Visualization of proteolysis in living cells

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Specific enzymes and proteases in particular play key roles in many pathophysiological processes and therefore are targets for therapeutic strategies. The activity of most enzymes is largely determined by many factors at the post-translational level. Therefore, it is essential to study the activity of target enzymes in living cells and tissues in a quantitative manner in relation to pathophysiological processes to understand its relevance and the potential impact of its targeting by drugs. Proteases can be visualized and localized microscopically with various tools. These can be endogenous fluorescent metabolites or synthetic chromogenic or fluorogenic substrates. The use of endogenous metabolites is rather limited and non-specific because they are involved in many biological processes, but novel chromogenic and fluorogenic substrates have been developed to visualize activity of proteases in living cells and tissues. These substrates and methods in which they are applied, as well as their advantages and disadvantages for metabolic mapping in living cells are reviewed. Reference: Boonacker E and Van Noorden CJF (2001) Enzyme cytochemical techniques for metabolic mapping in living cells, with special reference to proteolysis. J Histochem Cytochem 49: 1473-1486.