Chemistry in Medicine: fluorophores and optical imaging

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Fluorescent activatable probes are valuable tools for live-cell imaging because of their tunability and target specificity.[1] Over the last few years, our group has designed a collection of fluorogenic amino acids and peptides for high-resolution biological imaging and translational medicine, which was recognised with the RSC Bader Prize 2023. Our team have demonstrated that this approach can be used to generate probes to visualize infection and immune cells in human biosamples,[2] *in vivo*[3] and in *ex vivo* human biopsies.[4] We have designed fluorescent amino acids to: 1) be compatible with conventional solid-phase peptide synthesis, 2) maintain the biomolecular recognition features of the native peptides and 3) emit fluorescence preferentially after target binding, improving signal-to-noise ratios for imaging. Recently, we have included the smallest turn-on fluorescent amino acids for peptide-PAINT imaging and super-resolution microscopy,[5] and to fluorogenic tags for proteins associated with immune cell function like interleukins,[6] immunophilins and chemokines[7] as well as nanobodies and antibodies.[8] Finally, the talk will also briefly discuss our efforts to establish apply these fluorescent probes for clinical applications.

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[8] a) Kuru et al. Nat. Commun. **2024**, 15, 7531; b) Nadal-Bufi et al. JACS **2025**, 147, 7578.