Microscopy in Medicine Core Publications 2000-2014

Since 2000, the Microscopy in Medicine (MiM) Core facility, under the direction of Dr. Lula Hilenski, has supported studies on the following:

(**a**) detection of ROS production by cytochemical fluorescence methods within arteries both in animal vascular cells [1-3], within the brain circumventricular organ [4] and within arteries both in animal [1, 5-10] and in human vascular disease [11]; in a mouse model of renal ischemia-reperfusion injury [12]; in mitochondria from angiotensin II-stimulated endothelial cells [13]; and by new hydrocyanine probes for superoxide in angiotensin II-stimulated rat aortic smooth muscle cells [14]

(**b**) the localization of signaling molecules or signaling compartments in angiotensin II [15, 16], redox-sensitive [17] and angiogenic [17-21] pathways in vascular cells and tissues, and of intracellular signaling cascades in T cells from patients with acute coronary syndrome [22] or with rheumatoid arthritis [23]

(**c**) localization of NADPH oxidase components in vascular cells and tissues [24-30]

(**d**) characterization of transgenic mouse models for hypertension [31] and hypertrophy [32]

(**e**) morphometric measurements of vascular hypertrophy [33, 34], atherosclerotic lesion size [32, 35, 36], and injury-induced neointimal formation [37, 38], of computed relative distributions of stress in murine and human plaques [39, 40], and of elastin breaks in aortas from mouse models deficient in NADPH oxidase activity [41]

(**f**) immunostaining of ischemic and nonischemic tissues [42] and of bone marrow-derived [43] and human peripheral blood-derived [44] CD31+ cells in mouse models of impaired neovascularization [42, 43]

(**g**) immunohistochemical staining of cell-specific [11, 45, 46], apoptotic [37], inflammatory [47-50], proinflammatory cytokines [51] and atherosclerotic markers in lesions and vascular wall remodeling [45, 48, 52-54] and in analyses of collateral vessel formation [55], of extracellular matrix markers in bone healing [56], of extracellular copper-containing enzymes in intimal lesions [57], of growth factor receptor expression in diabetic mice [58] and of sodium chloride co-transporter trafficking in the kidney [59]

(**h**) localization of fluorescent eNOS mRNA [60] in endothelial cells, NOS protein in endocardium [61] and isoforms of actin in endothelial cells [60] and vascular smooth muscle cells [62, 63]

(**i**) immunohistochemical staining of bone morphogenic protein 4 (BMP4), secreted BMP antagonists and BMP receptor II (BMPII) in cultured bovine endothelial cells, in mouse and human blood vessels exposed to unstable flow conditions [64, 65] and in calcified and non-calcified human aortic valve sections [66]

(**j**) immunostaining of inflammatory cells in aortas in mouse models of hypertension [34]

(**k**) fluorescence imaging of transfected truncation variants of the Na+ channel protein fused to green fluorescence protein (GFP) in a model of heart failure [67]

(**l**) assessment of endothelial cell angiogenic capacity based on the sprouting of vascular tubes into collagen gels [68] and in mouse models of hindlimb ischemia [69, 70] or myocardial infarction [71]

(**m**) subcellular localization of isoforms of the mechanosensitive antioxidant peroxiredoxin in endothelial cells exposed to static, laminar or oscillatory shear stress [72]

(**n**) fluorescence measurement of the mitochondrial inner membrane electrochemical potential [73] or production of mitochondrial superoxide using MitoSOX [74, 75] in angiotensin II-stimulated endothelial cells

(**o**) localization of quantum dot-labeled adhesion proteins to view 3D enface images of aortic endothelial cells [76] and to compute temporal and spatial distributions of wall shear stress in mouse aortas [77]

(**p**) detection of polyketal-encapsulated fluorescent superoxide dismutase (SOD) after injection into the heart in a rat model of ischemia/reperfusion injury, with subsequent reduced superoxide production shown by dihydroethidium staining [78]
(**q**) the intracellular localization of fluorescent superparamagnetic iron oxide nanoparticles (SPIOs) in human mesenchymal stem cells, potential delivery devices for homing of stem cells to sites of injury using magnetic targeting [79]
(**r**) immunolabeling of hydrogen peroxide-dependent osteopontin and inflammatory cell expression and of human mesenchymal stem cells in alginate capsules [80] in a mouse model of hind limb ischemia [81]
(**s**) picrosirius red staining to assess collagen in hearts from a murine cardiac injury model [82] and to assess delivery to the heart of microparticles loaded with inhibitors to the p38 MAPK pathway [83], picrosirius red staining and immunolabeling of lysyl oxidase/lysyl oxidase-like protein [84, 85] and immunolabeling of metalloproteinases [86] in a mouse model of abdominal aortic aneurysm formation
(**t**) immunolabeling of leukocytes, monocytes and endothelial cell markers and fluorescent in situ hydridization in angiogenic colony-forming units to measure circulating bone marrow-derived proangiogenic cells [87]
(**u**) localization of fluorescently-labeled bone marrow mononuclear cells transplanted into mouse models of diabetes [88]
(**v**) measurements of G actin incorporation in PDGF-stimulated vascular smooth muscle cell protrusions during migration [62]
(**w**) immunolabeling of angiotensin-converting enzyme (ACE) in atherosclerotic lesions in genetic models of mice expressing either soluble or somatic ACE [89]
(**x**) localization of actin-binding proteins in migrating vascular cells [90]
(**y**) measurement of mitochondrial lengths in mouse models of mitochondrial dysfunction [91]
(**z**) immunolabeling of endothelium-specific proteins in development of immortalized mouse aortic endothelial cells [92]
(**aa**) labeling of mechanosensitive microRNAs using fluorescence *in situ* hybridization in carotid arteries in a mouse model of carotid artery ligation [93]
(**bb**) localization of transplanted fluorescently labeled cardiomyocytes, purified using molecular beacons and fluorescence-activated cell sorting, in a mouse model of acute myocardial infarction showing integration of the transplanted cardiomyocytes [94]
(**cc**) cytochemistry of differentiated mesenchymal stem cells assessed with oil red O (adipogenic), alizarin red (osteogenic) and toluidine blue (chondrogenic) [95, 96]
(**dd**) fluorescence imaging of osteopontin-deficient mouse aortic smooth muscle cells to assess functional impact of miR181a overexpression on cell adhesion [97]
(**ee**) immunohistochemistry of osteopontin, bone sialoprotein and fibronectin during bone fracture healing in osteopontin-deficient mice [56]
(**ff**) *en face* immunolabeling of endothelial cells to assess hemodynamic changes in a murine aortic coarctation model using nitinol clips [10, 98]
(**gg**) immunolabeling of bone marrow-derived lymphatic endothelial progenitor cells in a mouse model of lymphatic neovascularization [99]
(**hh**) immunostaining of cardiomyocytes generated from human pluripotent stem cells in a two-dimensional differentiation system [100]
(**ii**) immunolabeling of DNA methyltransferase to show epigenetic DNA methylation patterns in areas of disturbed flow following partial carotid ligation in mouse models [101]

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