

Methods Overview

Wavelength 488

Title	Author (Journal)	Year	Applications	Purpose	Animal	Dyes	Proflex	Notes
Skin derived stem cells scaffold regenerate axons of injured dorsal root	F. Colleoni (CellR4)	2014	Stem Cells Peripheral and central nervous system	This study demonstrates the efficacy of SDSCs transplanted in supporting the regeneration of the injured DR	Rats	GFP-SDSC 488 conjugated CTB	S-1500	
Molecular neuroimaging of post-injury plasticity	Y. Jouroukhin (J Mol Neurosci)	2014	Peripheral nerve injury Deep brain plasticity	They show that post-injury plasticity involves increases in transcription levels of c-fos in layer V of S1, both contralateral and ipsilateral to the injured limb	Rats	Lentivirus encoding YFP (ZsYellow1)	S-650/B	
Probe-based confocal laser endomicroscopy (pCLE) – a new imaging technique for in situ localization of spermatozoa	M. Trottmann (J Biophotonics)	2014	Reproduction	They localized vital spermatozoa and compared the images to confocal laser scanning microscopy. The goal was to improve the quality and targeting of testicular sperm extraction in azoospermic patients	Excised human tissue specimen and ejaculate	Acriflavine Fluorescein FITC TO-PRO- 3-iodide and cresyl violet	S-1500 UltraMiniO	
Tumor penetrability and anti-angiogenesis using iRGD-mediated delivery of doxorubicin-polymer conjugates	K. Wang (Biomaterials)	2014	Tumor vascular permeability and drug penetrability	Improved the tumor penetration ability of RGD-PPCD conjugate using a new peptide.	Mice	FITC-Dextran	Mini O/30 (permeability) S-1500 (morphology)	
Seminal plasma aids the survival and cervical transit of epididymal ram spermatozoa	J. Rickard (Reproduction)	2014	Reproduction	These results demonstrate that the survival and transport of ram spermatozoa through the cervix of the ewe is not linked to their motility or velocity but rather the presence of some cervical penetration trait conferred by exposure to seminal plasma	Ram/Ewe	Octadecyl rhodamine B chloride R18 Mitotracker Green FM	S-1500	
Local delivery of fluorescent dye for fiber-optics confocal microscopy of the living heart	C. Huang (Front Phys)	2014	Cardiology / Drug delivery	They investigated approaches for local dye delivery during FCM imaging based on dye carriers attached to the imaging probe	Excised rat hearts	Dextran-Alexa 488 Fluorescein Dextran-conjugated fluorescein	UltraMiniO WD30	
Reversibility of gastric mucosal lesions induced by sodium phosphate tablets and characterized by probe-based confocal laser endomicroscopy	E. Coron (EIO)	2014	Bowel preparation Drug-induced gastric injury	They aimed to characterize the effects of sodium phosphate tablets on the gastric mucosa in a large-animal model of bowel preparation for colonoscopy	Pigs	Fluorescein	Coloflex UHD	Clinical probe
Netrin-4 promotes mural cell adhesion and recruitment to endothelial cells	E. Lejmi (Vascular Cell)	2014	Cancer Tumor Growth Angiogenesis Cell adhesion	Identify the interactions between endothelial cells, perivascular cells and the role of Netrins (laminin-like proteins) in angiogenesis	Mice	FITC-Dextran 500 kDa 35 mg/kg, retro-orbital IV injection	S-1500	PC3 prostate carcinoma cells and xenografts in nude mice overexpressing Netrin-4
Tracking of cell nuclei for assessment of in vitro uptake kinetics in ultrasound-mediated drug delivery using fibered confocal fluorescence microscopy	M. Derieppe (MIB)	2014	Drug Delivery Ultrasound	They present a post-processing methodology to track nuclei from frame to frame to improve the accuracy of the measured pharmacokinetic parameters	Rat cells	SYTOX Green 600 Da	Z-1800	

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In vivo molecular imaging of HER2 expression in a rat model of Barrett's esophagus adenocarcinoma	S. Realdon (Dis Esophagus)	2014	Barrett's esophagus Carcinogenesis Tumor characterization	The aim of the study is to evaluate HER2 expression and to explore the feasibility of CLE for molecular imaging of HER2 in the 'Kumagai-Hattori' rat model of BE carcinogenesis	Rats	Anti-HER2 antibody labeled with AlexaFluor 488 (500µg/mL)	CholangioFlex	Clinical probe
Losartan prevents acquired epilepsy via TGF-β signaling suppression	G. Bar-Klein (Ann Neurol)	2014	Epileptogenesis BBB permeability	They aimed to identify the detailed molecular mechanisms underlying albumin-induced TGF-β signaling in different cell populations in the brain, to allow the design of targeted preventive treatments	Rats	Alexa488-Albumin	Z-1800	Dual Band
Control of ventricular ciliary beating by the melanin concentrating hormone-expressing neurons of the lateral hypothalamus : a functional imaging survey	G. Conductier A. O. Martin (Front Endocrinol)	2013	Brain Cerebro-spinal fluid	They demonstrate a dynamic control of MCH (Melanin Concentrating Hormone) neurons on spontaneous CBF (Cilia Beat Frequency) of MCHR1 mRNA expressing ependymal cells and discuss the current strategies for measuring CSF (Cerebro-spinal fluid) flows in small animal models.	Mice	10 µL of polystyrene beads - diameter 3 µm (Sigma L4530) dilution 1:4 in 0,09% NaCl - was injected in the third ventricle	MiniZ	Cellvizio imaging was used to visualize the in vivo movement of the polystyrene beads in the CSF flow
Blood flow analysis in epilepsy using a novel stereological approach	R. Leal-Campanario (Neuro-stereology)	2013	Epilepsy Vascularization Brain	They used standard and novel stereological approaches to test whether apoptotic neurons in epileptic animals are tightly couple to the hippocampal microvasculature	Mice	Fluorescein	S-0300 / B	They recorded EEG while conducting confocal microscopy (Cellvizio) in hippocampal capillaries of awake epileptic mice and WT littermates.
Glioma-homing peptide with a cell-penetrating effect for targeting delivery with enhanced glioma localization, penetration and suppression of glioma growth.	H. Gao (J. Control. Release)	2013	Tumor targeting Vascularization Glioma	The tumor targeting and localization study was conducted to determine the in vivo effect of modification with IL-13p (Interleukin-13 peptide)	Mice	FITC-Dextran (20 mg/kg) Coumarin-6 loaded ILNPs (6 mg/kg) Coumarin-6 loaded Nps (6 mg/kg)	MiniO/30	Vessel Detection The penetration was demonstrated by Cellvizio imaging indicating that the modification of IL-13p could effectively increase the speed of distribution from blood vessels to tumor cells
Disruption of dopamine neuron activity pattern regulation through selective expression of a human KCNN3 mutation	M. Soden (Neuron)	2013	Neurosciences Calcium imaging Mental illnesses	To elucidate the potential impact of hSK3Δ on dopamine physiology and behavior	Mice	GCaMP3	S-0300	
Multiparametric optical and MR imaging demonstrate inhibition of tumor angiogenesis natural history by mural cell therapy	N. Faye (Magn Reson Med)	2013	Cancer Angiogenesis Permeability	They combined multimodal and multiparametric macroscopic and microscopic functional imaging techniques to understand changes in tumor vessels after mural progenitor cell therapy in a murine squamous cell carcinoma xenograft	Mice	FITC-Dextran 70 kDa (150 µL of a 100 mg/ml)	Z-1800	

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Confocal laser endomicroscopy reliably detects sepsis-related and treatment-associated changes in intestinal mucosal microcirculation	C. Schmidt (BJA)	2013	Vascularization Translational GI mucosal Septic shock	To evaluate the feasibility of pCLE for in vivo imaging of microcirculatory alterations in various GI mucosal beds and to quantify the influence of volume therapy in the early phase of shock in a porcine model of septic shock	Pigs	FITC-Dextran (70 kDa, 5 ml of sterile solution, injection IV into septic animal)	UltraMiniO	Vessel Detection
Identification of nodal tissue in the living heart using rapid scanning fiber-optics confocal microscopy and extracellular fluorophores	C. Huang (Circ Imaging)	2013	Heart Nodal tissue Congenital cardiac defect	They established a novel intraoperative imaging modality to discriminate cardiac tissue types using methodology based on fluorescent labeling, confocal microscopy and image analysis.	Rats	Alexa Fluor 488 conjugated to dextran with a molecular weight of 3 kDa (Invitrogen) dissolved in PBS solution to a final concentration of 125 µg/mL	Non standard UltraMiniO	The microprobe was attached to a manual micro-manipulator allowing for fine precision 3D movement of the microprobe in proximity to the heart surface.
Macromolecule extravasation - xenograft size matters : a systematic study using probe - based confocal laser endomicroscopy (pCLE)	A. Dietrich (MIB)	2013	Cancer Vascular permeability Tumor growth	They for the first time systematically studied morphology and tracer permeation in two independent xenograft models longitudinally throughout tumor growth	Mice	FITC Dextran (tail vein, 150 or 500 kDa, 3.5 mg per mouse)	Z-1800	
Therapeutic potential of VEGF and VEGF - derived peptide in peripheral neuropathies	A. Verheyen (Neuro-science)	2013	Neuropathies Vascularization VEGF	They investigated if the VEGF, in addition to its well-established vascular effects, exerts direct neuroprotective effects on sensory neuron during diabetic - and chemotherapy - induced neuropathies	Mice	IV injection of Oregon Green (70 kDa)	S-1500	Cellvizio imaging of perfused vessel area in the footpad reveals that VEGF protects the vasculature against paclitaxel challenge
Human erythrocytes covered with magnetic core-shell nanoparticles for multimodal imaging	M. Laurencin (Adv Healthcare Mater)	2013	Nanoparticles	They propose to functionalize surface hRBCs with magnetic and fluorescent nano particles to obtain a carrier with a long circulating time	Mice	Nanoparticle / Fluorescent dyes can be incorporated within the first silica shell by cohydrolysing with TEOS rhodamine isothiocyanate (RITC) of FITC deviated 3-aminopropyltriethoxysilane (APTS)	S-0300	Article deals with the synthesis of core-shell magnetic nano particles
In vivo assessment of the pulmonary microcirculation in elastase-induced emphysema using probe-based confocal fluorescence microscopy	M. Salaun (IntraVital)	2013	Lung Vascularization Emphysema	To investigate whether FCFM is able to assess and quantify emphysema in vivo, on the basis of the loss of the pulmonary capillary network in elastase-induced emphysema	Rats	0,8 ml/kg of 1 % w/v fluorescein-dextran 150 kD was administered intravenously	S-1500	
Pioglitazone therapy in mouse offspring exposed to maternal obesity	A. K. Kalandrian (AJOG)	2013	Obesity Obstetric Drug delivery	They tested the hypothesis that postnatal administration of the pioglitazone will improve the metabolic status of adult offspring at risk to develop metabolic syndrome due to exposure to a maternal high-fat diet during the prenatal and early postnatal periods	Mice	1 % fluorescein sodium solution (0,2 – 0,3 ml / animal) via the tail vein or intraperitoneally	Z-1800	No image Cellvizio in the article
Observations on the viability of C6-glioma cells after sonoporation with low-intensity ultrasound and microbubbles	L. Van Ruijssevelt (IEEE)	2013	Drug delivery Ultrasound	The aim of their study was to further investigate these observations with respect to the viability of the cells and to determine and characterize the evolution of tumor cells within the 24h temporal window of enhanced membrane permeability after cavitation	Live cells	SYTOX green 1µM Topical (nucleic acid of dead cells)	Z-1800	

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Loss of p53 in enterocytes generates an inflammatory microenvironment enabling invasion and lymph node metastasis of carcinogen-induced colorectal tumors	S. Schwitala (Cancer Cell)	2013	Cancer Colon	They aimed to examine the intestinal epithelial cell (IEC)-specific tumor-suppressive function of p53 and the potential involvement of NF-κB during tumor progression	Mice	Fluorescein 2 % 100µl intravenous (10min before acquisition)	Mini-Z	Experiment with a mini endoscopy system (Karl Storz). Evaluation of blood vessels length and area in vivo.
Multimodal in vivo imaging reveals limited allograft survival, intrapulmonary cell trapping and minimal evidence for ischemia-directed BMSC homing	B. Everaert (BMC Biotech)	2012	Lung Stem cells	They combined two complementary in vivo imaging techniques : bioluminescence imaging and confocal endomicroscopy, to study dual reporter gene expressing stem cell survival and migration towards an ischemic stimulus in vivo.	Mice	eGFP	UltraMiniO	Small skin incision in the inguinal region
In vivo molecular microimaging of pulmonary aspergillosis	H. Morisse (Med Mycology)	2012	Lung Molecular imaging	Investigate the hypothesis that the use of this cyclic peptide, labeled with FITC-fluorophore, could be used as a specific fluorescent tracer for invasive pulmonary aspergillosis detection in vivo using FCFM	Rats	FITC-peptide (specifically target Aspergillus) - IV injection of 0,3 ml (30nmol)	S-1500	
In situ production of innate immune cells in murine white adipose tissue	S. Poglio (Blood)	2012	Stem cells Bone marrow	Characterize the immature hematopoietic cells population by asking whether prospectively isolated WAT-derived KLS may be considered true HSCs, as defined by the ability to self-renew and differentiate into all blood all types	Rats	GFP+	S-0300 S-1500	
Macromolecular capillary leakage is involved in the anaphylactic hypotension	N. Faye (Anesthesiology)	2012	Vascularization Allergy	Dynamic contrast-enhanced acquisition using FCFM in an anesthetized ovalbumin-induced Brown Norway rat model of anaphylactic shock to assess the microcirculatory changes during on going anaphylaxis	Rats	FITC-Dextran (70kDa) 150 mg/kg diluted in 200 µl 0,9% saline	S-1500	
Prospective identification of glioblastoma cells generating dormant tumors	R. Satchi-Fainaro (PlosOne)	2012	Glioblastoma Cancer Vascularization Dormant tumor	They set out to test whether the tumor dormancy gene signature that we previously identified can be used for isolation of tumor cells that will form non-angiogenic dormant tumors	Mice	FITC-Dextran - injection in the tail vein	MiniO/30	Cellvizio is used to study the tumoral vascularization
Prodrug of green tea epigallocatechin-3-gallate (Pro-EGCG) as a potent anti-angiogenesis agent for endometriosis in mice	C. C. Wang (Angiogenesis)	2012	Angiogenesis Oncology Reproductive system	They investigated the potential of Pro-EGCG as a novel anti-angiogenesis agent for endometriosis in mice	Mice	FITC-Dextran - 10 mg/ml - IV	S-1500	Study of angiogenesis - Vessel Detection
						YO-PRO-1 iodide in DMSO 10 µl of 10 µM - injected into the lesion area	MiniO/100	Study of apoptic cells
Analysis of regional compliance in a porcine model of acute lung injury	M. Czaplik (RPN)	2012	Lung	The objective of this study is to combine different imaging techniques and intrapulmonary pressure measuring to investigate effects of different tidal volumes on global gas exchanges	Pigs	Fluorescein 2% was continuously applied into the central venous line (10ml/h)	S-1500	
Real-time assessment of ultrasound-mediated drug delivery using confocal fluorescence microscopy	M. Derieppe (MIB)	2012	Drug delivery	Demonstrate the feasibility of monitoring of the US-mediated live cell uptake of a « smart probe » (model drug) with FCFM in vitro	Live cells	SYTOX green 2µM (Invitrogen)	Z-1800	Similar resolution between epifluorescence microscopy at x10 and FCFM images

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TIMP-2 fusion protein with human serum albumin potentiates anti-angiogenesis-mediated inhibition of tumor growth by suppressing MMP-2 expression	M-S Lee (PlosOne)	2012	Angiogenesis Oncology Tumor targeting	To investigate the precise role of HSA/TIMP-2 in anti-tumor activity associated with angiogenesis and further define in vivo molecular links between anti-angiogenesis and the modulation of MMP-2	Male Balb/c nude mice	Intra-arterial FITC-Dextran 75mg/kg	S	
In vivo histologic imaging of the muscularis propria and myenteric neurons with probe-based confocal laser endomicroscopy in porcine models	T. Ohya (GIE)	2012	Neurogastro- enterology	They evaluated the technical feasibility of in vivo imaging of the muscularis propria and the myenteric neurons by using a miniature probe-based confocal laser endomicroscope (pCLE) with SEMF	Pigs	NeuroTrace 500/525 (Invitrogen) ex vivo : 2mL in varying concentrations (x300, x600, x800, x1200) In vivo : submucosal space was stained with 2mL (x4, x20, x300) for 5 minutes	UltraMiniO	SEMF : Submucosal Endoscopy with a Mucosal Flap safety valve. In vivo experiments used a standard gastroscope (GIF-Q260J, Olympus)
Quantitative assessment of microbicide induced injury in the ovine vaginal epithelium using confocal microendoscopy	G. Vargas (BMC Infect Dis)	2012	Reproduction	Investigate the ability of a fixed-plane surface imaging CFM to visualize and quantify treatment with solutions and gels commonly studied in microbicide research	Female sheep	Propidium iodide (PI) 20µM applied evenly to the surface using a bulb pipet	S-1500	
Confocal fluorescence microscopy in a murine model of microdissection testicular sperm extraction to improve sperm retrieval	R. P. Smith (JUrology)	2012	Reproduction	Using FCFM in microTESE is a novel concept that successfully identified labeled sperm in vivo in an azoospermic murine model	Mice	Alexa Fluor 488 conjugated to the intra-acrosomal protein SP- 10 (MHS-10)	S-0650	
Confocal microendoscopy of neuromuscular synapses in living mice	G. Blanco (Curr Protoc Mouse Biol)	2012	Peripheral nervous system	Describe a step-by-step method for vital imaging of neuromuscular junctions and axons using fiberoptic confocal microendoscopy	Mice	Thy1,2-YFP16 or Thy1,2-YFPH transgenic mice (Jackson Labs)	S-1500	Step-by-step method
Dynamic contrast enhanced optical imaging of capillary leakage	N. Faye (TCRT)	2011	Vascular permeability Microcirculation Tumor	They attempted to visualize and quantify phenomena underlying microcirculation parameters in vivo, and particularly capillary permeability, by means of microscopic DCE imaging	Mice	FITC / FITC-albumin 100 µg/ml (140x10 ⁻⁵ mmol FITC) - injected as a bolus into a retro-orbital vein	S-1500	DCE Dynamic Contrast Enhanced
In vivo and in situ imaging of experimental invasive pulmonary aspergillosis using fibered confocal fluorescence microscopy	H. Morisse (Med Mycology)	2011	Lung Infection	To test the hypothesis that FCFM can detect A. fumigatus infection in vivo, in situ	Rats	Tag-RFP-T	S-1500	
Green tea epigallocatechin-3-gallate inhibits angiogenesis and suppresses vascular endothelial growth factor C/vascular endothelial growth factor receptor 2 expressing and signaling in experimental endometriosis in vivo	H. Xu (Fert Ster)	2011	Reproductive system Angiogenesis	To investigate the antiangiogenesis mechanism of epigallocatechin-3-gallate (EGCG) in an endometriosis model in vivo	Mice	YO-PRO-1 iodide (10µM, Sigma Aldrich) in 0,05 ml of phosphate- buffered saline – injected directly into the lesions	MiniO/100	
						FITC-Dextran (150kd, Sigma Aldrich) in 0,1ml of phosphate- buffered saline – IV into the tail vein	S-1500	
Cell death detection after high-LET irradiation in an orthotopic human hepatocellularcarcinoma in vivo	A. Altmeyer (In Vivo)	2011	Apoptosis Liver	Follow-up of apoptosis in the liver	Mice	FLIVO (Immunocytochemistry Technologies, Bloomington, USA) + DMSO - IV 40µl – 30min		

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In vivo bioimaging as a novel strategy to detect doxorubicin-induced damage to gonadal blood vessels	H. Bar-Joseph (PlosOne)	2011	Apoptosis Drug delivery Reproduction	Imaging of ovarian and femoral vessels during and following doxorubicin	Mice	FITC-dextran 100µl IV – monitored continuously for 20min after the injections	MiniO/30	
Confocal laser endomicroscopy and narrow-band imaging-aided endoscopy for in vivo imaging of colitis and colon cancer in mice	M. J. Waldner (Nature Protcols)	2011	Colon Infectious diseases	This protocol, which can be completed in 2h, provides a detailed description of narrowband imaging and CLE in the mouse colon	Mice	Fluorescein sodium 10% solution IV (extracellular matrix) Acrifavine 0,05% solution Topical (cell nuclei) FITC-Dextran 5% solution IV (intravascular fluid) SYTOX green 1µM Topical (nucleic acid of dead cells) Green FAM Flivo IV (apoptosis) Rhodamine 6G 200mM IV (mitochondria) Anti-E-selectin antibody 100µg IV (endothelial cells activated during inflammatory response) Anti-VEGF or anti-VEGFR2 antibody 100µg IV (tumor angiogenesis) Fluorescently labeled RGD peptide 100µg IV (tumor angiogenesis)	Mini Z	
MLL-ENL leukemia burden initiated in femoral diaphysis and preceded by mature B-cell depletion	A. Jaracz-Ros (Haematologica)	2011	Leukemia Stem cells	Investigate the early steps of leukemia development inside the femur	Mice	indicated numbers of syngenic murine GFP+ or CFSE-labeled leukemic cells	S-300 S-1500	
In vivo diagnosis of murine pancreatic intraepithelial neoplasia and early-stage pancreatic cancer by molecular imaging	S. Eser (PNAS)	2011	Pancreas	Investigation of a relevant genetically engineered Kras(G12D)- dependent endogenous mouse model of murine PanIn development and progression to PDAC	Mice	100 µL 0,05% fluorescein	S-650	
Impaired functionality and homing of Fang-deficient hematopoietic stem cells	V. Barroca (HMG)	2011	Stem cells	Investigate the influence of deletion of Fancg on the functionality of HSC and primitive hematopoietic progenitors (HPC)	Mice	GFP	S-300 B	
Improved survival, vascular differentiation and wound healing potential of stem cells co-cultured with endothelial cells	D. C. S. Pedroso (PlosOne)	2011	Stem cells	Investigate the use of UCB-derived CD34+ cells to promote the healing of diabetic wounds when administered topically in a fibrin gel	Mice	cells labeled with CFSE (Sigma-Aldrich)	S-1500	

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Methods for quantitative evaluation of alveolar structure during in vivo microscopy	M. Czaplik (RPN)	2011	Lung	Objective of this study was to develop quantification algorithms for analysis of alveolar structure during mechanical ventilation	Mice Pigs	Fluorescein injected into the central venous streak line prior to image recording 1% (50-100 µl/kg body weight)	Lateral résolution 5 µm – FOV 600 µm in diameter	
The synergistic therapeutic effect of cisplatin with Human Papillomavirus E6/E7 short interfering RNA on cervical cancer cell lines in vitro and in vivo	H. S. Jung (Inter Jour Cancer)	2011	Cancer Angiogenesis HPV	The combination of E6 specific or E6/E7-specific siRNA and CDDP was assessed for synergy in vitro and in vivo	Mice	FITC-Dextran (75 mg/kg) injected into the tail vein	S-1500	In vivo and in situ imaging of tumor blood vessels
A multimode optical imaging system for preclinical applications in vivo : technology development, multiscale imaging, and chemotherapy assessment	J. Y. Hwang (MIB)	2011	Multimodality	Demonstrate a new multimode optical imaging system that enables simultaneous use of powerful multiscale optical imaging technologies	Rats	Autofluorescence	S-0650	Intravital confocal image of a rat spine
New concept of cytotoxic immunoconjugate therapy targeting cancer-induced fibrin clots	M. Yasunaga (Cancer Science)	2011	Tumor targeting Cancer	They developed an mAb against fibrin to target the tumor stroma. In addition, they exploited the newly developed specialized immunoconjugate linker to conjugate the anti fibrin mAb with an anticancer	Mice	FITC-Dextran 400µg (250 kDa) – injected into tumor bearing mice before and 5 days after treatment with the immunoconjugate		Cellvizio is used for the visualization of tumor vessels
FLIM FRET technology for drug discovery : Automated multiwellplate high-content analysis, multiplexed readouts and application in situ	S. Kumar (Chem PhysChem)	2011	Drug discovery	Demonstrate the broad applicability of FLIM to read out FRET in a range of applications across the spectrum of the drugdiscovery pipeline.	Live cells	eGFP	UltraMiniO	MKT partnership
Systemic magnetic targeting of pure-antiestrogen-loaded superparamagnetic nanovesicles for effective therapy of hormone dependant breast cancers	V. Plassat (Bioanal & Biomed)	2011	Tumor targeting	They implemented preclinical experiments to show in vivo the efficacy of magnetic targeting for systemic therapy of hormone dependent breast cancer tumors	Mice	FITC-Dextran injection 100 µL of 20mg/mL (5.10 ⁵ g/mol) – Sigma	S-1500	
A new experimental model to allow use of clinical-scale endoscopes in small-animal tumor models	M. Anders (J Gastro Onco)	2011	Colon	Determine the feasibility of the proposed method (evaluating new endoscopic techniques in small animal models of colon carcinogenesis) and the duration of preservation of a vital colon mucosa	Rats	0,1 ml of a 5% fluorescein solution (Alcon Pharma GmbH) in the rat's tail vein	Z	
VEGF receptor signaling links inflammation and tumorigenesis in colitis-associated cancer	M. J. Waldner (J Experi Medicine)	2010	Colon Cancer Angiogenesis VEGF	To analyze the role of angiogenesis and VEGF signaling in a mouse model of colitis associated cancer using azoxymethane and dextran sodium sulfate to study the interplay between inflammation, angiogenesis and VEGF signaling during tumor development	Mice	100 µL of FITC-Dextran (70 kDa, 5 mg/mL ; Sigma Aldrich) – injected into the tail vein	Mini Z	The Mini Z was positioned endoscopically to the area of interest (Endoscope Storz)
Origin and characterization of retrograde labeled neurons supplying the rat urethra using fiberoptic confocal fluorescent microscopy in vivo and immunohistochemistry	K. C. Lee (J Urology)	2010	Prostate Peripheral Nervous System	Using a retrograde axonal tracer combined with real-time in vivo imaging and ex-vivo immunohistochemistry they determined the course and type of neurons supplying urethral smooth muscle distal to the prostate in the rat	Rats	CTb488 injected into urethral smooth muscle distal to the prostate at 4 sites (2µl per site as 1,0mg/ml dissolved in PBS) – imaged after 5 days		

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Optimal fluorescein dose for intravenous application in miniprobe-based confocal laser scanning microscopy in pigs	V. Becker (Biophotonics)	2010	Colon	Investigate the ideal fluorescein concentration by objective and subjective parameters in pCLE	Pigs	Fluorescein sodium – IV 0,1ml/kg body weight with the respective concentrations (0,5%, 1%, 2%, 5%, 10%)	Z-1800	the best results using single injection IV fluorescein 5% (0,1ml/kg)
Quantitative analysis of intravenously administered contrast media reveals changes in vascular barrier functions in a murine colitis model	T. Aychek (MRM)	2010	Colon Microcirculation	Develop noninvasive quantitative fluorescence and MRI-based methods to evaluate the changes in colonic vascular function	Mice	FITC-Dextran 500 kDa ; 75mg/kg ; (Sigma-Aldrich, USA) – IV – imaged after 20min	S-1500	
In vivo cellular imaging pinpoints the role of reactive oxygen species in the early steps of adult hematopoietic reconstitution	D. Lewandowski (Blood)	2010	Leukemia Stem cells	Study the early steps of hematopoietic reconstitution by hematopoietic stem cells in long bones after lethal irradiation	Mice	Phycoerythrin-fluorescent conjugate and injected using a retro-orbital injection mode into mice (0,5 to 1 mg/kg)	S-300	
Needle-based confocal laser endomicroscopy to assess liver histology in vivo	A. Mennone (Gastro Endos)	2010	Liver	Test 3 available prototype nCLE probes with different working distance to determine whether they are adequate for determining the presence of liver disease and to compare their relative efficacies	Rats	Fluorescein (0,25ml of a 1,0% solution in saline solution) – injected into the inferior vena cava – imaging 5min after injection	prototypes with a diameter of 0,85mm WD 0 – WD 50 / MiniZ	
In vivo microscopy in a porcine model of acute lung injury	J. Bickenbach (RPN)	2010	Lung	Evaluation of regional inhomogeneity and alveolar mechanics in a porcine model of acute lung injury	Pigs	Fluorescein 0,1% 3ml – central venous line right before beginning of microscopy	S-1500	
Original encounter with antigen determines antigen-presenting cell imprinting of the quality of the immune response in mice	V. Abadie (PlosOne)	2009	Immunology Vaccines	Investigate the early mechanisms of MVA-induced immune response after intradermal and intramuscular immunization	Mice	eGFP (MVA recombinant for the eGFP rMVA-egfp)	S-1500	MVA : Modified Vaccinia virus Ankara
Intestinal lamina propria dendritic cell subsets have different origin and functions	C. Varol (Immunity)	2009	Colon Immunology	Investigate the functional organization of IpDCs by probing their in vivo origins with a combination of conditional cell ablation and engraftment with defined DC precursors	Mice	GFP	S-0650	Experiment with Coloview
Real-time in vivo bioluminescence imaging of lentiviral vector-mediated gene transfer in mouse testis	T.S. Kim (Therio genology)	2009	Reproductive system Gene transfer	Investigate the feasibility of transgene expression in ICR mouse testes after microinjection of bicistronic LV into the seminiferous tubules the testis.	Mice	eGFP	S-1500	
Functional fibered confocal microscopy: a promising tool for assessing tendon regeneration	J. G. Snedeker (Tissue Eng)	2009	Biomechanics	Measurement of achilles tendon strains in response to applied load	Mice	SYTO 13 (Invitrogen, Carlsbad, CA) 50µM for 5min	S-650	
The use of a synthetic oxygen carrier-enriched hydrogel to enhance mesenchymal stem cell-based bone formation in vivo	N. Kimelman-Bleich (Biomaterials)	2009	Stem cells	They hypothesized that an oxygen-enriched hydrogel scaffold would enhance tissue-engineered bone formation in vivo	Mice	GFP - Microprobe was inserted into the ectopic implants 3 days post implantation and the fluorescence signal was recorded	S-650	

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Towards modeling of cardiac micro structure with catheter-based confocal microscopy : a novel approach for dye delivery and tissue characterization	R. A. Lasher (IEEE)	2009	Cardiology Drug delivery	Modeling and analyzing cardiac tissue	Excised rabbit hearts	Dextran-Texas Red (3kDa, 6-12 mg/mL)	M/30	
Fibred confocal fluorescence microscopy for in vivo study of cerebral microcirculation in the rat : vasodilatory effects of the phytoestrogen genistein	M. Castello-Ruiz (JCBFM)	2009	Microcirculation	Study of brain microcirculation in the rat and to assess the vasoactive effects of phytoestrogen genistein	Rats	FITC-Dextran 5 to 10 mg/mL (700µL) – left femoral vein to label plasma FITC isomer I-Celite 10 mg/mL – saline washed erythrocytes Genistein (10 mg/kg) – infused directly into the brain circulation through the right carotid artery and through the femoral vein	Z-1800	
Getting inside their minds	M. Eisenstein (Nature Methods)	2009	Neuroscience	Review of current imaging techniques in neuroscience		Oregon Green BAPTA-1 AM/Fluo-4 AM		
Axonal and neuromuscular synaptic phenotypes in Wlds, SOD1(G93A) and oster mutant mice identified by fiber-optic confocal microendoscopy	F. Wong (MCN)	2009	Peripheral nervous system	Live imaging by fiber-optic confocal microendoscopy of YFP expression in motor neurons to observe and monitor axonal and neuromuscular synaptic phenotypes in mutant mice	Mice	Thy 1,2 -YFP	S-1500	
In vivo imaging of in situ motility of fresh and liquid stored ram spermatozoa in the ewe genital tract	X. Druart (Reproduction)	2009	Reproduction	Method based on FCM to observe the behavior of individual spermatozoa and to determine quantitatively the in situ patterns of migration along the genital tract inseminated	Ewes	R18 (Octadecyl rhodamine B chloride) 30 nM / MitoTracker Green FM Labels (M-7514) 2nM (Molecular Probes, Eugene, OR, USA)	S-1500 MiniO/100	
Comparison of two in vivo microscopy techniques to visualize alveolar mechanics	J. Bickenbach (J Clin Monitor Comp)	2009	Lung	Test a minimally invasive fibred confocal microscopy system that also allows endoscopy view on alveoli and enables real-time dynamic observation of different lung regions. The imaging quality was compared with conventional dark field microscopy	Mice Rabbits	Fluorescein 0,1% in the central venous line right before the beginning of microscopy	S-1500 for mice MiniO for rabbits	FD-OCT and CLSM are imaging techniques that provide high-resolution images of alveolar structure giving depth information that is beneficial to conventional microscopy in a mouse and a rabbit model
In vivo imaging of oligonucleotidic aptamers	B. Tavitian	2009	Biodistribution	They present the methods developed in their laboratory for in vivo imaging of oligonucleotidic aptamers	Mice	Thiol-protected aptamer	MiniO/30	Book chapter
Fluorine-18-labeled phospholipid quantum dot micelles for in vivo multimodal imaging from whole body to cellular scales	F. Ducongé (Bioconjugate Chem)	2008	Biodistribution	Dynamic quantitative whole body biodistribution and pharmacokinetics (PET and in vivo FCFM)	Mice	18F-QDs – injection 5nM	MiniO/30	

Methods Overview

Wavelength 488

Title	Author (Journal)	Year	Applications	Purpose	Animal	Dyes	Proflex	Notes
Magnetic targeting of iron-oxide-labeled fluorescent hepatoma cells to the liver	A. Luciani (MIB)	2008	Biodistribution Liver	Preferential trafficking of magnetically labeled Huh7 hepatoma cells to the liver following liver cell transplantation	Mice	fluorescent lipophilic membrane marker PKH-67 (Sigma-Aldrich, France) – intrasplenic injection	S-1500	
An analytical model for elucidating tendon tissue structure and biomechanical function from in vivo cellular confocal microscopy images	J. G. Snedeker (Cells Tissues Organs)	2008	Biomechanics	Study examining the local strain field of a living tissue using cells as displacement markers	Mice	SYTO 13 green fluorescent nucleic acid stain (Invitrogen AG, Basel, Switzerland)	S-650	
Nanoparticle-based targeting of vaccine compounds to skin antigen-presenting cells by hair follicles and their transport in mice	B. Mahe (J Invest Dermatol)	2008	Dermatology Drug delivery Immunology	To assess the potential of the hair Nps, protein, DNA, and virus as its efficacy to generate protective immune responses	Mice	40 and 200 nm polystyrene particles (FluoreSpheres) (Molecular Probes)	S-1500 / Z-1800	
Intravenous application of fluorescein for confocal laser scanning microscopy : evaluation of contrast dynamics and image quality with increasing injection-to-imaging time	V. Becker (Gastroin test Endosc)	2008	Abdominal cavity	Investigate the ideal time period for the best CLSM imaging when using fluorescein sodium	Pigs	Fluorescein 1% intravenously (0,1 mL/kg body weight), consecutive sequences were recorded after 1, 2, 3, 5, 8, 20, 30, 40, 50 and 60 minutes)	Z-1800	In the pig model, fluorescein-based CLSM of the GI tract delivered the best contrast and image quality within the first 8 minutes after injection
Transgastric in vivo histology in the peritoneal cavity using miniprobe-based confocal fluorescence microscopy in an acute porcine model	S. Von Delius (Endoscopy)	2007	Abdominal cavity	In vivo histology	Pigs	IV 10 ml of Fluorescein 1% IV 50 ml of fluorescein isothiocyanate-dextran 150 000 4%	Gastroflex type S (WD 10 µm) and type Z (WD 100 µm) – FOV 600µmx500µm	
Fiberoptic imaging of cavernous nerves in vivo	L. B. Boyette (J Urology)	2007	Peripheral nervous system	Development of a nontoxic technique that would allow high resolution, in vivo real-time imaging specifically of the cavernous nerves	Rats	DiO (Invitrogen) and CTb-488 (cholera toxin conjugated to Alexa Fluor 488) (2 fluorescent retrograde axonal tracers) – injection volume of 100 µL at 1,0 mg/ml in 1xPBS	S-650	
Magnetic targeting of rhodamine-labeled superparamagnetic liposomes to solide tumors : in vivo tracking by fibered confocal fluorescence microscopy	M. S. Martina (MIB)	2007	Tumor targeting	Rhodamine-labeled MFLs (Rho-MFLs) provide an original nanosystem for double in vivo imaging that combines fluorescence detection with fiberop-tics and MRI. Track MFLS in vivo within blood circulation	Mice	Rho-PE (Alabaster, AL) – 1 mol %	S-0300	
Giant vesicles containing magnetic nano-particles and quantum dots : feasibility and tracking by fiber confocal fluorescence microscopy	G. Beaune (Angew Chem Int Ed)	2007	Tumor targeting	Report a new strategy that uses emulsion processes to encapsulate two types of nanoparticles (MNPs and Qds) which exhibit unique optical properties	Mice	Core-shell CdSe/ZnS Qds with 3nm diameter – 7pmol.g-1 body weight		
Single CX3CL1-Ig DNA administration enhances T cell priming in vivo	M. Iga (Vaccine)	2007	Immunology	Evaluate the ability of CX3CL1-Ig to augment T cell priming by DNA vaccine-coding viral or tumoral antigens, in several murin models of DNA vaccination	Mice	UBI-GFP transgenic mice (Jackson Laboratories, Charles River, France)	S-1500	

Methods Overview

Wavelength 488

Title	Author (Journal)	Year	Applications	Purpose	Animal	Dyes	Proflex	Notes
Endoscopic cellular microscopy for in vivo biomechanical assessment of tendon function	J. G. Snedeker (<i>Bio Optics</i>)	2006	Biomechanics	Study examining the local strain field of a living tissue using cells as displacement markers	Mice	SYTO 13 green fluorescent nucleic acid stain (Invitrogen AG, Basel, Switzerland)	S-650	
Live imaging of neural structure and function by fibered fluorescence microscopy	P. Vincent (<i>EMBO Reports</i>)	2006	Deep brain	Measurement of neuronal degeneration and regeneration in vivo, which can be used repeatedly to monitor the same nerve fibre in individual animals.	Mice	Thy-1 eYFP mice (Jackson Laboratory, Bar Harbor, ME, USA) / CaMK-eGFP mice / TH-eGFP mice (image dopaminergic neurons)	S-0650 / S-0300	
				The in situ recording of calcium transients with in deep central nervous system nuclei in the anaesthetized animal	Rats	Oregon Green BAPTA-1 AM (OGB1) – injection stereotactically into the brain (Molecular Probes Invitrogen) – optical recording started 1h later		OGB1 neuronal activity
Osteogenic differentiation of noncultured immunoisolated bone marrow-derived CD105+ cells	H. Aslan (<i>Stem Cells</i>)	2006	Stem cells	They have used the CD105-based immunoisolation method to obtain a fresh noncultured population of CD105+ hMSCs and to determine their osteogenic potential both in vitro and in vivo	Mice	Vybrant Dil cell-labeling solution (Molecular probes) – 15µl/ml cell suspension – visualized 3 days postimplantation		
In vivo tumor targeting using a novel intestinal pathogen-based delivery approach	K. P. Janssen (<i>Cancer Research</i>)	2006	Tumor targeting	Show the in-vivo accumulation of STxB-delivered contrast agents in tumors of different mouse models for spontaneous digestive tumorigenesis	Mice	FITC-coupled STxB	1,65mm diameter	
Fibered confocal fluorescence microscopy for imaging apoptotic DNA fragmentation at the single-cell level in vivo	K.H. Al-Gubory (<i>Exp Cell Res</i>)	2005	Apoptosis	Analysis of apoptosis	Ewes	YO-PRO-1 (Molecular Probes, Interchim, France) 50µl et 10µM In situ micro-injection	S-650 S-1500 HD/1800	
Endoscopic confocal fluorescence microscopy of normal and tumor bearing rat bladder	M. A. D'Hal-lewin (<i>J Urology</i>)	2005	Bladder	Feasibility of miniaturized FCFM in situ in rat bladders	Rat	Rhodamine 123 – 100µM for 30min (Faculty of medicine Geneva)	S-1500	
Organically modified silica nanoparticles: A nonviral vector for in vivo gene delivery and expression in the brain	D. J. Bharali (<i>PNAS</i>)	2005	Deep brain	In vivo transfection and modulation of the activity of neural cells in the brains of mice by using Ormosil nanoparticles	Mice	Alexa Fluor 488- conjugated goat anti-mouse IgG (Molecular Probes)	Cerboflex	
						Cy3-conjugated goat anti-rabbit IgG (Jackson ImmunoResearch)		
In vivo imaging of migrating neurons in the mammalian forebrain	M. Davenne (<i>Chem Senses</i>)	2005	Deep brain	Track in vivo newborn neurons migrating in the adult mouse forebrain. After labeling a large number of subventricular zone progenitor cells, we are able to track neuroblasts migrating in vivo in the adult forebrain	Mice	Stereotaxic injection of GFPex-pressing lentivirus – imaging 2 to 5 days after labeling	S-300	
						200nl of cell tracker green CMFDA (Molecular Probes)		

Methods Overview

Title	Author (Journal)	Year	Applications	Purpose	Animal	Dyes	Proflex	Notes
Catheter confocal fluorescence imaging and functional magnetic resonance imaging of local and systems level recovery in the regenerating rodent sciatic nerve	G. Pelled (Neuro-image)	2005	Peripheral nervous system	Develop minimally invasive imaging techniques to monitor local regeneration of peripheral nerves and to determine the extent of return to function of brain cortical regions associated with that nerve	Rats	DiO (Molecular probes OR) – 5% in DMF – injected into the nerve bundle – imaged 2-5 days later	1,8mm diameter – WD 80µm – FOV 240x170 / 1,5mm diameter – WD 80µm – FOV 425x323	
Integrating new neurons into the adult olfactory bulb: joining the network, life–death decisions, and the effects of sensory experience	P.M. Lledo	2005	Deep brain					
The progressive nature of Wallerian degeneration in wild-type and slow Wallerian degeneration (Wlds) nerves	B. Beirowski	2005	Peripheral nervous system		Mice	iYFP-H		Cellvizio not used in this article
Fibered confocal fluorescence microscopy facilitates extended imaging in the field of microcirculation. A comparison with intravital microscopy	E. Laemmel (J Vasc Res)	2004	Microcirculation	Investigate the capability of FCFM to provide in vivo microvascular observations	Mice	FITC-albumin (500 mg/kg) / FITC-dextran 150 (75 mg/kg) – intra-arteriously	Z-1800 / S-1500 / S-0650	

Methods Overview

Wavelength 660

Title	Author (Journal)	Year	Applications	Purpose	Animal	Dyes	Proflex	Notes
Losartan prevents acquired epilepsy via TGF- β signaling suppression	G. Bar-Klein (Ann Neurol)	2014	Epileptogenesis BBB permeability	They aimed to identify the detailed molecular mechanisms underlying albumin-induced TGF- β signaling in different cell populations in the brain, to allow the design of targeted preventive treatments	Rats	Evans Blue	Z-1800	Dual Band
A novel minimally invasive technique to create a rabbit VX2 lung tumor model for nano-sized image contrast and interventional studies	T. Anayama (PlosOne)	2013	Lung Cancer Multimodality	The purpose of this research is to employ a minimally invasive technique to develop a reproducible lung cancer animal model in rabbits suitable for imaging and transbronchial interventional studies using clinically relevant tools	Rabbit	6 μ g/ml of Genhance 680 (Perkin Elmer)	S-0650	Cellvizio confirmed the specificity of tumor accumulation of the liposomes in the malignant lung nodule compared to surrounding healthy lung tissue
In vivo tracking of murine adipose tissue-derived multipotent adult stem cells and ex vivo cross validation	C. Garrovo (Inter J. Mol. Imaging)	2013	Stem cells Biosdistribution	They evaluate the applicability of the time domain preclinical optical imaging Optix to follow in the mouse the biodistribution of NIR-labelled murine adipose-tissue-derived stem cells (mAT-MASC)	Mice	5 μ L of Vybrant DiD cell-labeling solution was supplied per mL of cell suspension – intramuscular in the left tibialis anterior muscle – imaging 48 hours after the injection	S-1500	DiD is a lipophilic carbocyanines tracer with markedly red-shifted fluorescence excitation and emission spectra which can be used for cellular adhesion studies and migration applications
A minimally invasive multimodality image-guided (MIMIG) system for peripheral lung cancer intervention and diagnosis	T. He (Comput Med Imag Grap)	2012	Lung Oncology Angiogenesis	To present the idea of a new workflow for dealing with early-stage lung cancer : on-the-stop image guided intervention, optical imaging-bases diagnosis, and on-site treatment	Rabbit (VX2 lung cancer model)	IntegriSense 680	Mini-Z	IntegriSense signal within VX2 rabbit tumor model was significantly different from that in the background (normal lung tissue) – p-value<0,05
In vivo diagnosis of murine pancreatic intraepithelial neoplasia and early-stage pancreatic cancer by molecular imaging	S. Eser (PNAS)	2011	Pancreas	Investigation of a relevant genetically engineered Kras(G12D)- dependent endogenous mouse model of murine PanIn development and progression to PDAC	Mice	150 μ L (2nm) of a cathepsin B/H/L/S sensitive probe (ProSense 680) (VisEn Medical)	S-650	
Protein kinase C Iota in the intestinal epithelium protects against dextran sodium sulfate-induced colitis	S. Calcagno (Inflamm Bowel Dis)	2011	IBD Colon Vascularization	Evaluate the effect of inhibition of PKC ι expression in the intestinal epithelium on basal homeostasis and susceptibility to DSS-induced colitis and in vitro wound healing	Mice	AngioSpark 680 – administered by retro-orbital injection – 250 μ M – 100 μ L/mouse – immediately before imaging	Mini-Z	Endoscope Karl Storz
Peripheral lung cancer detection by vascular tumor labeling using in-vivo microendoscopy under real time 3D CT image guided intervention	M. Valdivia y Alvarado (MIAR)	2010	Lung Cancer	Report the results of a study where they coupled microendoscopic imaging with the image guided intervention system they created for peripheral lung cancer detection	Rabbit (VX2 lung cancer model)	ICG (Indocyanine Green) 125mg – IV injection 15 minutes before the percutaneous thoracic puncture	Mini-Z	MIAR 2010 Proceedings
Cancer cell-derived microparticles bearing P-selection glycoprotein ligand 1 accelerate thrombus formation in vivo	G. M. Thomas (J Exp Med)	2009	Microcirculation Pancreas	To determine the involvement of MP in thrombus formation in vivo	Mice	Alexa Fluor 488 / Alexa Fluor 594 conjugated secondary antibody / Qtracker 705 (Invitrogen)	MiniO/100	

Methods Overview

Wavelength 660

Title	Author (Journal)	Year	Applications	Purpose	Animal	Dyes	Proflex	Notes
Feasibility and reliability of pancreatic cancer staging using fiberoptic confocal fluorescence microscopy in rats	M. Ignat (<i>Imag Adv Tech</i>)	2009	Pancreas	Evaluation of a new in vivo technique FCFM for detection and staging of pancreatic tumors in rats	Rats	ProSense 680 (2 nmol/100g of body weight) – intravenously – imaging 16 to 24 hours after injection	MiniO/30	100% sensitivity and 92,2% specificity in rats
In vivo quantitative microvasculature phenotype imaging of healthy and malignant tissues using	Ken Young Lin (<i>Trans Oncology</i>)	2008	Angiogenesis Oncology Pancreas	Visualization of the pancreatic microvasculature	Mice	Angiosense 680 IVM (VisEN Medical) – IV 100µl	S-1500	
Real-time assessment of inflammation and treatment response in a mouse model of allergic airway inflammation	V. Cortez-Retamozo (<i>J Clin Invest</i>)	2008	Inflammation Lung	To define which enzymes may serve as sensitive biomarkers of inflammation and whether these biomarkers could be used to diagnose the modulation of inflammation upon therapeutic intervention	Mice	5nmol MMPsense-680 or ProSense-750 (VisEn Medical) via a tail vein injection – these sensors have a reported blood half-life of about 24h	S-300	
Highly sensitive detection of early-stage pancreatic cancer by multimodal near-infrared imaging in living mice	J. Von Burstin (<i>Int J Cancer</i>)	2008	Pancreas	Investigate novel molecular near infrared fluorescent (NIRF) in vivo imaging techniques in clinically relevant mouse models of pancreatic cancer	Mice	EGFP (Enhanced Green Fluorescent Protein) and fLuc	MiniO/30	