

Frank G. Shellock, Ph.D., FACC, FACSM, FISMRM

Adjunct Clinical Professor of Radiology and Medicine
Keck School of Medicine, University of Southern California

Adjunct Professor of Clinical Physical Therapy
Division of Biokinesiology and Physical Therapy
School of Dentistry, University of Southern California

Director for MRI Studies of Biomimetic MicroElectronic Systems
National Science Foundation, Engineering Research Center
University of Southern California

Founder, Institute for Magnetic Resonance Safety, Education, and Research (IMRSER)

President, Magnetic Resonance Safety Testing Services

Magnetic Resonance Imaging - Safety Curriculum Vitae

WEB SITES:

www.MRIsafety.com -information resource for magnetic resonance safety. This web site has over 100,000 registered users

www.IMRSER.org -web site for the Institute for Magnetic Resonance Safety, Education, and Research

www.MagneticResonanceSafetyTesting.com -web site for company involved in testing implants and devices for safety in the magnetic resonance environment.

PUBLICATIONS: Textbooks and Monographs

(1) Shellock FG, Kanal E. MAGNETIC RESONANCE: BIOEFFECTS, SAFETY AND PATIENT MANAGEMENT. Raven Press, New York, 1994.

(2) Shellock FG. GUIDE TO MR PROCEDURES AND METALLIC OBJECTS: UPDATE 1994. First Edition, Raven Press, New York, 1994.

(3) Kanal E, Shellock FG, SAFETY REFERENCE MANUAL ON MAGNETIC RESONANCE IMAGING CONTRAST AGENTS. Lippincott-Raven Healthcare, New York, 1996.

(4) Shellock FG. GUIDE TO MR PROCEDURES AND METALLIC OBJECTS: UPDATE 1996. Second Edition, Lippincott-Raven Press, New York, 1996.

(5) Shellock FG, Kanal E. MAGNETIC RESONANCE: BIOEFFECTS, SAFETY AND PATIENT MANAGEMENT. Second Edition, Lippincott-Raven Press, New York, 1996.

(6) Shellock FG. GUIDE TO MR PROCEDURES AND METALLIC OBJECTS: UPDATE 1997. Third Edition, Lippincott-Raven Press, New York. 1997.

- (7) Shellock FG. GUIDE TO MR PROCEDURES AND METALLIC OBJECTS: UPDATE 1998. Fourth Edition, Lippincott-Raven Press, New York, 1998.
- (8) Shellock FG. GUIDE TO MR PROCEDURES AND METALLIC OBJECTS: UPDATE 1999. Fifth Edition, Lippincott Williams & Wilkins Healthcare, Philadelphia, 1999.
- (9) Shellock FG. GUIDE TO MR PROCEDURES AND METALLIC OBJECTS: UPDATE 2000. Sixth Edition, Lippincott Williams & Wilkins Healthcare, Philadelphia, 2000.
- (10) Shellock FG. MAGNETIC RESONANCE PROCEDURES: HEALTH EFFECTS AND SAFETY. CRC Press, Boca Raton, FL, 2001.
- (11) Shellock FG. GUIDE TO MR PROCEDURES AND METALLIC OBJECTS: UPDATE 2001. Seventh Edition, Lippincott Williams & Wilkins Healthcare, Philadelphia, 2001.
- (12) Shellock FG. REFERENCE MANUAL FOR MAGNETIC RESONANCE SAFETY: 2002 EDITION. Amirsys, Inc., Salt Lake City, Utah, 2002.
- (13) Shellock FG. REFERENCE MANUAL FOR MAGNETIC RESONANCE SAFETY: 2003 EDITION. Amirsys, Inc., Salt Lake City, Utah, 2003.
- (14) Shellock FG. REFERENCE MANUAL FOR MAGNETIC RESONANCE SAFETY, IMPLANTS AND DEVICES -2004 EDITION. Biomedical Research Publishing Group, Los Angeles, CA, 2004.
- (15) Shellock FG. REFERENCE MANUAL FOR MAGNETIC RESONANCE SAFETY, IMPLANTS, AND DEVICES: 2005 EDITION. Biomedical Research Publishing Group, Los Angeles, CA, 2005.
- (16) Shellock FG. REFERENCE MANUAL FOR MAGNETIC RESONANCE SAFETY, IMPLANTS, AND DEVICES: 2006 EDITION. Biomedical Research Publishing Group, Los Angeles, CA.
- (17) Shellock FG. REFERENCE MANUAL FOR MAGNETIC RESONANCE SAFETY, IMPLANTS, AND DEVICES: 2007 EDITION. Biomedical Research Publishing Group, Los Angeles, CA.
- (18) Shellock FG. REFERENCE MANUAL FOR MAGNETIC RESONANCE SAFETY, IMPLANTS, AND DEVICES: 2008 EDITION. Biomedical Research Publishing Group, Los Angeles, CA.
- (19) Shellock FG. REFERENCE MANUAL FOR MAGNETIC RESONANCE SAFETY, IMPLANTS, AND DEVICES: 2009 EDITION. Biomedical Research Publishing Group, Los Angeles, CA.
- (20) Shellock FG. REFERENCE MANUAL FOR MAGNETIC RESONANCE SAFETY, IMPLANTS, AND DEVICES: 2010 EDITION. Biomedical Research Publishing Group, Los Angeles, CA.

(21) Shellock FG. REFERENCE MANUAL FOR MAGNETIC RESONANCE SAFETY, IMPLANTS, AND DEVICES: 2011 EDITION. Biomedical Research Publishing Group, Los Angeles, CA.

(22) Shellock FG. REFERENCE MANUAL FOR MAGNETIC RESONANCE SAFETY, IMPLANTS, AND DEVICES: 2012 EDITION. Biomedical Research Publishing Group, Los Angeles, CA.

PUBLICATIONS: Articles

(1) Shellock FG, Schaefer DJ, Gordon CJ. Effect of a 1.5 Tesla static magnetic field on body temperature of man. *Magnetic Resonance in Medicine*, 3:644-647, 1986.

(2) Shellock FG, Gordon CJ, Schaefer DJ. Thermoregulatory responses to clinical magnetic resonance imaging of the head at 1.5 Tesla: Lack of evidence for direct effects on the hypothalamus. *Acta Radiologica, Suppl.* 369: 512-513, 1986.

(3) Shellock FG, Schaefer DJ, Grundfest W, Crues JV. Thermal effects of high field (1.5 Tesla) magnetic resonance imaging of the spine: Clinical experience above a specific absorption rate of 0.4 W/kg. *Acta Radiologica, Suppl.* 369: 514-516, 1986.

(4) Shellock FG, Crues JV. Temperature, heart rate, and blood pressure changes associated with clinical magnetic resonance imaging at 1.5 T. *Radiology*, 163: 259-262, 1987.

(5) Shellock FG, Crues JV. MRI: Potential adverse effects and safety considerations. *MRI Decisions*, 2:25-30, 1988.

(6) Shellock FG, Crues JV. Temperature changes caused by clinical MR imaging of the brain at 1.5 Tesla using a head coil. *American Journal of Neuroradiology*, 9: 287-291, 1988.

(7) Shellock FG, Crues JV. Corneal temperature changes associated with high-field MR imaging of the brain with a head coil. *Radiology*, 167: 809-811, 1988.

(8) Shellock FG, Crues JV. High-field MR imaging of metallic biomedical implants: An ex vivo evaluation of deflection forces. *American Journal of Roentgenology*. 151: 389-392, 1988.

(9) Shellock FG. MR imaging of metallic implants and materials: A compilation of the literature. *American Journal of Roentgenology*. 151: 811-814, 1988.

(10) Shellock FG, Schaefer DJ, Crues JV. Exposure to a 1.5 Tesla static magnetic field does not alter body and skin temperatures in man. *Magnetic Resonance in Medicine*, 11:371-375, 1989.

(11) Shellock FG. Biological effects and safety aspects of magnetic resonance imaging. *Magnetic Resonance Quarterly* 5:243-261, 1989.

(12) Shellock FG, Schaefer DJ, Crues JV. Alterations in body and skin temperatures caused by MR imaging: Is the recommended exposure for radiofrequency radiation too conservative? *British Journal of Radiology*, 62:904-909, 1989.

(13) Hong CZ, Shellock FG. Short-term exposure to a 1.5 Tesla static magnetic field does not effect somato-sensory evoked potentials in man. *Magnetic Resonance Imaging*. 8:65-69, 1990.

(14) Shellock FG, Slimp G. Halo vest for cervical spine fixation during MR imaging. *American Journal of Roentgenology*, 154:631-632, 1990.

(15) Shellock FG, Rothman B, Sarti D. Heating of the scrotum by high-field-strength MR imaging. *American Journal of Roentgenology* 154:1229-1232, 1990.

(16) Kanal E, Shellock FG, Talagala L. Safety considerations in MR imaging. *Radiology*, 176:593-606, 1990.

(17) Shellock FG, Kanal E. Policies, guidelines, and recommendations for MR imaging safety and patient management. *Journal of Magnetic Resonance Imaging*, 1:97-101, 1991.

- (18) Shellock FG, Schatz C. High field strength MRI and otologic implants. *American Journal of Neuroradiology*, 12:279-281, 1991.
- (19) Shellock FG, Curtis JS. MR imaging and biomedical implants, materials, and devices: An updated review. *Radiology*, 180:541-550, 1991.
- (20) Yuh WTC, Hanigan MT, Nerad JA, Carter KD, Kardon RH, Ehrhardt JC, Shellock FG. Extrusion of a magnetic eye implant after MR examination: a potential hazard to the enucleated eye. *Journal of Magnetic Resonance Imaging*. 1:711-713, 1991.
- (21) Shellock FG, Myers SM, Kimble K. Monitoring heart rate and oxygen saturation during MRI with a fiber-optic pulse oximeter. *American Journal of Roentgenology*, 158: 663-664, 1992.
- (22) Yuh WTC, Ehrhardt JC, Fisher DJ, Shields RK, Shellock FG. Phantom limb pain induced in amputee by strong magnetic fields. *Journal of Magnetic Resonance Imaging*, 2: 221-223, 1992.
- (23) Shellock FG, Mink JH, Curtin S, Friedman MJ. MRI and orthopedic implants used for anterior cruciate ligament reconstruction: Assessment of ferromagnetism and artifacts. *Journal of Magnetic Resonance Imaging*, 2: 225-228, 1992.
- (24) Kanal E, Shellock FG. Policies, guidelines, and recommendations for MR imaging safety and patient management. Patient monitoring during MR examinations. *Journal of Magnetic Resonance Imaging*, 2: 247-248, 1992.
- (25) Shellock FG, Litwer C, Kanal E. MRI bioeffects, safety, and patient management: a review. *Reviews in Magnetic Resonance Imaging*, 4:21-63, 1992.
- (26) Kanal E, Shellock FG. Patient monitoring during clinical MR imaging. *Radiology*, 185: 623-629, 1992.
- (27) Shellock FG, Schatz CJ. Increases in corneal temperature caused by MR imaging of the eye with a dedicated local coil. *Radiology*, 185: 697-699, 1992.
- (28) Kanal E, Gillen J, Evans JA, Savitz DA, Shellock FG. Survey of reproductive health among female MR operators. *Radiology* 187:395-399, 1993.
- (29) Kanal E, Shellock FG. MR imaging of patients with intracranial aneurysm clips. *Radiology*, 187: 612-614, 1993.
- (30) Holshouser B, Hinshaw DB, Shellock FG. Sedation, anesthesia, and physiologic monitoring during MRI. *Journal of Magnetic Resonance Imaging*, 3: 553-558, 1993.
- (31) Shellock FG, Hahn HP, Mink JH, Itskovich E. Adverse reaction to IV gadoteridol. *Radiology*, 189:151-152, 1993.
- (32) Shellock FG, Morisoli S, Kanal E. MR procedures and biomedical implants, materials, and devices: Update 1993. *Radiology*, 189:587-599, 1993.
- (33) Kanal E, Shellock FG. The value of published data on MR compatibility of metallic implants. *American Journal of Neuroradiology*, 15:1394-1396, 1994.
- (34) Shellock FG, Kanal E. SMRI Report. Policies, guidelines and recommendations for MR imaging safety and patient management. Questionnaire for screening patients before MR procedures. *Journal of Magnetic Resonance Imaging*. 4:749-751, 1994.
- (35) Shellock FG, Morisoli SM. Ex vivo evaluation of ferromagnetism and artifacts for cardiac occluders exposed to a 1.5 Tesla MR system. *Journal of Magnetic Resonance Imaging*, 4:213-215, 1994.
- (36) Shellock FG, Morisoli M, Ziarati M. Measurement of acoustic noise during MR imaging: evaluation of six different "worse case" pulse sequences. *Radiology*, 191:91-93, 1994.
- (37) Shellock FG, Morisoli SM. Ex vivo evaluation of ferromagnetism, heating, and artifacts for heart valve prostheses exposed to a 1.5 Tesla MR system. *Journal of Magnetic Resonance Imaging*. 4:756-758, 1994.
- (38) Shellock FG, Kanal E. Re: Metallic foreign bodies in the orbits of patients undergoing MR imaging: prevalence and value of pre-MR radiography and CT. *American Journal of*

- Roentgenology, 162:985-986, 1994.
- (39) Shellock FG, Schaefer DJ, Kanal E. Physiologic responses to MR imaging performed at an SAR level of 6.0 W/kg. *Radiology*. 192:865-868, 1994.
- (40) Nogueira M, Shellock FG. Otologic bioimplants: Ex vivo assessment of ferromagnetism and artifacts at 1.5 Tesla. *American Journal of Roentgenology*. 163: 1472-1473, 1995.
- (41) Moscatel M, Shellock FG, Morisoli S. Biopsy needles and devices: assessment of ferromagnetism and artifacts during exposure to a 1.5 Tesla MR system. *Journal of Magnetic Resonance Imaging*. 5:369-372, 1995.
- (42) Shellock FG, Nogueira M, Morisoli M. MRI and vascular access ports: ex vivo evaluation of ferromagnetism, heating, and artifacts at 1.5 T. *Journal of Magnetic Resonance Imaging*, 4:481-484, 1995.
- (43) Fagan LL, Shellock FG, Brenner RJ, Rothman B. Ex vivo evaluation of ferromagnetism, heating, and artifacts of breast tissue expanders exposed to a 1.5 T MR system. *Journal of Magnetic Resonance Imaging*, 5:614-616, 1995.
- (44) Elmquist C, Shellock FG, Stoller D. Screening adolescents for metallic foreign bodies prior to MR procedures. *Journal of Magnetic Resonance Imaging*. 5:784-785, 1996.
- (45) Kanal E, Shellock FG. MR imaging in the testing of 1,765 aneurysm clips for ferromagnetic property: clip variability issues. *Radiology*. 200: 576-578, 1996.
- (46) Shellock FG, Shellock VJ. Vascular access ports and catheters tested for ferromagnetism, heating, and artifacts associated with MR imaging. *Magnetic Resonance Imaging*. 14:443-447, 1996.
- (47) Shellock FG, Shellock VJ. Ceramic surgical instruments: Evaluation of MR-compatibility at 1.5 Tesla. *Journal of Magnetic Resonance Imaging*. 6:954-956, 1996.
- (48) Shellock FG. MR imaging and cervical fixation devices: Evaluation of ferromagnetism, heating, and artifacts at 1.5 Tesla. *Magnetic Resonance Imaging*. 14:1093-1098, 1996.
- (49) Shellock FG, Detrick MS, Brant-Zawadski M. MR-compatibility of Guglielmi detachable coils. *Radiology*. 203: 568-570, 1997.
- (50) Bendel L, Shellock FG, Steckel M. The effect of mechanical deformation on magnetic properties and MR imaging artifacts of type 304 and type 316 stainless steel. *Journal of Magnetic Resonance Imaging*. 7:1170-1173, 1997.
- (51) Shellock FG, Shellock VJ. MR-compatibility evaluation of the Spetzler titanium aneurysm clip. *Radiology*. 206:838-841, 1998.
- (52) Shellock FG, Shellock VJ. Evaluation of cranial flap fixation clamps for compatibility with MR imaging. *Radiology*. 207:822-825, 1998.
- (53) Shellock FG, Kanal E. Yasargil aneurysm clips: evaluation of interactions with a 1.5 Tesla MR system. *Radiology*. 207:587-591, 1998.
- (54) Shellock FG, Crues JV. Aneurysm clips: Assessment of magnetic field interaction associated with a 0.2-T extremity MR system. *Radiology*. 208:407-409, 1998.
- (55) Shellock FG. MR-compatibility of an endoscope designed for use in interventional MRI procedures. *American Journal of Roentgenology*. 171:1297-1300, 1998.
- (56) Shellock FG, Ziarati M, Atkinson D, Chen DY. Determination of acoustic noise during MRI using echo planar and three dimensional fast spin echo imaging techniques. *Journal of Magnetic Resonance Imaging*. 8:1154-1157, 1998.
- (57) Shellock FG, Kanal E. Aneurysm clips: Evaluation of MR imaging artifacts at 1.5 Tesla. *Radiology*. 209:563-566, 1998.
- (58) Shellock FG, Shellock VJ. Cardiovascular catheters and accessories: Ex vivo testing of ferromagnetism, heating, and artifacts associated with MRI. *Journal of Magnetic Resonance Imaging*. 8:1338-1342, 1998.

- (59) Shellock FG, O'Neil M, Ivans V, Kelly D, O'Connor M, Toay L, Crues JV. Cardiac pacemakers and implantable cardiac defibrillators are unaffected by operation of an extremity MR system. *American Journal of Roentgenology*. 172:165-172, 1999.
- (60) Kanal E, Shellock FG. Aneurysm clips: effects of long-term and multiple exposures to a 1.5 Tesla MR system. *Radiology*. 210:563-565, 1999.
- (61) Shellock FG, Shellock VJ. Metallic marking clips used after stereotactic breast biopsy: ex vivo testing of ferromagnetism, heating, and artifacts associated with MRI. *American Journal of Roentgenology*. 172:1417-1419, 1999.
- (62) Shellock FG, Shellock VJ. Stents: Evaluation of MRI safety. *American Journal of Roentgenology*. 173:543-546, 1999.
- (63) Shellock FG, Kanal E. Safety of magnetic resonance imaging contrast agents. *Journal of Magnetic Resonance Imaging*. 10:477-484, 1999.
- (64) Ho JC, Shellock FG. Magnetic properties of Ni/Co/Cr-base Elgiloy. *Journal of Materials Science: Materials in Medicine*. 10:555-560, 1999.
- (65) Shellock FG. Radiofrequency-induced heating during MR procedures: A review. *Journal of Magnetic Resonance Imaging*. 12: 30-36, 2000.
- (66) McJury M, Shellock FG. Acoustic noise and MR procedures: A review. *Journal of Magnetic Resonance Imaging*. 12: 37-45, 2000.
- (67) Kangarlu A, Shellock FG. Aneurysm clips: evaluation of magnetic field interactions with an 8.0 T MR system. *Journal of Magnetic Resonance Imaging*. 12:107-111, 2000.
- (68) Shellock FG, Hatfield M, Simon BJ, Block S, Wamboldt J, Starewicz PM, Punchard WFB. Implantable spinal fusion stimulator: assessment of MRI safety. *Journal of Magnetic Resonance Imaging*. 12:214-223, 2000.
- (69) Sawyer-Glover A, Shellock FG. Pre-MRI procedure screening: recommendations and safety considerations for biomedical implants and devices. *Journal of Magnetic Resonance Imaging*. 12: 92-106, 2000.
- (70) Ordidge R, Shellock FG, Kanal E. A Y2000 Update of current safety issues related to MRI (Editorial). *Journal of Magnetic Resonance Imaging*. 12:1, 2000
- (71) Edwards, M-B, Taylor KM, Shellock FG. Prosthetic heart valves: evaluation of magnetic field interactions, heating, and artifacts at 1.5 Tesla. *Journal of Magnetic Resonance Imaging*. 12:363-369, 2000.
- (72) Shellock FG. Surgical instruments for interventional MRI procedures: assessment of MR safety. *Journal of Magnetic Resonance Imaging*, 13:152-157, 2001.
- (73) Ahmed S, Shellock FG. Magnetic resonance imaging safety: implications for cardiovascular patients. *Journal of Cardiovascular Magnetic Resonance*. 3:171-182, 2001.
- (74) Shellock FG. Prosthetic heart valves and annuloplasty rings: assessment of magnetic field interactions, heating, and artifacts at 1.5-Tesla. *Journal of Cardiovascular Magnetic Resonance*. 3:159-169, 2001.
- (75) Shellock FG. Metallic neurosurgical implants: evaluation of magnetic field interactions, heating, and artifacts at 1.5 Tesla. *Journal of Magnetic Resonance Imaging*. 14:295-299, 2001.
- (76) Tope WD, Shellock FG. Magnetic resonance imaging and permanent cosmetics (tattoos): survey of complications and adverse events. *Journal of Magnetic Resonance Imaging* 15:180-184, 2002.
- (77) Rezai AR, Finelli D, Nyenhuis JA, Hrdlick G, Tkach J, Rugieri P, Stypulkowski PH, Sharan A, Shellock FG. Neurostimulator for deep brain stimulation: Ex vivo evaluation of MRI-related heating at 1.5-Tesla. *Journal of Magnetic Resonance Imaging* 15:141-150, 2002.
- (78) Shellock FG. New metallic implant used for permanent female contraception: evaluation of MR safety. *American Journal of Roentgenology* 178:1513-1516, 2002.

- (79) Greatbatch W, Miller V, Shellock FG. Magnetic resonance safety testing of a newly-developed, fiber-optic cardiac pacing lead. *Journal of Magnetic Resonance Imaging*. 16:97103, 2002.
- (80) Shellock FG, Crues JV. Commentary: MR safety and the American College of Radiology White Paper. *American Journal of Roentgenology*. 178:1349-1352, 2002.
- (81) Shellock FG. MR safety update 2002: Implants and devices. *Journal of Magnetic Resonance Imaging*. 16:485-496, 2002.
- (82) Shellock FG. Biomedical implants and devices: assessment of magnetic field interactions with a 3.0-Tesla MR system. *Journal of Magnetic Resonance Imaging* 16:721732, 2002.
- (83) Finelli DA, Rezai AR, Ruggieri P, Tkach J, Nyenhuis J, Hrdlicka G, Sharan A, Gonzalez-Martinez J, Stypulkowski PH, Shellock FG. MR-related heating of deep brain stimulation electrodes: an in vitro study of clinical imaging sequences. *American Journal of Neuroradiology* 23:1795-1802, 2002.
- (84) Shellock FG, Tkach JA, Ruggieri PM, Masaryk T, Rasmussen P. Aneurysm clips: evaluation of magnetic field interactions and translational attraction using "long-bore" and "short-bore" 3.0-Tesla MR systems. *American Journal of Neuroradiology* 24:463-471, 2003.
- (85) Kangarlu A, Shellock FG, Chakeres D. 8.0-Tesla MR system: Temperature changes associated with radiofrequency-induced heating of a head phantom. *Journal of Magnetic Resonance Imaging* 17:220-226, 2003.
- (86) Shellock FG, Tkach JA, Ruggieri PM, Masaryk TJ. Cardiac pacemakers, ICDs, and loop recorder: Evaluation of translational attraction using conventional ("long-bore") and "short-bore" 1.5-and 3.0-Tesla MR systems. *Journal of Cardiovascular Magnetic Resonance* 5:387-397, 2003.
- (87) Sharan A, Rezai AR, Nyenhuis JA, Hrdlicka G, Tkach J, Baker K, Turbay M, Ruggieri P, Phillips M, Shellock FG. MR safety in patients with implanted deep brain stimulation systems (DBS). *Acta Neurochir*. 87(S):141-145, 2003.
- (88) Park SM, Nyenhuis JA, Smith CD, Lim EJ, Foster KS, Baker KB, Hrdlicka G, Rezai AR, Ruggieri P, Sharan, A, Shellock FG, Stypulkowski PH, Tkach J. Gelled vs. nongelled phantom material for measurement of MRI-induced temperature increases with bioimplants. *IEEE Transactions on Magnetics*, 39:3367-3371, 2003.
- (89) Martin TE, Coman JA, Shellock FG, Pulling C, Fair R, Jenkins K. Magnetic resonance imaging and cardiac pacemaker safety at 1.5 Tesla. *Journal of the American College of Cardiology*, 43:1315-1324, 2004.
- (90) Rezai AR, Phillips M, Baker K, Sharan AD, Nyenhuis J, Tkach J, Henderson J, Shellock FG. Neurostimulation system used for deep brain stimulation (DBS): MR safety issues and implications of failing to follow guidelines. *Investigative Radiology*, 39:300-303, 2004.
- (91) Baker KB, Tkach JA, Nyenhuis JA, Phillips M, Shellock FG, Gonzalez-Martinez J, Rezai AR. Evaluation of specific absorption rate as a dosimeter of MRI-Related implant heating. *Journal of Magnetic Resonance Imaging*, 20:315-320, 2004.
- (92) Shellock FG, Crues JV. MR procedures: biologic effects, safety, and patient care. *Radiology*, 232:635-652, 2004.
- (93) Shellock FG, Cosendai G, Park S-M, Nyenhuis JA. Implantable microstimulator: magnetic resonance safety at 1.5-Tesla. *Investigative Radiology*, 39:591-599, 2004.
- (94) Baker, K, Nyenhuis JA, Hrdlicka G, Rezai AR, Tkach JA, Sharan A, Shellock FG. Neurostimulator implants: assessment of magnetic field interactions associated with 1.5 and 3.0-Tesla MR systems. *Journal of Magnetic Resonance Imaging*, 21:72-77, 2005.
- (95) Shellock FG, Gounis M, Wakhloo A. Detachable coil for cerebral aneurysms: In vitro evaluation of magnet field interactions, heating, and artifacts at 3-Tesla. *American Journal of Neuroradiology*, 26:363-366, 2005.

- (96) Kangarlu A, Ibrahim TS, Shellock FG. Effects of coil dimensions and field polarization on RF heating inside a head phantom. *Magnetic Resonance Imaging*. 23:53-60, 2005.
- (97) Shellock FG, Forder J. Drug eluting coronary stent: In vitro evaluation of magnet resonance safety at 3-Tesla. *Journal of Cardiovascular Magnetic Resonance*, 7:415-419, 2005.
- (98) Bhidayasiri R, Bronstein JM, Sinha S, Krahl SE, Ahn S, Behnke EJ, Cohen MS, Frysinger R, Shellock FG. Bilateral neurostimulation systems used for deep brain stimulation: In vitro study of MRI-related heating at 1.5-Tesla and implications for clinical imaging of the brain. *Magnetic Resonance Imaging*. 23:549-555, 2005.
- (99) Baker KB, Tkach J, Hall JD, Nyenhuis JA, Shellock FG, Rezai AR. Reduction of MRI-related heating in deep brain stimulation leads using a lead management system. *Neurosurgery*. 57:392-397, 2005.
- (100) Henderson J, Tkach J, Phillips M, Baker K, Shellock FG, Rezai A. Permanent neurological deficit related to magnetic resonance imaging in a patient with implanted deep brain stimulation electrodes for Parkinson's disease: Case report. *Neurosurgery* 57:E1063, 2005.
- (101) Rezai AR, Baker K, Tkach J, Phillips M, Hrdlicka G, Sharan A, Nyenhuis J, Ruggieri P, Henderson J, Shellock FG. Is magnetic resonance imaging safe for patients with neurostimulation systems used for deep brain stimulation (DBS)? *Neurosurgery* 57:10561062, 2005.
- (102) Gray RW, Bibens WT, Shellock FG. Simple design changes to wires to substantially reduce MRI induced-heating at 1.5-Tesla: Implications for implanted leads. *Magnetic Resonance Imaging* 23:887-891, 2005.
- (103) Shellock FG, Valencerina S. Septal repair implants: evaluation of MRI safety at 3-Tesla. *Magnetic Resonance Imaging*, 23:1021-1025, 2005.
- (104) Nyenhuis JA, Park SM, Kamondetdacha R, Amjad A, Shellock FG, Rezai A. MRI and implanted medical devices: basic interactions with an emphasis on heating. *IEEE Transactions on Device and Materials Reliability* 5:467-478, 2005.
- (105) Shellock FG, Fieno DS, Thomson TJ, Talavage TM, Berman DS. Cardiac pacemaker: in vitro assessment of MR safety at 1.5-Tesla. *American Heart Journal*, 151:436-443, 2006.
- (106) Shellock FG, Habibi R, Knebel J. Programmable CSF shunt valve: In vitro assessment of MRI safety at 3-Tesla. *American Journal of Neuroradiology*, 27:661-665, 2006.
- (107) Shellock FG, Parker J, Spinazzi A. Safety of gadobenate dimeglumine: summary of findings from clinical studies and post-marketing surveillance. *Investigative Radiology*, 41:500-509, 2006.
- (108) Shellock FG, Begnaud J, Inman DM. VNS Therapy System: In vitro evaluation of MRI-related heating and function at 1.5- and 3-Tesla. *Neuromodulation*, 9:204-213, 2006.
- (109) Shellock FG, Parker JR, Pirovano G, Shen N, Venetianer C, Kirchin MA, Spinazzi A. Safety characteristics of gadobenate dimeglumine: Clinical experience from intra- and inter-individual comparison studies with gadopentate dimeglumine. *Journal of Magnetic Resonance Imaging*, 24:1378-1285, 2006.
- (110) Shellock FG, Fischer L, Fieno DS. Cardiac pacemakers and implantable cardioverter defibrillators: in vitro evaluation of MRI safety at 1.5-Tesla. *Journal of Cardiovascular Magnetic Resonance*, 9:21-31, 2007.
- (111) Shinbane J, Colletti P, Shellock FG. MR in patients with pacemakers and ICDs: Defining the Issues. *Journal of Cardiovascular Magnetic Resonance*, 9:5-13, 2007.
- (112) Shellock FG, Wilson SF, Mauge CP. Magnetically programmable shunt valve: MRI at 3-Tesla. *Magnetic Resonance Imaging*, 25:1116-21, 2007.
- (113) Shellock FG. Guest Editorial. Comments on MRI heating tests of critical implants. *Journal of Magnetic Resonance Imaging*. 26:1182-1185, 2007.

- (114) Levine GN, Gomes AS, Arai AE, Bluenke DA, Flamm SD, Kanal E, Manning WJ, Martin ET, Smith JM, Wilke N, Shellock FG. Safety of magnetic resonance imaging in patients with cardiovascular devices: an American Heart Association scientific statement from the Committee on Diagnostic and Interventional Cardiac Catheterization. *Circulation*. 2007;116:2878-91.
- (115) Shellock FG, Wilson SF, Mauge CP. Magnetically programmable shunt valve: MRI at 3-Tesla. *Magnetic Resonance Imaging*, 25:1116-21, 2007.
- (116) Shellock FG. Guest Editorial. Comments on MRI heating tests of critical implants. *Journal of Magnetic Resonance Imaging*. 26:1182-1185, 2007.
- (117) Shellock FG, Valencerina S. Ventricular assist implant (AB5000): *In Vitro* assessment of MRI issues at 3-Tesla. *Journal of Cardiovascular Magnetic Resonance*. 10:23-30, 2008.
- (118) Shellock FG, Crivelli R, Venugopalan R. Programmable infusion pump and catheter: evaluation using 3-Tesla MRI. *Neuromodulation*. 11:163-170, 2008.
- (119) Shellock FG, Spinazzi A. MRI Safety Update: 2008, Part 1, MRI contrast agents and nephrogenic systemic fibrosis. *American Journal of Roentgenology*. 191:1-11, 2008.
- (120) Shellock FG, Spinazzi A. MRI Safety Update: 2008, Part 2, Screening patients for MRI. *American Journal of Roentgenology*. 191:12-21, 2008.
- (121) Shellock FG, Woods TO, Crues JV. MRI Labeling Information for Implants and Devices: Explanation of Terminology. *Radiology* 253:26-30, 2009.
- (122) Diaz F, Tweardy L, Shellock FG. Cervical fixation devices: MRI issues at 3-Tesla. *Spine* 35:411-425, 2010.
- (123) Shellock FG, Valencerina S. *In vitro* evaluation of MR imaging issues at 3-T for aneurysm clips made from MP35N: Findings and information applied to 155 additional aneurysm clips. *American Journal of Neuroradiology*, 31:615-619, 2010.
- (124) Shellock FG, Kanal E, Gilk T. Confusion regarding the value reported for the term “spatial gradient magnetic field” and how this information is applied to labeling of medical implants and devices. *American Journal of Roentgenology*, 196:142-5, 2011.
- (125) Shellock FG, Bedwinek A, Oliver-Allen M, Wilson SF. Assessment of MRI issues for a 3 -Tesla “immune” programmable CSF shunt valve. *American Journal of Neuroradiology*, 197:202-207, 2011.
- (126) Colletti P, Shinbane J, Shellock FG. “MR conditional” pacemakers: The radiologist’s role in multidisciplinary management. *American Journal of Roentgenology*, 197:457-459, 2011.
- (127) Greenberg KLZ, Weinreb J, Shellock FG. MR conditional” respiratory ventilator system incident in a 3-Tesla MRI environment. *Magnetic Resonance Imaging*, 29:1150-1154, 2011.
- (128) Shinbane J, Colletti P, Shellock FG. Magnetic resonance imaging in patients with cardiac pacemakers: Era of “MR conditional designs. *Journal of Cardiovascular Magnetic Resonance*. 13:63, 2011; <http://www.jcmr-online.com/content/13/1/63>
- (129) Oliver-Allen M, Valencerina S, Shellock FG, Wilson SF. Evaluation of MRI Issues at 3-Tesla for a Hospital Identification (ID) Wristband. *Magnetic Resonance Imaging*, 30:299-303, 2012.
- (130) Weiland JD, Faraji B, Greenberg RJ, Humayun MS, Shellock FG. Assessment of MRI issues for the Argus II retinal prosthesis. *Magnetic Resonance Imaging*, 30:382-389, 2012.
- (131) Gill A, Shellock FG. Assessment of MRI issues at 3-Tesla for metallic surgical clips: Findings applied to 61 additional vessel ligation and skin closure clips. *Journal of Cardiovascular Magnetic Resonance*, *J Cardiovasc Magn Reson*. 2012 Jan 9;14(1):3. [Epub ahead of print]