs: Results of the first three years. *Proton Therapy Cooperative Group*, Boston, MA, 1997.
- Levy RP**: Stereotactic radiosurgery: The role of protons. Long Beach Memorial Hospital, Long Beach, CA, 1997 (invited paper).
- Levy RP**: Stereotactic radiosurgery: The role of charged particles. *Swedish Society of Oncology Autumn Meeting*, Gavle, Sweden, 1997 (invited paper).
- Levy RP**: Stereotactic radiosurgery: The role of charged particles. University of Uppsala, Sweden, 1997 (invited paper).

Thompson RC, Steinberg, GK, **Levy RP**, Marks MP: The management of patients with arteriovenous malformations and associated intracranial aneurysms. *Annual Meeting, Western Neurosurgical Society Program* 43:7, 1997.

Chang SD, **Levy RP**, Krakovitz P, Adler JR, Steinberg GK: Radiosurgery of angiographically occult vascular malformations. Annual Meeting, Congress of Neurological Surgeons Program 47:328-239, 1997.

**Levy RP**: Stereotactic radiosurgery: The role of protons. *Proton Therapy Symposium*. Universidad La Salle, Mexico City, Mexico, 1998 (invited paper).

**Levy RP**: Stereotactic radiosurgery: The role of protons. *Proton Therapy Symposium*. Universidad Autonoma de Guadalajara, Guadalajara, Mexico, 1998 (invited paper).

**Levy RP**: Stereotactic radiosurgery: The role of protons. *Clinical Research Utilizing Proton Beam Irradiation*, Society of Southern California Clinical Research Professionals, Loma Linda, CA, 1998 (invited paper).

**Levy RP**: Stereotactic proton radiosurgery: Status of the LLUMC program. *Proton Therapy Cooperative Group*, Loma Linda, CA, 1998.

Chang SD, **Levy RP**, Adler JR, Martin DP, Steinberg GK: Treatment of angiographically occult vascular malformations with stereotactic radiosurgery. *J Neurosurg* 88: 201A, 1998.

Steinberg GK, Cockroft KM, Bell TE, Marks MP, **Levy RP**, Adler JR: Multidisciplinary treatment of posterior fossa pial A VMs. Annual Meeting, Western Neurosurgical Society Program 44:23, 1998.

Chang SD, **Levy RP**, Adler JR Jr., Steinberg GK: Treatment of angiographically occult vascular malformations with stereotactic radiosurgery. *Annual Joint Meeting of the AANS/CNS Section of Cerebrovascular Surgery and American Society of Interventional and Therapeutic Neuroradiology Meeting Program*. 3 :80, 1998.

Stoodley M, Cockroft K, Bell T, Marks M, **Levy R**, Adler J, Steinberg G: Multidisciplinary treatment of posterior fossa arteriovenous malformations. *J Neurosurg* 90: 203A, 1999.

Cockroft K, Bell TE, Marks MP, **Levy RP**, Adler JR, Steinberg GK: Multidisciplinary treatment of pial AVMs of the posterior fossa. *Annual Meeting, American Association Neurological Surgeons Program* 67:34, 1999.

Chang SD, Stoodley MA, Marks MP, **Levy RP**, Adler JR, Steinberg GK: Treatment of brainstem arteriovenous malformations using a multi-modality approach. *Annual Meeting, Congress of Neurological Surgeons Program* 49:470-471, 1999.

**Levy RP**: Proton Therapy at Loma Linda Medical Center. *Cedars-Sinai Medical Center Clinical Neuroscience Lecture Series*, Los Angeles, 1999 (invited paper).

- Chang SD, Marks MP, Adler JR, **Levy RP**, Lopez JR, Steinberg GK: Treatment of giant AVMs by using multi-modality therapy. *J Neurosurg* 92:198, 2000.
- Chang SD, Lopez JR, **Levy RP**, Marks MP, Steinberg GK: The treatment of giant intracranial arteriovenous malformations using multi-modality therapy. *Stroke* 31:324, 2000.
- Chang SD, Lopez JR, Marks MP, **Levy RP**, Adler JR, Steinberg GK: Treatment of intracranial arteriovenous malformations in the elderly population. *Stroke* 31:325, 2000.
- Chang SD, **Levy RP**, Marks MP, Steinberg GK: Multimodality treatment of giant intracranial AVMs. *J Neurosurg* 92:554, 2000.
- Levy RP**: Proton beam irradiation of benign targets. *Proton Therapy Cooperative Group*, Uppsala, Sweden, 2000 (invited paper).
- Fleetwood IG, Marks MP, **Levy RP**, Marcellus M, Steinberg GK: Multi-modal treatment of basal ganglia and thalamus arteriovenous malformations. *Annual Meeting American Association Neurological Surgeons Program* 69:96, 2001.
- Fleetwood IG, Marcellus ML, **Levy RP**, Marks MP, Steinberg GK: Natural history of AVMs of the basal ganglia and thalamus. *J Neurosurg* 96:175A, 2002.
- Fleetwood IG, Marks MP, **Levy RP**, Marcellus ML, Adler JR, Chang SD, Do HM, Steinberg GK: Multimodal treatment of basal ganglia and thalamus AVMs. *J Neurosurg* 96:183A, 2002.
- Chang SD, **Levy RP**, Marks MP, Do HM, Marcellus ML, Steinberg GK: Multimodality treatment of giant intracranial arteriovenous malformations. *Stroke* 33:343–344, 2002.
- Fleetwood IG, Marcellus ML, **Levy RP**, Marks MP, Steinberg GK: Natural history of arteriovenous malformations of the basal ganglia and thalamus. *Stroke* 33:396, 2002.
- Fleetwood IG, Marks MP, **Levy RP**, Marcellus ML, Chang SD, Do HM, Steinberg GK: Multimodal treatment of basal ganglia and thalamus arteriovenous malformations. *Stroke* 33:412, 2002.
- Fleetwood IG, Marks MP, Marcellus ML, Do HM, Chang SD, Adler JR, Steinberg GK, **Levy RP**: Natural history of basal ganglia and thalamus AVMs. *J Neurosurg* 96:436–439, 2002.
- Fleetwood IG, Marks MP, Marcellus ML, Do HM, Chang SD, Adler JR, Steinberg GK, **Levy RP**: Natural history of basal ganglia and thalamus AVMs. *Annual Meeting of American Association Neurological Surgeons Program* 70:807, 2002.
- Zielinski SC, Stoodley MA, Bell–Stephens T, Cockroft K, Marks MP, Chang SD, Adler JR, **Levy RP**, Steinberg GK: Posterior fossa arteriovenous malformations: A comparison of outcome according to treatment modality and lesion location. *Annual Meeting Congress of Neurological Surgeons Program* 52:4, 2002.

Chang SD, Sakamoto G, Marcellus MK, **Levy RP**, Adler JR, Martin DP, Steinberg GK: Cavernous malformation radiosurgery: Long-term results (10 year minimum follow-up). *J Neurosurg*, 98:A237, 2003.

Cockroft KM, Marcellus ML, Marks MP, Chang SD, Huhn SL, **Levy RP**, Adler JR, Sakamoto GT, Steinberg GK: The Stanford experience in multimodality treatment of high-flow AVMs in the pediatric population. *J Neurosurg*, 98:A251, 2003.

Chang SD, Sakamoto GT, Marcellus ML, **Levy RP**, Adler JR, Martin DP, Steinberg GK: Cavernous Malformation Radiosurgery: Long-term results (10-year minimum follow up). *J Neurosurg* 98:693, 2003.

Cockroft KM, Marcellus ML, Marks MP, Chang SD, Huhn SL, **Levy RP**, Adler JR, Sakamoto GT, Steinberg GK: The Stanford experience in multimodality treatment of high-flow AVMs in the pediatric population. *J Neurosurg* 98:710, 2003.

Steinberg GK, Sinclair J, Marks MP, Chang SD, **Levy RP**, Do HM, Adler JR, Bell-Stephens T: Visual field preservation following treatment of occipital lobe arteriovenous malformations. *Annual Meeting Western Neurosurgical Society Program*, 49:46, 2003.

Sinclair J, Marks P, **Levy RP**, Adler JA, Chang SD, Bell-Stephens T, Steinberg GK: Visual field preservation following treatment of occipital lobe arteriovenous malformations. *Annual Meeting Congress of Neurological Surgeons Program* 53:130, 2003.

Massengale JL, **Levy RP**, Marks MP, Steinberg GK: Outcome of surgery for resection of symptomatic radiation necrosis after stereotactic radiosurgery for arteriovenous malformations. *Annual Meeting of American Association of Neurological Surgeons Program* 73:1044, 2005.

**Levy RP**: PET-CT: Evolving role in 3-D radiation therapy. *LLUMC Radiation Medicine Research Symposium*, Loma Linda, CA, 2006.

**Levy RP**: Evolving role of hadron irradiation: Potential and risks of hadrons heavier than protons. *Nucl Instrm Meth Phys Res B (American Institute of Physics Conference Proceedings: Applications of Accelerators in Research and Industry: 19th International Conference, CAARI 2006)*, 2007; 261: 763-767.

**Levy RP**: PET-CT: Evolving Role in Hadron Therapy. *Nucl Instrm Meth Phys Res B (American Institute of Physics Conference Proceedings: Applications of Accelerators in Research and Industry: 19th International Conference, CAARI 2006)*, 2007; 261: 782-785.

**Levy RP**: Organizer and Section Director: Medical Applications Section. 20th International Conference of Applications of Accelerators in Research and Industry (CAARI 2008, American Institute of Physics), Fort Worth, TX, 2008.

- Levy RP:** Plenary Talk: The Future of Particle Therapy in Medicine: The Next Likely Steps. 20th International Conference of Applications of Accelerators in Research and Industry (CAARI 2008, American Institute of Physics), Fort Worth, TX, 2008.
- Levy RP,** Blakely EA, Chu WT, Coutrakon GB, Hug EB, Kraft GH, Tsujii H: Medical Applications of Accelerator Technology: Overview. 20th International Conference of Applications of Accelerators in Research and Industry (CAARI 2008, American Institute of Physics), Fort Worth, TX, 2008.
- Levy RP,** Blakely EA, Chu WT, Coutrakon GB, Hug EB, Kraft GH, Tsujii H: The Future of Particle Therapy in Medicine: The Next Likely Steps. 20th International Conference of Applications of Accelerators in Research and Industry (CAARI 2008, American Institute of Physics), Fort Worth, TX, 2008.
- Levy RP:** Particle Beam Therapy and Accelerator R&D Needed to Boost It. *Future Directions for Accelerator R&D at Fermilab*, Fermilab Workshop, Lake Geneva, WI, 2009.
- Levy RP:** History and Future of Proton Therapy: The Clinical Perspective (Keynote Address), Recent Advances in Proton Radiation Therapy Research, Northern Illinois University, Naperville, IL, 2009.
- Levy RP:** The Case for Light Ions and Carbon. International Workshop on *FFAGs*, Fermilab, Batavia, IL, 2009.
- Levy RP:** Organizer and Section Director: Medical Applications Section. 21st International Conference of Applications of Accelerators in Research and Industry (CAARI 2010, American Institute of Physics), Fort Worth, TX, 2010.
- Levy RP:** Organizer and Section Director: Medical Applications Section. 22nd International Conference of Applications of Accelerators in Research and Industry (CAARI 2012, American Institute of Physics), Fort Worth, TX, 2012.
- Giap FN, **Levy RP,** Giap HB: Summary of Ongoing Clinical Protocols for Proton and Heavier-ion Therapy. Conference on the Applications of Accelerators in Research and Industry (CAARI 2012, American Institute of Physics), Fort Worth, TX, 2012.
- Levy RP:** Organizer and Section Director: Medical Applications Section. 23rd International Conference of Applications of Accelerators in Research and Industry (CAARI 2014, American Institute of Physics), San Antonio, TX, 2014.
- Levy RP,** Giap B, Shia D, O'Donnell B, Vob P, Giap F: Summary of Ongoing Clinical Protocols for Proton and Heavier-ion Therapy. Conference on the Applications of Accelerators in Research and Industry (CAARI 2014, American Institute of Physics), San Antonio, TX, 2014.
- Levy RP:** Evolving Role of Charged-Particle Irradiation: Potential and Risks of Clinical Treatment with Particles Heavier than Protons. Conference on the Applications of Accelerators in Research and Industry (CAARI 2014, American Institute of Physics), San Antonio, TX, 2014.



**Levy RP:** Organizer and Section Director: Medical Applications Section. 24th International Conference of Applications of Accelerators in Research and Industry (CAARI 2016, American Institute of Physics), Fort Worth, TX, 2016.

**Levy RP:** Bioequivalent Treatment Planning for Charged-Particle Therapy: Algorithmic and Generic Approaches. Conference on the Applications of Accelerators in Research and Industry (CAARI 2016, American Institute of Physics), Fort Worth, TX, 2016.

**Levy RP:** The Evolving Role of Heavier-Ion Therapy: An Overview of the Potential Clinical Benefits and Risks. Conference on the Applications of Accelerators in Research and Industry (CAARI 2016, American Institute of Physics), Fort Worth, TX, 2016.

**Levy RP:** Organizer and Section Director: Medical Applications Section. 25th International Conference of Applications of Accelerators in Research and Industry (CAARI 2018, American Institute of Physics), Gaylord Texan Resort, Grapevine, TX, 2018.