

RECORDING THE PHYSIOLOGICAL HISTORY OF CELLS WITH CHEMICAL LABELING

Abstract: Recordings of the physiology of cells provide insights into biological processes, yet obtaining such recordings is a challenge. To address this challenge, I will discuss methods to record transient cellular events for later analysis. The method is based on designed proteins that become labeled in the presence of both a specific physiological activity and a fluorescent substrate. The recording period is set by the presence of the substrate, whereas the physiological activity controls the degree of the labeling. The use of substrates of different colors enables the recording of successive periods of activity. Applications include the recording of protein-protein interactions, receptor activation and elevations in intracellular calcium as well as the recording of kinase activities. The recording of physiological activities can be used, among other things, for the sorting of cells from heterogenous populations for transcriptomic analysis, or for the tracking of neuronal activities in vivo.