

NONINVASIVE IDENTIFICATION OF POLARIZED MACROPHAGE USING TWO-PHOTON FLUORESCENCE INTENSITY AND LIFETIME IMAGING MICROSCOPY

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Abstract

Serving to eliminate damage and senescent cells, macrophage as a kind of heterogeneous immune cell are important for non-specific immunity in the body. Depended on the phenotypic variability and versatility of macrophage, it can be activated to different phenotype in response to various factors, which named as macrophage polarization. In recent years, it has identified two types of macrophage polarization, which are divided into classically activated macrophages (M1) and alternatively activated macrophages (M2). Accumulating evidence has proved that macrophages polarization owns plasticity and be related to several disease development. Therefore, identification of polarized macrophage offers a huge potential value for investigating the function and metabolism in macrophage. Several approaches have been developed to identify the polarized macrophages, such as quantifying protein expression status in biological samples by using western blot, ELISA as well immunohistochemistry. Besides, it has been reported that macrophages play crucial role in iron trafficking. In physiological process, through phagocytes of old blood cell by macrophage initiatively and recognition of hemoglobin-haptoglobin complex by CD163, abundant heme will be released in macrophage and further be degraded to porphyrin and Fe^{2+} , which return to iron circulation. Therefore, as a naturally fluorophore in cell and the degradation product of heme, porphyrin may offer a choice for recognizing phenotype macrophage with the aid of TPEFM and FLIM.

In this project, we prompted a non-invasive and label-free technique for identification of polarized macrophage, which offers a huge potential value for real-time investigating the function and metabolism in macrophage. In addition, a fluorescence spectrometer and fluorescence lifetime imaging microscopy will also be involved for assisting verification the fluorescence property.

Reference

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