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Sommario/riassunto

Over the past decades, the field of molecular imaging has been rapidly growing involving multiple disciplines such as medicine, biology, chemistry, pharmacology and biomedical engineering. Any molecular imaging procedure requires an imaging probe that is an agent used to visualize, characterize and quantify biological processes in living systems. Such a probe typically consists of an agent that usually produces signal for imaging purpose, a targeting moiety, and a linker connecting the targeting moiety and the signaling agent. Many challenging problems of molecular imaging can be addressed by exploiting the great possibilities offered by modern synthetic organic and coordination chemistry and the powerful procedures provided by conjugation chemistry. Thus, chemistry plays a decisive role in the development of this cutting-edge methodology. Currently, the diagnostic imaging modalities include Magnetic Resonance Imaging (MRI), Computed Tomography (CT), Ultrasound (US), Nuclear Imaging (PET, SPECT), Optical Imaging (OI) and Photoacoustic Imaging (PAI). Each of these imaging modalities has its own advantages and disadvantages, and therefore, a multimodal approach combining two techniques is often adopted to generate complementary anatomical and functional information of the disease. The basis for designing imaging probes for a given application is dictated by the chosen imaging modality, which in turn is dependent upon the concentration and localization profile (vascular, extracellular matrix, cell membrane,

intracellular, near or at the cell nucleus) of the target molecule. The development of high-affinity ligands and their conjugation to the targeting vector is also one of the key steps for pursuing efficient molecular imaging probes. Other excellent reviews, text and monographs describe the principles of biomedical imaging, focusing on molecular biology or on the physics behind the techniques. This Research Topic aims to show how chemistry can offer molecular imaging the opportunity to express all its potential.