

Find a Biomarker by Disease Categories*

Disease Category	Biomarker	Disease / Medical condition	Imaging Technique	Investigators	Comments
Cardiology / Vascular	Anatomic disruption of arterial wall	Aortic dissection	US CT MRI Angiography	Gonzalez R Waltman A	
Cardiology / Vascular	Embolism volume	Pulmonary embolism	MRI	Weissleder R	Via monocrySTALLINE iron oxide nanoparticles (MION)
Cardiology / Vascular	Intravascular thrombus	Acute myocardial infarction	MRI	Brady T	
Cardiology / Vascular	Intravascular thrombus	Arterial embolism	CT MRI Angiography	Waltman A	
Cardiology / Vascular	Intravascular thrombus	Deep venous thrombosis	US MRI Angiography	O'Neill MJ Waltman A	
Cardiology / Vascular	Intravascular thrombus	Pulmonary embolism	CT	McLoud T	
Cardiology / Vascular	Myocardial blood flow via 13N-ammonia	Ischemic heart disease	Nuclear medicine SPECT	Fischman A	
Cardiology / Vascular	Pulmonary consolidation	Alveolar pulmonary edema	CT MRI	McLoud T Shepard J	
Cardiology / Vascular	Vascular diameter and circumference	Iliac aneurysm	US CT MRI	Waltman A	
Cardiology / Vascular	Vascular diameter and circumference	Aortic aneurysm	US CT MRI	Waltman A	
Cardiology / Vascular	Vascular lumen diameter	Dissection / peripheral	CT MRI Angiography	Waltman A	
Cardiology / Vascular	Ventilation / perfusion mismatch	Pulmonary embolism	Nuclear medicine	Fischman A	
Cardiology / Vascular Metabolic	Arterial calcification	Atherosclerosis / central	CT	Brady T	
Cardiology / Vascular Metabolic	Arterial calcification	Arteriosclerosis / peripheral	CT	Brady T	
Cardiology / Vascular Metabolic	Lumen vascular diameter	Arteriosclerosis / peripheral	CTA MRA Angiography	Gonzalez R Hunter G Lev M Waltman A	
Cardiology / Vascular Metabolic	Arterial calcification	Coronary artery disease	CT	Brady T	
Cardiology / Vascular Metabolic	Myocardial blood flow via 13N-ammonia	Coronary artery disease	Nuclear medicine SPECT	Fischman A	
Cardiology / Vascular Metabolic	Myocardial contractility / function	Coronary artery disease	MRI Nuclear Medicine	Brady T Fischman A	
Cardiology / Vascular Metabolic	Myocardial perfusion	Coronary artery disease	Nuclear medicine	Fischman A	
Cardiology / Vascular Gastrointestinal	Intravascular thrombus	Portal vein thrombosis	US CT MRI Angiography	Hahn P Mueller P O'Neill MJ Waltman A	
Cardiology / Vascular Inflammatory Infectious disease Endocrine Metabolic	Myocardial function contractility	Myocarditis	Nuclear medicine	Fischman A	
Cardiology / Vascular Inflammatory Infectious disease Endocrine Metabolic	Myocardial function contractility	Myocarditis	MRI	Brady T	

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Cardiology / Vascular Inflammatory Infectious disease Endocrine Metabolic	Perfusion / diffusion	Myocarditis	MRI	Brady T	
Cardiology / Vascular Inflammatory Infectious disease Endocrine Metabolic	Perfusion / diffusion	Myocarditis	Nuclear medicine	Fischman A	
Endocrine Inflammatory Gastrointestinal Metabolic	Biliary ductal dilatation	Choledo-cholithiasis	US CT MRI	Hahn PF O'Neill MJ Mueller P	
Endocrine Inflammatory Gastrointestinal Metabolic	Gallstones	Cholelithiasis	US CT MRI	Hahn P Mueller P O'Neill MJ	
Endocrine Metabolic Inflammatory	Increased pulmonary interstitial markings	Allergic drug reaction	CT	McLoud TC Shepard J	
Endocrine Metabolic Musculoskeletal Infectious disease Gastrointestinal	Body fat composition	AIDS wasting syndrome	CT	Rosenthal DI	
Endocrine Metabolic Musculoskeletal Infectious disease Gastrointestinal	Increased abdominal visceral fat associated with decreased bone mineral density	AIDS wasting syndrome / lipodystrophy	Quantitative CT Dual energy X- ray absorptiometry (DEXA)	Rosenthal DI	
Endocrine Gastrointestinal	MR cholangio- pancreatography	Calculus disease	MRI	Sahani D Prasad S	
Endocrine Metabolic Musculoskeletal	Bone mineral density	Osteopenia	Plain radiographs Dual energy X- ray absorptiometry (DEXA) CT	Rosenthal DI	Must establish bone strength as well as density
Endocrine Metabolic Musculoskeletal	Bone mineral density	Osteoporosis	Plain radiographs Dual energy X- ray absorptiometry (DEXA) CT	Rosenthal DI	Must establish bone strength as well as density
Endocrine Metabolic Musculoskeletal Gastrointestinal	Body fat composition	Obesity	Quantitative CT MRI US	Rosenthal DI	
Endocrine Inflammatory Infectious disease Gastrointestinal	Gallbladder wall thickening	Cholecystitis	US CT MRI	Hahn P Mueller P O'Neill MJ	
Endocrine Inflammatory Infectious disease Gastrointestinal	Gallstones	Cholecystitis	US CT MRI	Hahn P Mueller P O'Neill MJ	
Endocrine Inflammatory Infectious Disease Cardiology / Vascular	Soft tissue inflammation	Myopathy	MRI	Palmer W Rosenthal DI	
Endocrine Metabolic Gastrointestinal	Acinar cell receptor binding	Pancreatic function	MRI	Brady TJ Shen TT Weissleder R	Secretin monocrystalline iron oxide nanoparticles (MION)

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Gastrointestinal	Biliary ductal dilatation	Biliary obstruction	US CT MRI	Hahn P Mueller P	
Gastrointestinal	Intraluminal hemorrhage	Gastrointestinal bleeding	SPECT	Fischman AJ	
Gastrointestinal	Liver tissue characterization	Hepatic cysts	MRI US	Hahn PF Harisinghani M Mueller PR O'Neill MJ Weissleder R	Using ultrasmall superpara-magnetic iron oxide, mangafodipir trisodium
Gastrointestinal	Liver tissue characterization	Hepatobiliary disorders	MRI	Hahn P Harisinghani M Mueller P Weissleder R	Using ultrasmall superpara-magnetic iron oxide, mangafodipir trisodium
Gastrointestinal	MR cholangio-pancreatography	Biliary stricture	MRI	Prasad S Sahani D	
Gastrointestinal Genitourinary Infectious disease	Cyst composition / tissue characterization	Intra-abdominal abscess	US CT MRI	Mueller P	
Gastrointestinal Inflammatory	Bowel wall differentiation	Crohn's disease	MR enteroclysis	Hahn P	Use of experimental oral contrast Kaolin, locus bean gum, methylcellulose + Barium
Gastrointestinal Inflammatory	Bowel wall thickening	Inflammatory bowel disease (IBD)	MRI	Hahn P	Tissue FISP pulse sequence
Gastrointestinal Inflammatory	Inflammation	Crohn's disease	MR enteroclysis	Hahn P	Use of experimental oral contrast Kaolin, locus bean gum, methylcellulose + Barium
Gastrointestinal Inflammatory	Peri-intestinal inflammation	Inflammatory bowel disease (IBD)	MRI	Hahn P	Tissue FISP pulse sequence
Gastrointestinal Oncology / Neoplasm	Infiltration of tunica muscularis Presence of positive nodes	Rectal carcinoma / advanced staging	MRI Multidetector CT angiography (MDCT) US	Hahn P Saini S O'Neill MJ Mueller P	
Gastrointestinal Oncology / Neoplasm	Peri-rectal fat involvement	Rectal carcinoma / recurrent	MRI	Hahn P Prasad S Saini S	Predictor of high probability of local recurrence
Gastrointestinal Oncology / Neoplasm	Spiculated lymph node	Rectal carcinoma / recurrent	MRI	Hahn P Prasad S Saini S	Predictor of high probability of local recurrence
Gastrointestinal Cardiology / Vascular	Splenic tissue characterization	Splenic trauma	MRI	Harisinghani M Weissleder R	Using ultrasmall superpara-magnetic iron oxide
Gastrointestinal Inflammatory Metabolic Infectious disease Endocrine	Chemotactic peptide uptake	Pancreatitis	SPECT	Fischman AJ	Via 99mTc labeled peptide analog
Gastrointestinal Inflammatory Metabolic Infectious disease Endocrine	Ductal irregularity or obstruction	Pancreatitis	MRI	Prasad S Sahani D Saini S	Visualized by MR cholangio-pancreatography (MRCP)
Gastrointestinal Infectious disease	Biliary ductal dilatation	Biliary parasitic disease	US CT MRI	Hahn P Mueller P O'Neill MJ	

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Gastrointestinal Infectious disease Inflammatory	Biliary ductal dilatation	Cholangitis	MRI	Prasad S Sahani D	MR cholangio- pancreatography
Gastrointestinal Infectious disease Inflammatory	Caudate lobe enlargement	Cirrhosis	MRI CT	Hahn PF Sahani D	Discrimination of alcohol from virus induced cirrhosis
Gastrointestinal Infectious disease Inflammatory	Ductal dilatation	Cholangitis	MRI	Prasad S Sahani D	MR cholangio- pancreatography
Gastrointestinal Infectious disease Inflammatory	Right posterior hepatic notch	Cirrhosis	MRI CT	Hahn PF Sahani D	Discrimination of alcohol from virus induced cirrhosis
Infectious disease	Acute bronchial dilatation Wall thickening	Respiratory syncytial virus	CT	McLoud TC Shepard J	
Infectious disease	Directed molecular probes	HIV	MRI PET Optical	Weissleder R	
Infectious disease	Ground-glass appearance	Respiratory syncytial virus	CT	McLoud TC Shepard J	
Infectious disease	Increased Cerebral blood volume (CBV)	HIV	fMRI	Gonzalez RG Hunter G	Cerebral injury related to HIV infection
Infectious disease	Increased pulmonary interstitial markings	Pulmonary infection	CT	McLoud TC Shepard J	
Infectious disease	Opacities	Respiratory syncytial virus	CT	McLoud TC Shepard J	
Infectious disease Inflammatory	Pulmonary consolidation	Pneumonitis	CT MRI Plain radiographs	McLoud TC Shepard J	
Infectious disease Inflammatory	Pulmonary consolidation	Pneumonitis	CT MRI	McLoud TC Shepard J	
Infectious disease Musculoskeletal Inflammatory	Cyst composition / tissue characterization	Arthritis / septic	PET	Palmer W Rosenthal DI	
Infectious disease Musculoskeletal Inflammatory	Increased synovial glucose metabolism	Arthritis / septic	MRI	Palmer W Rosenthal DI	
Infectious disease Musculoskeletal Inflammatory	Leukocyte accumulation	Soft tissue infection	Nuclear medicine	Fischman AJ	
Infectious disease Musculoskeletal Inflammatory	Osteoblastic activity	Soft tissue infection	Nuclear medicine	Fischman AJ	
Infectious disease Musculoskeletal Inflammatory	Periarticular erosion	Arthritis / septic	Plain radiographs MRI	Palmer W Rosenthal DI	
Infectious disease Musculoskeletal Inflammatory	Soft tissue inflammation	Soft tissue infection	MRI Nuclear medicine	Fischman AJ Palmer W Rosenthal DI	
Infectious disease Musculoskeletal Inflammatory	Synovial thickening	Arthritis / septic	Plain radiographs MRI	Palmer W Rosenthal DI	
Infectious disease Musculoskeletal Inflammatory	Leukocyte accumulation	Osteomyelitis	Nuclear medicine	Fischman AJ	Radiolabeled IL-8 accumulation
Inflammatory	Increased pulmonary interstitial markings	Connective tissue disorders	CT	McLoud TC Shepard J	
Inflammatory Musculoskeletal	Increased synovial glucose metabolism	Pigmented villonodular synovitis	PET	Fischman AJ Palmer W Rosenthal DI	
Inflammatory Musculoskeletal	Periarticular erosion	Pigmented villonodular synovitis	Plain radiographs MRI	Palmer W Rosenthal DI	

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Inflammatory Cardiology / Vascular	Aneurysmal wall thickness	Inflammatory abdominal aortic aneurysm (IAAA)	CT	Brady T Saini S Waltman A	
Inflammatory Cardiology / Vascular	Perianeurysmal fibrosis	Inflammatory abdominal aortic aneurysm (IAAA)	CT	Brady T Saini S Waltman A	
Inflammatory Cardiology / Vascular Infectious Disease	Increased pulmonary interstitial markings	Interstitial pulmonary edema	CT	McLoud T Shepard J	
Metabolic Cardiology / Vascular	Vascular lumen diameter	Arteriosclerosis / central	CTA MRA Angiography	Gonzalez R Hunter G Lev M Waltman A	
Metabolic Endocrine	Decreased regional blood flow	Renal disease	PET	Alpert NM Fischman AJ	
Metabolic Endocrine	Directed molecular probes for beta cell mass	Diabetes	MRI	Moore A Bogdanov AJ Weissleder R	
Metabolic Endocrine	Hippuran clearance	Renal disease	PET	Alpert NM Fischman AJ	
Musculoskeletal	Articular cartilage and subchondral bone thickness	Cartilage abnormalities	MRI	Palmer WE	MR using fat-suppressed SPGR images
Musculoskeletal	Articular labrum fraying	SLAP lesions of the shoulder	MR arthrography	Bencardino JT Palmer WE	
Musculoskeletal	Bicep anchor avulsion	SLAP lesions of the shoulder	MR arthrography	Bencardino JT Palmer WE	
Musculoskeletal	Cortical surface disruption	Bone fracture	Plain radiographs	Palmer W Rosenthal DI	
Musculoskeletal	Cystic architecture / tissue characterization	Synovial cyst	US CT MRI	Palmer W Rosenthal DI	
Musculoskeletal	Distribution and leakage of intra-articular administered contrast media	Rotator cuff injury	MR arthrography	Palmer WE	Distinguishes full from partial thickness tears
Musculoskeletal	Increasing periosteal and endosteal enhancement	Osteoarticular allograft imaging	MRI	Palmer WE Rosenthal DI	3-4 months post allograft / represents vascular ingrowth and early skeletal repair
Musculoskeletal	Ligament tears	Ankle injury	MR arthrography	Palmer WE	Predicts sensitivity for ankle impingement syndromes
Musculoskeletal	Marrow edema	Bone fracture	MRI -T1 Diffusion weighted imaging / Apparent diffusion constant	Palmer WE	Impact fractures demonstrate prominent edema, distraction fractures exhibit minimal edema
Musculoskeletal	Musculoskeletal blood flow	Skeletal muscle injury and repair	PET	Alpert NM Fischman AJ	Animal study Use of H2(15)O to study muscle metabolism
Musculoskeletal	Negative defect	Bone fracture	Plain radiographs	Palmer W Rosenthal DI	
Musculoskeletal	Osteochondral lesions	Joint injury / general	MR arthrography	Palmer WE	Assesses the stability of lesions
Musculoskeletal	Partial thickness and full thickness tears	Elbow injury / collateral ligament	MR arthrography	Palmer WE	Distinguishes thickness of tears

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Musculoskeletal	Water content	Bone fracture	MRI -T1 Diffusion weighted imaging / Apparent diffusion constant	Palmer WE	Impact fractures demonstrate prominent edema, distraction fractures exhibit minimal edema
Musculoskeletal	Articular cartilage volume	Joint injury / hip and knee	Co-planar MRI	Palmer WE Rosenberg AE Rosenthal DI	MR using fat- saturated 3D spoiled gradient- echo images (SPGR)
Musculoskeletal	Spatial cartilage thickness	Joint injury / hip and knee	Co-planar MRI	Palmer WE Rosenberg AE Rosenthal DI	MR using fat- saturated 3D spoiled gradient- echo images (SPGR)
Musculoskeletal Inflammatory	Articular cartilage thickness	Osteoarthritis	Plain radiographs MRI	Palmer W Rosenthal DI	
Musculoskeletal Inflammatory	Cartilage thickness	Osteoarthritis	Intra-articular Optical coherence topography	Palmer WE	
Musculoskeletal Inflammatory	Edema / change in signal intensity and apparent diffusion constant	Trauma	MRI Diffusion weighted imaging	Palmer W Rosenthal DI	
Musculoskeletal Inflammatory	Fibrillations	Osteoarthritis	Intra-articular Optical coherence topography	Palmer WE	
Musculoskeletal Inflammatory	Fibrosis	Osteoarthritis	Intra-articular Optical coherence topography	Palmer WE	
Musculoskeletal Inflammatory	Osteoblastic activity	Osteoarthritis	Nuclear medicine	Fischman AJ	
Musculoskeletal Inflammatory	Soft tissue inflammation	Trauma	MRI	Palmer W Rosenthal DI	
Musculoskeletal Inflammatory	Soft tissue inflammation	Trauma	Nuclear medicine	Fischman AJ	
Musculoskeletal Inflammatory	Soft tissue uptake of radiotracers	Trauma	Nuclear medicine	Fischman AJ	
Musculoskeletal Infectious disease	Osteoblastic activity	Osteomyelitis	Nuclear medicine	Fischman AJ	Uptake of bone- seeking radio- pharmaceuticals
Musculoskeletal Inflammatory	Increased synovial glucose metabolism	Arthritis / inflammatory	PET	Fischman AJ Palmer W Rosenthal DI	
Musculoskeletal Inflammatory	Joint space narrowing	Arthritis	Plain radiographs	Palmer W Rosenthal DI	
Musculoskeletal Inflammatory	Synovial thickening	Arthritis / inflammatory	MRI	Palmer W Rosenthal DI	
Musculoskeletal Inflammatory Metabolic	Periarticular erosion	Amyloid arthropathy / crystalline disease	Plain radiographs MRI	Palmer W Rosenthal DI	
Musculoskeletal Metabolic	Microarchitecture deterioration	Osteoporosis	Digital radiographs 3D microMRI 3D microCT	Rosenthal DI	Fine element modeling (FEM) to predict mechanical properties
Musculoskeletal Metabolic	Osseous bridging	Bone fracture / healing	Plain radiographs MRI CT	Palmer W Rosenthal DI	
Musculoskeletal Metabolic	Osteoblastic activity	Bone fracture / healing	Nuclear medicine	Fischman AJ	
Musculoskeletal Metabolic	Trabecular pore size	Osteoporosis	MRI	Rosenthal DI	

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Musculoskeletal Oncology / Neoplasm	Periarticular erosion	Synovial chondromatosis	Plain radiographs MRI	Palmer W Rosenthal DI	
Musculoskeletal Oncology / Neoplasm	Synovial thickening	Pigmented villonodular synovitis	MRI	Palmer W Rosenthal DI	
Musculoskeletal Metabolic	Bone fill score and penetration depth	Bone fracture / healing and distraction osteogenesis wounds	US	O'Neill MJ	Animal study Bone healing assessed by increased fill and decreased penetration depth
Musculoskeletal Inflammatory	Cyst composition / tissue characterization	Ganglion cyst	US CT MRI	Rosenthal DI	
Musculoskeletal Oncology / Neoplasm	Change in local tissue density or contrast enhancement	Neoplasm / primary and secondary	CT MRI	Palmer WE Rosenthal DI	Multicenter Trail with 367 patients CT and MRI equally reliable for diagnosis
Musculoskeletal Oncology / Neoplasm	Local uptake of specific tumor avid radiotracers	Neoplasm / primary and secondary	Nuclear medicine	Fischman AJ	
Musculoskeletal Inflammatory	Articular cartilage thickness	Arthritis / inflammatory	Plain radiographs MRI	Palmer W Rosenthal DI	
Musculoskeletal Inflammatory	Articular cartilage thickness	Arthritis / rheumatoid	Plain radiographs MRI	Palmer W Rosenthal DI	
Musculoskeletal Inflammatory	Periarticular erosion	Arthritis / inflammatory	Plain radiographs MRI	Palmer W Rosenthal DI	
Musculoskeletal Metabolic	Micro-architecture deterioration	Osteoporosis	Digital radiographs 3D microMRI 3D microCT	Rosenthal DI	Fine element modeling (FEM) to predict mechanical properties
Neurological	ACCD activation (anterior cingulate cortex division)	Attention deficit hyperactivity disorder (ADHD)	fMRI PET	Bush G Fischman A Rosen B	
Neurological	Altered vascular and tissue permeability	Asphyxia	CT	Gonzalez RG Grant E	
Neurological	Apparent diffusion constant (ADC)	Neurodegenerative disorders	fMRI MRI / diffusion weighted imaging	Jenkins BG Kennedy D Rosas HD Rosen B	
Neurological	Basal ganglia / putamen volume	Huntington's disease	MRI	Harris G	
Neurological	Blood oxygen level depletion	Neurodegenerative disorders	fMRI MRI / diffusion weighted imaging	Jenkins BG Kennedy D Rosas HD Rosen B	
Neurological	Blood oxygen level depletion (BOLD)	Dementia	fMRI	Rosen B	
Neurological	Cerebral blood flow (CBF)	Dementia	MRI / arterial spin labeling	Hoge R	
Neurological	Cerebral blood flow (CBF)	Epilepsy	MRI / arterial spin labeling	Hoge R Kwong KK	
Neurological	Cerebral blood flow (CBF)	Migraine	Laser speckle contrast imaging Diffuse optical topography	Boas D Bolay Dunn A	
Neurological	Cerebral blood flow (CBF)	Schizophrenia	PET	Alpert N Fischman A Heckers S Rauch SL Schaefer P	Regional activation during cognitive paradigms

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Neurological	Cerebral blood flow (CBF)	Parkinson's disease	MRI / Arterial spin labeling	Hoge R	
Neurological	Cerebral blood flow (CBF)	Migraine	Diffusion / perfusion weighted imaging fMRI	Grant E Schaefer P Sorensen AG Rosen BR	
Neurological	Cerebral blood volume (CBV)	Parkinson's disease	MRI / Arterial spin labeling	Hoge R	
Neurological	Cerebral blood volume (CBV)	Migraine	Diffusion / perfusion weighted imaging fMRI	Grant E Schaefer P Sorensen AG Rosen BR	
Neurological	Choline	CNS AIDS / neuroinflammation neurodegeneration	MRS	Gonzalez R Schaefer P Schwamm LH	
Neurological	Choline : creatine ratio	Huntington's disease	MRS	Jenkins BG Rosen B	
Neurological	Cortical thickness	Schizophrenia	MRI (morphometry)	Fischl B Harris G Kennedy D Kuperberg G	
Neurological	Cortical activation during provoked conditions	Obsessive compulsive disorder	fMRI PET SPECT	Fischman A Rauch SL Rosen BR	
Neurological	Cortical dysplasia	Epilepsy	MRI / MEG fMRI	Dale A Grant E Mandeville J Rosen B Stufflebeam SM Wald LL	
Neurological	Cortical spreading depression (CSD)	Migraine	Blood oxygen level dependent (BOLD) fMRI	Hadjikhani N Rosen BR Sorensen AG	Signal changes measured during visual aura
Neurological	Cortical thickness	Huntington's disease	fMRI MRI morphometry	Dale A Fischl B Harris G Kennedy D Rosas D	
Neurological	Cortical thickness	Obsessive compulsive disorder	MRI (morphometry)	Kennedy D	
Neurological	Cortical thickness and asymmetry	Attention deficit hyperactivity disorder (ADHD)	MRI (morphometry)	Kennedy D	
Neurological	Cortical thickness, volume and location	Brain development / -anencephaly -microcephaly -holoprosencephaly	MRI morphometry fMRI	Caviness VS Dale A Fischl B Kennedy D	
Neurological	Directed molecular probes	Huntington's disease	MRI PET Optical	Fischman A Weissleder R	
Neurological	Directed molecular probes	Parkinson's disease	PET Optical	Weissleder R	
Neurological	Dopamine binding potential	Parkinson's disease	SPECT (using I-123 altropane)	Fischman A Halpern E Sahani D	
Neurological	Dopamine transporter (DAT) density	Parkinson's disease	SPECT (using I-123 altropane)	Fischman A Halpern E Sahani D	
Neurological	Dopamine transporter density	Attention deficit hyperactivity disorder (ADHD)	SPECT	Fischman A Rauch SL	
Neurological	Dopaminergic neurotransmitter activity	Parkinson's disease	fMRI PET	Fishman A Livni E Rosen B	Pet using 11C-CRT
Neurological	Early diffusion changes	Asphyxia	Diffusion weighted imaging	Grant E Schaefer P Sorensen AG	

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Neurological	Focal atrophy	Brain injury / toxicity and trauma	MRI	Caviness VS Kennedy D	
Neurological	Focal brain uptake	CNS AIDS / fungal and opportunistic infections	PET SPECT	Fischman A	
Neurological	Frontal language area	Autism	MRI	Caviness VS Harris G Kennedy D	Reversal of morphometric asymmetry in frontal language area
Neurological	Frontal language area	Autism	fMRI	Harris G	Abnormal fMRI activation of frontal language areas during semantic language tasks
Neurological	Hyperperfusion	Epilepsy	MRI / arterial spin labeling	Hoge R Kwong KK	
Neurological	Lactate	Huntington's disease	MRS	Jenkins BG Rosen B	
Neurological	Lactate : choline ratio	Asphyxia	MRS	Jenkins B	
Neurological	Mean transit time (MTT)	Migraine	Diffusion / perfusion weighted imaging fMRI	Grant E Schaefer P Sorensen AG Rosen BR	
Neurological	Myoinositol (MI)	CNS AIDS / neuroinflammation neurodegeneration	MRS	Gonzalez R Schaefer P Schwamm LH	
Neurological	N-acetylaspartate (NAA)	CNS AIDS / neuroinflammation neurodegeneration	MRS	Gonzalez R Schaefer P Schwamm LH	
Neurological	N-acetylaspartate (NAA)	Huntington's disease	MRS	Jenkins BG Rosen B	
Neurological	N-acetylaspartate (NAA) lateralization	Epilepsy	MRS	Jenkins BG	
Neurological	N-acetylaspartate (NAA) levels over time	Parkinson's disease	MRS	Gonzales RG Jenkins BG	
Neurological	Neural activation of dorsolateral pre-frontal cortex, hippocampus and cerebellum	Schizophrenia	PET	Alpert N Fischman A Heckers S Rauch SL Schaefer P	Regional activation during cognitive paradigms
Neurological	Neuronal activation	Visual process disorders	fMRI	Mandeville JB Rosen B Tootell RBH	
Neurological	Relative cerebral blood flow (rCBF)	Anorexia	PET	Alpert N Fischman A Rauch SL	
Neurological	Restricted diffusion	Migraine	Optical	Boas D Dunn A	
Neurological	Restricted water mobility	Brain injury	Diffusion weighted imaging Apparent diffusion constant	Huisman TA Gonzalez RG Schaefer P Sorensen AG	Cytotoxic edema, vasogenic edema and diffuse axonal injury
Neurological	Seizure focus	Epilepsy	MEG / EEG	Halgren E Stufflebeam SM	
Neurological	Specific regional uptake, target selection and functional activation	Schizophrenia	fMRI	Kuperberg G Manoach D Stufflebeam SM Rosen B	Regional activation during cognitive paradigms

Disease Category

Neurological	Whole brain morphometry	Obsessive compulsive disorder	MRI (morphometry)	Kennedy D Rosen BR	Findings include sig. less total white-matter and greater cortex and opercular volumes
Neurological	Choline	Hepatic encephalopathy	MRS	Grant E Jenkins BG Schaefer P	
Neurological	Glucose	Hepatic encephalopathy	MRS	Grant E Jenkins BG Schaefer P	
Neurological	Lactate	Hepatic encephalopathy	MRS	Grant E Jenkins BG Schaefer P	
Neurological	N-acetylaspartate (NAA)	Hepatic encephalopathy	MRS	Grant E Jenkins BG Schaefer P	
Neurological Cardiology / Vascular	Anatomic disruption of arterial wall	Carotid dissection	US CT / CTA MRI / MRA Angiography	Gonzalez R Waltman A	
Neurological Oncology / Neoplasm	Cerebral blood flow (CBF)	CNS neoplasm / primary and secondary, presence and viability	Optical	Boas D Dunn A	Diffuse optical imagine (DOI)
Neurological Oncology / Neoplasm	Choline	CNS neoplasm / primary and secondary	MRS	Gonzalez R Husiman TA Sorensen AG	Metabolism, tumor viability and response to therapy
Neurological Oncology / Neoplasm	Glucose metabolism	CNS neoplasm / primary and secondary, presence and viability	PET	Alpert N Choi N Fischman A Kennedy D Rosen B	Non-specific marker with wide variety of applications
Neurological Oncology / Neoplasm	Lactate	CNS neoplasm / primary and secondary	MRS	Gonzalez R Husiman TA Sorensen AG	Metabolism, tumor viability and response to therapy
Neurological Oncology / Neoplasm	Lesion volume	CNS neoplasm / primary and secondary	CT MRI morphometry	Gonzalez R Harris G Kennedy D Lev Schaefer P Sorensen AG	Anatomic marker of disease presence Response to therapy
Neurological Oncology / Neoplasm	Microvascular blood volume and microvascular density	CNS neoplasm / primary and secondary	fMRI MRI	Belliveau Kennedy D Rosen BR	
Neurological Oncology / Neoplasm	N-acetylaspartate (NAA)	CNS neoplasm / primary and secondary	MRS	Gonzalez R Husiman TA Sorensen AG	Metabolism, tumor viability and response to therapy
Neurological Oncology / Neoplasm	Oxygen consumption	CNS neoplasm / primary and secondary, presence and viability	Optical	Boas D Dunn A	Diffuse Optical imagine (DOI)
Neurological Oncology / Neoplasm	Phosphocreatine	CNS neoplasm / primary and secondary	MRS	Gonzalez R Husiman TA Sorensen AG	Metabolism, tumor viability and response to therapy
Neurological Oncology / Neoplasm	Targeted cellular and molecular probes	CNS neoplasm / primary and secondary, presence and viability	Optical MRI PET	Kwong KK Weissleder R	Exogenous contrast agents Animal models
Neurological Oncology / Neoplasm	Tumor angiogenesis	CNS neoplasm / primary and secondary	MRI MRS MRA	Davis T Rosen B Wald LL Weissleder R	Measured by dynamic susceptibility contrast (DSC) and monocrySTALLINE iron oxide nanoparticles (MION)

Disease Category

Neurological Oncology / Neoplasm	Tumor angiogenesis	Glioma	MRI MRS MRA	Davis T Rosen B Wald LL Weissleder R	Measured by dynamic susceptibility contrast (DSC) and monocrystalline iron oxide nanoparticles (MION)
Neurological Oncology / Neoplasm	Tumor growth rate	CNS neoplasm / primary and secondary	MRI	Bogdanov A Weissleder R	Serial studies of tumor volume using uptake of long-circulating dextrin coated iron oxide (LCDIO) Rodent model
Neurological Oncology / Neoplasm	Tumor growth rate	CNS Neoplasm / schwannoma and neurofibromatosis	MRI	Tang Y Weissleder R	Transgenic murine models of neurofibromatosis
Neurological Oncology / Neoplasm	Vascular volume fraction	Glioma	Optical	Weissleder	
Neurological Cardiology / Vascular	Apparent diffusion constant (ADC)	Stroke	Diffusion weighted imaging fMRI MRI (morphometry)	Kennedy D Lo E Rosen B	
Neurological Cardiology / Vascular	Cerebral Blood flow (CBF)	Stroke	Optical imaging	Boas, D Dunn, A Lo E	
Neurological Cardiology / Vascular	Cerebral blood flow (CBF)	Stroke	MRI (combined Arterial spin labeling and Dynamic susceptibility contrast) CAPTIVE	Harris G Hoge R Ostergaard L Rosen B Sorensen AG Wald LL	MTT helps to stratify patients in clinical trials MR perfusion territory imaging
Neurological Cardiology / Vascular	Cerebral blood flow (CBF)	Stroke / ischemic	CAPTIVE MRI	Bogdanov A Jenkins B Kwong K Weissleder R	
Neurological Cardiology / Vascular	Cerebral blood volume (CBV)	Stroke	MRI (combined Arterial spin labeling and Dynamic susceptibility contrast) CAPTIVE	Harris G Hoge R Ostergaard L Rosen B Sorensen AG Wald LL	MTT helps to stratify patients in clinical trials MR perfusion territory imaging
Neurological Cardiology / Vascular	CMRO2	Stroke	fMRI Diffuse optical topography (Near infrared spectroscopy)	Boas D Mandeville JB Strangman G	NIRS agrees well with fMRI, useful in longitudinal studies
Neurological Cardiology / Vascular	Cortical activation during sensorimotor tasks	Stroke / recovery	fMRI	Schaechter J Rosen BR	
Neurological Cardiology / Vascular	Flow heterogeneity (FH)	Stroke	MRI (combined Arterial spin labeling and Dynamic susceptibility contrast) CAPTIVE	Harris G Hoge R Ostergaard L Rosen B Sorensen AG Wald LL	MTT helps to stratify patients in clinical trials MR perfusion territory imaging
Neurological Cardiology / Vascular	Intravascular thrombus	Stroke	CT / CTA MRI / MRA Angiography	Caviness VS Gonzalez RG Schaefer P Sorensen AG	

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Neurological Cardiology / Vascular	Ischemic brain tissue	Stroke / ischemic	Diffusion / perfusion weighted imaging MRI CT perfusion CTA	Gonzalez R Harris G Sorensen AG	
Neurological Cardiology / Vascular	Mean transit time (MTT)	Stroke	MRI (combined Arterial spin labeling and Dynamic susceptibility contrast) CAPTIVE	Harris G Hoge R Ostergaard L Rosen B Sorensen AG Wald LL	MTT helps to stratify patients in clinical trials MR perfusion territory imaging
Neurological Cardiology / Vascular	Neuronal activation	Stroke	fMRI Diffuse optical topography (Near infrared spectroscopy)	Boas D Mandeville JB Strangman G	NIRS agrees well with fMRI, useful in longitudinal studies
Neurological Cardiology / Vascular	Neuronal activation CMRO2	Stroke	Arterial spin labeling MRI O2 15 PET Xenon Enhanced CT	Wald LL	
Neurological Cardiology / Vascular	Oxygen consumption	Stroke	Optical imaging	Boas, D Dunn, A Lo E	
Neurological Cardiology / Vascular	Relative cerebral blood flow index (rCBF)	Stroke	Diffusion weighted imaging fMRI MRI (morphometry)	Kennedy D Lo E Rosen B	
Neurological Cardiology / Vascular	Relative cerebral blood volume (rCBV)	Stroke / ischemic	CAPTIVE MRI	Bogdanov A Jenkins B Kwong K Weissleder R	
Neurological Cardiology / Vascular	Subendothelial lipid pool	Vulnerable plaque	Optical coherence topography Near infrared spectroscopy	Brady T Muller J	
Neurological Cardiology / Vascular	Vascular occlusion	Stroke / ischemic	Diffusion / perfusion weighted imaging MRI CT perfusion CTA	Gonzalez R Harris G Sorensen AG	
Neurological Cardiology / Vascular	Water EF	Stroke / ischemic	CAPTIVE MRI	Bogdanov A Jenkins B Kwong K Weissleder R	
Neurological Cardiology / Vascular Inflammatory	Fibrous cap thickness	Vulnerable plaque	Optical coherence topography	Weissleder R	
Neurological Cardiology / Vascular Inflammatory	Macrophage content	Vulnerable plaque	Optical coherence topography	Weissleder R	
Neurological Cardiology / Vascular Inflammatory	Plaque Type	Vulnerable plaque	Optical coherence topography	Weissleder R	
Neurological Cardiology / Vascular Inflammatory	Targeted microbubble contrast agents	Vulnerable plaque	Contrast enhanced US	O'Neill MJ Waltman A	
Neurological Cardiology / Vascular Inflammatory	Thickness and composition of plaque	Vulnerable plaque	Intravascular US IVUS	Brady T Lev M O'Neill NJ Waltman A	
Neurological Cardiology/ Vascular Inflammatory	Atherosclerotic plaque temperature	Vulnerable plaque	Thermography	Brady T Lev M Waltman A	

Disease Category

Neurological Infectious disease	Diffuse cerebral edema with thalamic +/- cerebellar hypo-attenuation	Cerebral malaria	CT	Gonzalez RG	
Neurological Infectious disease	Diffuse cerebral edema with thalamic +/- cerebellar hypo-attenuation	Infectious disease / cerebral malaria	CT	Gonzalez RG	
Neurological Infectious disease	Restricted diffusion	Infectious disease / -empyema -herpes virus -CJD	Diffusion weighted imaging	Grant, E Schaefer P	
Neurological Infectious disease Inflammatory	Thalamus and substantia nigra hyperintensities	Encephalitis / west nile virus	MRI	Gonzalez RG Sorensen AG	Disease confirmation and progression monitoring
Neurological Inflammatory Musculoskeletal Genitourinary Infectious disease Gastrointestinal	Leukocyte accumulation	Abscess	SPECT	Fischman AJ	Tc-99m HMPAO improvement over TI-201 and Ga-67
Neurological Metabolic	Anterior cingulate size and thickness	Alzheimer's disease	MRI	Hyman B	Can distinguish normal from mild AD with 93% accuracy
Neurological Metabolic	Cerebral blood flow	Alzheimer's disease	Perfusion weighted imaging / Arterial spin labeling	Hoge R	
Neurological Metabolic	Cerebral blood flow (CBF)	Alzheimer's disease	Optical	Boas D Dunn A	Combining of multi-wavelength and laser speckle contrast imaging
Neurological Metabolic	Cerebral blood flow (CBF)	Brain function	MRI fMRI PET	Belliveau Kwong K Rosen BR	Response to stimuli
Neurological Metabolic	Cerebral blood flow (CBF)	Brain development	Optical Imaging	Boas D Dunn A	Diffuse optical imaging (DOI)
Neurological Metabolic	Cerebral blood flow (CBF)	Alzheimer's disease	SPECT fMRI	Harris G Gonzalez RG Sorensen AG	
Neurological Metabolic	Cerebral blood volume (CBV)	Brain function / drugs of abuse	fMRI	Jenkins B Kosofsky B Mandeville JB Rosen B	Response to stimuli
Neurological Metabolic	Cerebral blood volume (CBV)	Alzheimer's disease	SPECT fMRI	Harris G Gonzalez RG Sorensen AG	
Neurological Metabolic	Directed molecular probes	Alzheimer's disease	PET SPECT Optical	Fischman A Weissleder R	Animal modeling Optical with exogenous contrast agents
Neurological Metabolic	Entorhinal cortex	Alzheimer's disease	MRI	Hyman B	Can distinguish normal from mild AD with 93% accuracy
Neurological Metabolic	Hippocampal size	Alzheimer's disease	MRI Quantitative volumetric morphometry	Dale A Hyman B Fischl B Kennedy D	Accurately indicates absence of disease progression in therapeutic trials - allows markedly reduced subject numbers

Disease Category

Neurological Metabolic	Mean transit time (MTT)	Alzheimer's disease	SPECT fMRI	Harris G Gonzalez RG Sorensen AG	
Neurological Metabolic	Myoinositol	Alzheimer's disease	MRS	Gonzalez RG Jenkins B	
Neurological Metabolic	N-acetylaspartate (NAA)	Alzheimer's disease	MRS	Gonzalez RG Jenkins B	
Neurological Metabolic	N-acetylaspartate (NAA) Images	Brain function / neuronal content	MRI chemical shift Echo-planar imaging (EPI)	Gonzalez RG Jenkins B Rosen B	
Neurological Metabolic	Neuritic (senile) plaque	Alzheimer's disease	In vivo multiphoton microscopy	Hyman B	Can use histochemical or immunofluorescence for amyloid B
Neurological Metabolic	Neuronal injury	Alzheimer's disease	MRI	Gonzalez RG	
Neurological Metabolic	Oxygen consumption	Brain development	Optical Imaging	Boas D Dunn A	Diffuse optical imaging (DOI)
Neurological Metabolic	Oxygen utilization	Alzheimer's disease	Optical	Boas D Dunn A	Combining of multi-wavelength and laser speckle contrast imaging
Neurological Metabolic	rCMRO2	Brain function / drugs of abuse	fMRI	Jenkins B Kosofsky B Mandeville JB Rosen B	Response to stimuli
Neurological Metabolic	Relative cerebral blood flow (rCBF)	Brain function / mapping dopaminergic neurotransmitter activity	Pharmacologic MRI PET fMRI	Bogdanov M Chen YC Jenkins B Rosen B	Using D-amphetamine and CFT
Neurological Metabolic	Relative cerebral blood volume (rCBV)	Brain function / mapping dopaminergic neurotransmitter activity	Pharmacologic MRI PET fMRI	Bogdanov M Chen YC Jenkins B Rosen B	Using D-amphetamine and CFT
Neurological Musculoskeletal	Dopa decarboxylase activity	Dyskinesia (PNKD)	PET	Fischman A	
Neurological Cardiology / Vascular	Anatomic disruption of arterial wall	Intracranial arterial dissection	CTA MRA Angiography	Gonzalez R Lev MH Waltman A	
Neurological Cardiology / Vascular	Relative cerebral blood volume (rCBV)	Hypertension	Dynamic susceptibility contrast MRI	Hunter G Rosen B	Using Gd-DTPA following L-arginine infusion
Neurological Inflammatory	Choline / sodium (NA) ratio Creatine / sodium (NA) ratio	Multiple sclerosis	MRS	Jenkins B Gonzalez RG	
Neurological Inflammatory	Comparative brainstem analysis	Multiple sclerosis	MRI	Jenkins B Rosen BR Stufflebeam SM	
Neurological Inflammatory	Cortical thickness	Multiple sclerosis	fMRI MRI morphometry	Fischl B Kuperberg G	
Neurological Inflammatory	Decreased N-acetylaspartate (NAA)	Multiple sclerosis	MRS	Jenkins B Gonzalez RG	
Neurological Inflammatory	MS plaque demyelination	Multiple sclerosis	MRI	Jenkins B Rosen BR Stufflebeam SM	
Neurological Inflammatory	Thalamic neuronal loss	Multiple sclerosis	MRI fMRI MRS	Gonzalez RG Fischl B Kuperberg G	
Neurological Inflammatory	Tissue characterization	Multiple sclerosis	fMRI MRI morphometry	Fischl B Kuperberg G	

Disease Category

Neurological Musculoskeletal	Cortical activity	Pain	fMRI PET SPECT MEG	Fischman A Halgren E Rosen B Sorensen AG Stuffelbeam SM	
Neurological Oncology / Neoplasm	Blood-tumor barrier permeability (BTP)	Glioma	MRI fMRI	Gonzalez RG Kwong KK Sorensen AG Weissleder R	
Neurological Oncology / Neoplasm	Cerebral blood flow (CBF)	Glioma	MRI fMRI	Gonzalez RG Sorensen AG Rosen B	
Neurological Oncology / Neoplasm	Cerebral blood volume (CBV)	Glioma	MRI fMRI	Gonzalez RG Sorensen AG Rosen B	
Neurological Oncology / Neoplasm	Glucose metabolism	Head and neck neoplasm / primary and secondary	PET	Alpert N Choi N Fischman A	Non-specific marker with wide variety of applications
Neurological Oncology / Neoplasm	Glucose uptake	Glioma	PET	Fischman A Kennedy D Rosen B	
Neurological Oncology / Neoplasm	Lesion volume	Head and neck neoplasm / primary and secondary	CT MRI	Gonzalez R Lev MH Schaefer P Schwamm Sorensen AG	Anatomic marker of disease presence
Neurological Oncology / Neoplasm	Tumor margin	Glioma	MRI	Weissleder R	Via ultra small particulate iron oxide (USPIO)
Neurological Inflammatory Infectious disease	Restricted diffusion	Abscess	Diffusion weighted imaging	Grant E Gonzalez RG Schaefer P	
Oncology / Neoplasm	Angiogenesis	Breast neoplasm	US	O'Neill MJ	Microbubble contrast agents
Oncology / Neoplasm	Anti-tumor antibody	Neoplasm / primary and secondary	Optical	Ntziachristos V Weissleder R	Targeted Fluorochromes
Oncology / Neoplasm	Apoptosis Caspase-1 Caspase-3	Neoplasm / primary and secondary	Optical	Ntziachristos V Weissleder R	Active, stable Fluorochromes
Oncology / Neoplasm	Apoptosis Phosphatidylserine	Neoplasm / primary and secondary	Optical	Ntziachristos V Weissleder R	Active, stable Fluorochromes
Oncology / Neoplasm	Cathepsin D	Neoplasm / primary and secondary	Optical	Ntziachristos V Weissleder R	Active, stable Fluorochromes
Oncology / Neoplasm	Cyst composition / tissue characterization	Fibrocystic change	US CT MRI	Kopans DB	
Oncology / Neoplasm	Directed molecular probes	Neoplasm / primary and secondary	MRI PET Optical	Fischman AJ Hunter GJ Weissleder R	
Oncology / Neoplasm	Enzymatic activity	Neoplasm / primary and secondary	Optical	Weissleder R	Rodent model
Oncology / Neoplasm	Fluorescent proteins / exogenous	Neoplasm / primary and secondary	Macroscopic fluorescence reflective imagine (FRI) Fluorescence molecular tomography (FMT)	Ntziachristos V Weissleder R	Green fluorescence proteins (GFPs) Ds Red Hc Red
Oncology / Neoplasm	Folate receptor	Neoplasm / primary and secondary	Optical	Ntziachristos V Weissleder R	Targeted Fluorochromes
Oncology / Neoplasm	Glucose metabolism	Breast neoplasm	PET	Alpert NM Choi NC Fischman AJ	

Disease Category

Oncology / Neoplasm	Glucose metabolism	Lung neoplasm / non small cell carcinoma	PET	Choi NC Fischman AJ Weissleder R	Pilot trial in NSCLC showed good inverse correlation between MR post radiation and outcomes
Oncology / Neoplasm	Glucose metabolism	Pulmonary neoplasm / presence and viability	PET	Fischman AJ	Non-specific marker with wide variety of applications
Oncology / Neoplasm	Glucose transporter	Neoplasm / primary and secondary	Optical	Ntziachristos V Weissleder R	Targeted Fluorochromes
Oncology / Neoplasm	Human transferrin receptor	Neoplasm / primary and secondary	MRI	Weissleder R	Receptor binding probe linking transferrin and monocrySTALLINE iron oxide (Tf-MION)
Oncology / Neoplasm	Increased pulmonary interstitial markings	Lymphangio-carcinomatosis	CT	McLoud TC Mueller PR Shepard J Weissleder R	
Oncology / Neoplasm	Lesion volume	Lung neoplasm / primary and secondary	CT MRI	Hunter GJ	Anatomic marker of disease presence
Oncology / Neoplasm	Matrix metalloproteinase-2 MMP-9 MMP-13	Neoplasm / primary and secondary	Optical	Ntziachristos V Weissleder R	Active, stable Fluorochromes
Oncology / Neoplasm	Mediastinal nodal status	Lung neoplasm / primary and secondary	PET MRI CT	Fischman AJ McLoud TC Weissleder R	Physiologic imaging with FDG or iron oxide particles in NSCLC
Oncology / Neoplasm	Microvascular blood volume	Breast neoplasm	US	O'Neill MJ	Microbubble contrast agents
Oncology / Neoplasm	Microvascular density	Breast neoplasm	US	O'Neill MJ	Microbubble contrast agents
Oncology / Neoplasm	Microvessel density (MVD)	Breast neoplasm	MRI	Kopans DB	Magnetic susceptibility-based contrast agent OR GD-DTPA with dynamic echo planar imaging
Oncology / Neoplasm	N-acetylaspartate (NAA)	Hodgkin's disease	MRS	Jenkins B Kennedy D Rosas D Rosen BR	
Oncology / Neoplasm	Permeability surface area product	Pulmonary neoplasm	PET MRI	Fischman AJ McLoud TC	
Oncology / Neoplasm	Pharmacokinetics Biodistribution Non-tumor uptake	Neoplasm / primary and secondary	SPECT PET MRS	Fischman AJ Jenkins B	Additional use for determining in vivo heterogeneity of tumor uptake
Oncology / Neoplasm	Prostate-specific antigens (PSA)	Prostate cancer	Optical	Ntziachristos V Weissleder R	Active, stable Fluorochromes
Oncology / Neoplasm	Regional blood flow and blood volume	Breast neoplasm	MRI	Kopans DB	Magnetic susceptibility-based contrast agent OR GD-DTPA with dynamic echo planar imaging
Oncology / Neoplasm	Soft tissue inflammation	Neoplasm / primary and secondary	Nuclear medicine MRI	Fischman AJ Palmer WE Rosenthal DI	

Disease Category

Oncology / Neoplasm	Somatostatin receptor	Neoplasm / primary and secondary	Optical	Ntziachristos V Weissleder R	Targeted Fluorochromes
Oncology / Neoplasm	Tumor angiogenesis	Neoplasm / primary and secondary	MRI Dynamic susceptibility contrast (DSC) / monocrySTALLine iron oxide nanoparticles (MION)	Bogdanov A Bremer C Rosen BR Weissleder R	High resolution MR using long circulating iron oxide contrast agents Rodent model
Oncology / Neoplasm	Tumor angiogenesis Macromolecular contrast extravasate	Neoplasm / primary and secondary	MRI SPECT	Bogdanov A Weissleder R	Animal model using pegylated DOTA derivatized graft copolymers
Oncology / Neoplasm	Tumor growth rate	Neoplasm / primary and secondary	MRI SPECT Dual tracer NMR	Bogdanov A Kwong K Weissleder R	SPECT via uptake of long-circulating dextrin coated iron oxide (LCDIO) Rodent model
Oncology / Neoplasm	Tumor mass	Neoplasm / primary and secondary	Optical	Weissleder R	
Oncology / Neoplasm	Tumor volume	Breast neoplasm	MRI	Harris G	
Oncology / Neoplasm	Tumoral proteinase	Neoplasm / primary and secondary	Optical Near infrared spectroscopy	Bogdanov A Mahmood U Weissleder R	Rodent model
Oncology / Neoplasm	Vascular volume fraction	Sarcoma	Optical	Weissleder R	
Oncology / Neoplasm	Microcalcifications	Breast neoplasm	Raman Spectroscopy	Feld MS (MIT)	Differential diagnosis of benign from malignant microcalcifications
Oncology / Neoplasm	Presence of contralateral synchronous cancers	Breast neoplasm	MRI	Kopans DB	4 of 17 patients (24%) had contralateral cancer occult to physical exam, mammography and US
Oncology / Neoplasm	Tumor associated enzymatic activity	Breast neoplasm	Optical Near infrared spectroscopy	Bremer C Bogdanov A Weissleder R	Expression levels of cathepsin-B activity in animal models of breast cancer
Oncology / Neoplasm	Pulmonary consolidation	Aveolar bronchial cell carcinoma	CT MRI	McLoud TC Shepard J	
Oncology / Neoplasm Gastrointestinal	Portal Venous invasion	Pancreatic carcinoma	MRA	Halpern EF Saini S Waltman AC	Better predictor than conventional angiography
Oncology / Neoplasm Gastrointestinal	Vascular involvement	Pancreatic carcinoma	MRA	Halpern EF Saini S Waltman AC	Better predictor than conventional angiography
Oncology / Neoplasm Genitourinary	Lesion volume	Adenopathy, lymphoma and metastatic disease	US CT MRI	Harisinghani M Mueller PR O'Neill MJ Saini S	Anatomic marker of disease presence
Oncology / Neoplasm Genitourinary	Relative % contrast washout	Adrenal neoplasm	CT	Boland GW Hahn PF Mueller PR	Differential diagnosis of adrenal masses
Oncology / Neoplasm Endocrine	Cystic nodal metastases	Thyroid carcinoma	US	Hahn PF Harisinghani M Mueller PR O'Neill MJ	

Disease Category

Oncology / Neoplasm Genitourinary	Prostate volume	Benign prostatic hypertrophy	US CT MRI	Hahn PF Mueller PR O'Neill MJ	
Oncology / Neoplasm Musculoskeletal	Cyst composition / tissue characterization	Synovial cell sarcoma	US CT MRI	Rosenthal DI	
Oncology / Neoplasm Musculoskeletal	Glucose metabolism	Soft tissue neoplasm / primary and secondary	PET	Fischman AJ	Non-specific marker with wide variety of applications
Oncology / Neoplasm Gastrointestinal	99mTc labeled monoclonal antibody	Colorectal carcinoma	SPECT	Fischman AJ	Phase III clinical trial with HumaSPECT-Tc
Oncology / Neoplasm Gastrointestinal	Glucose metabolism	Hepatic neoplasm / primary and secondary	PET	Fischman AJ	Non-specific marker with wide variety of applications
Oncology / Neoplasm Gastrointestinal	Lesion detection	Hepatic neoplasm / primary and secondary	MRI	Hahn PF Harisinghani M Saini S Weissleder R	Increased SNR and CNR with liver specific contrast agent GD-BOPTA and mangafodipir
Oncology / Neoplasm Gastrointestinal	Lesion volume	Hepatic neoplasm / primary and secondary	US CT MRI	Harris G Mueller PR O'Neill MJ Saini S	Anatomic marker of disease presence
Oncology / Neoplasm Gastrointestinal	Liver tissue characterization	Cholangio-carcinoma	MRI	Hahn PF Halpern EF Sahani D	Using combined ferrumoxide / Gd-DPTA
Oncology / Neoplasm Gastrointestinal	Liver tissue characterization	Hepatic hemangioma	MRI US	Hahn PF Harisinghani M Mueller PF O'Neill MJ Saini S Weissleder R	Using ultrasmall superparamagnetic iron oxide OR Gd-based chelates
Oncology / Neoplasm Gastrointestinal	Liver tissue characterization	Hepatocellular carcinoma	MRI	Hahn PF Harisinghani M Mueller PR Weissleder R	Using ultrasmall superparamagnetic iron oxide, mangafodipir trisodium
Oncology / Neoplasm Gastrointestinal	Liver tissue characterization	Hepatocellular carcinoma	MRI	Hahn PF Halpern EF Harisinghani M Sahani D	Using combined ferrumoxide / Gd-DPTA
Oncology / Neoplasm Gastrointestinal	Vascular architecture	Hepatic neoplasm / primary and secondary	Multidetector CT angiography (MDCTA)	Hahn PF Mueller PR Saini S Sahani D	Presurgical treatment planning
Oncology / Neoplasm Genitourinary	Glucose metabolism	Ovarian neoplasm / presence and viability	PET	Fischman AJ	Non-specific marker with wide variety of applications
Oncology / Neoplasm Genitourinary	Prostate volume	Prostate cancer	US CT MRI	Hahn PF Mueller PR O'Neill MJ	
Oncology / Neoplasm Genitourinary	ROC curve analysis of 13 CT radiographic parameters	Ovarian neoplasm / presence and viability	CT	O'Neill MJ	Predictive model of relative success of surgical cytoreduction
Oncology / Neoplasm Genitourinary	Spermine levels	Prostate cancer	MRS magic angle spinning	Cheng LL Gonzalez RG	Proposed endogenous inhibitor of prostate CA growth

Disease Category

Oncology / Neoplasm Inflammatory	Abnormal lymphatic uptake of tracer	Lymphatic extension of pelvic malignancy (gynecological oncology)	MRI	Hahn PF Harisinghani M Mueller PR Saini S Weissleder R	MR Lymphangiography using ultrasmall superparamagnetic iron oxide
Oncology / Neoplasm Gastrointestinal	18 F-fluorodeoxyglucose	Pancreatic carcinoma	PET	Fischman AJ	
Oncology / Neoplasm Gastrointestinal	Contrast enhanced tissue characterization	Pancreatic mass	MRI cholangio - pancreatography	Prasad S Sahani D Saini S	
Oncology / Neoplasm Gastrointestinal	Degree of circumferential vessel involvement	Pancreatic adrenal carcinoma	Multidetector CT angiography (MDCT) / CTA	Boland GW Mueller PR Saini S	
Oncology / Neoplasm Gastrointestinal	Splenic tissue characterization	Splenic cysts	MRI	Hahn PF Harisinghani M Mueller PR Weissleder R	Using ultrasmall superparamagnetic iron oxide
Oncology / Neoplasm Gastrointestinal	Splenic tissue characterization	Splenic neoplasm	MRI	Hahn PF Harisinghani M Mueller PR Weissleder R	Using ultrasmall superparamagnetic iron oxide
Oncology / Neoplasm Genitourinary	Cyst composition / tissue characterization	Renal neoplasm / primary and secondary	US CT MRI	Mueller PR	
Oncology / Neoplasm Genitourinary	Glucose metabolism	Renal neoplasm / primary and secondary	PET	Fischman AJ	
Oncology / Neoplasm Genitourinary	Lesion volume	Renal neoplasm / primary and secondary	US CT MRI	Mueller PR O'Neill MJ Saini S	Anatomic marker of disease presence
Oncology / Neoplasm Genitourinary	Cyst composition / tissue characterization Soft tissue inflammation	Simple renal cysts	US CT MRI	Mueller PR	
Oncology / Neoplasm Genitourinary	Soft tissue inflammation	Simple renal cysts	US CT MRI	Mueller PR	
Oncology / Neoplasm Gastrointestinal Endocrine	Liver tissue characterization	Hepatic focal nodular hyperplasia	MRI	Hahn PF Halpern EF Sahani D	Using combined ferrumoxide / Gd-DPTA
Oncology / Neoplasm Gastrointestinal Endocrine	Liver tissue characterization	Hepatic focal nodular hyperplasia	MRI	Hahn PF Harisinghani M Mueller PR Weissleder R	Using ultrasmall superparamagnetic iron oxide, mangafodipir trisodium
Oncology / Neoplasm Musculoskeletal	Glucose metabolism	Osseous neoplasm / primary and secondary	PET	Fischman AJ	
Oncology / Neoplasm Musculoskeletal	Osteoblastic activity	Osseous neoplasm / primary and secondary	Nuclear medicine	Fischman A	
Oncology / Neoplasm Musculoskeletal	Tissue characterization	Osseous neoplasm / primary and secondary	CT MRI	Rosenthal DI	

*Given the breadth of biomarkers in imaging and the rapid progress being made in this area, this catalog necessarily represents a work in progress. While the Center has done its best to incorporate imaging biomarkers from beyond the MGH community, our limited resources mean that the foundation of this catalog is the imaging biomarkers available at MGH. Should you wish to bring additional imaging biomarkers to our attention, please [click here](#).