From Molecules to Mice to Men

Research Focus Module by the MUPIC Consortium

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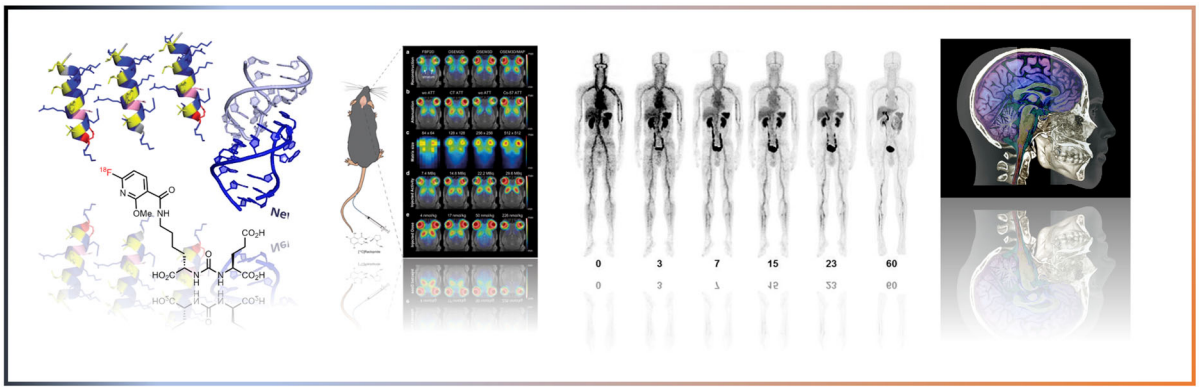

Structural imaging systems such as *Computer Tomography (CT)*, *Magnetic Resonance Imaging (MRI),* as well as the nuclear imaging modalities *Single Photon Emission Computer Tomography (SPECT)* and *Positron Emission Tomography (PET)* offer the unique opportunity to non-invasively study biological processes such as disease development or response to therapy in vivo. While MRI and CT offer superb contrast for soft tissue and bone, respectively, PET and SPECT provide molecular information at tissue or cellular level using target specific probes - termed molecular imaging. Nuclear imaging in combination with MRI or CT is widely used to visualize e.g. targets related to tumor development, the tumor microenvironment, immune response or also related to neurological diseases. Moreover, molecular imaging allows assessing pharmacokinetics and biodistribution of radiolabeled molecules or drugs in vivo, making it a perfect tool for (bio-)chemical and pharmacological research. To optimize synergies among all groups working on imaging methods and applications for oncology and neurology, we established the interfaculty network “Molecular Imaging Platform of the University of Cologne (MUPIC)”. One goal of the MUPIC consortium is to introduce these methods to chemistry and neuroscience students in form of a research focus module.

The lectures will cover (radio, bio-) chemistry including probe design and synthesis, radiolabeling, biodistribution of drugs, biological targets & multimodal imaging in neurological disorders and oncology, imaging methods, computer science incl. image data analysis, 2D and 3D visualization. The module will also comprise a visit to the CAVE (https://rrzk.uni-koeln.de/hpc-projekte/visualisierung/cave), with a demo of 3D visualization of selected medical images covering neurology and oncology. Furthermore, a hands-on 1-day course on MRI, CT, SPECT or PET will be offered. As part of the seminar, each student will present a research paper, which will be graded.

The module will be open to students from programs including M.Sc Chemistry, M.Sc. Neuroscience and M.Sc. Experimental and Clinical Neurosciences.