Clinically compatible moxifloxacin-based cell imaging

Seunghun Lee, Seonghan Kim, Myoung Joon Kim, Ki Hean Kim
Department of Mechanical Engineering and Division of Integrative Biosciences and Biotechnology, Pohang University of Science and Technology, 77 Cheongam-ro, Nam-gu, Pohang, Gyeongbuk 37673, Rep. of KOREA
E-mail : kiheankim@postech.ac.kr

KEY WORDS: Clinically compatible cell imaging, moxifloxacin, linear and nonlinear microscopies

We developed a clinically compatible high contrast cell imaging method based on moxifloxacin [1]. Moxifloxacin is an antibiotic used both to treat and prevent infection in clinic, and it was used as a cell labeling agent in fluorescence microscopic imaging of tissues based on various properties such as intrinsic fluorescence, good tissue penetration, high intra-cellular distribution. Both the fluorescence properties and cell labeling characteristics of moxifloxacin were analyzed in both linear and nonlinear fluorescence microscopies. Moxifloxacin ophthalmic solution was used in all the experiments, and moxifloxacin-based cell imaging in tissues was conducted after topical administration and 5 to 10-minute incubation. Moxifloxacin showed fluorescence in both linear microscopy and nonlinear two-photon, three-photon microscopies, and excitation wavelengths for these microscopies were 350nm-405nm, 700nm-780nm, and 1000nm–1050nm, respectively [1-3]. Emission wavelength was approximately 480nm-530nm, and its fluorescence intensities were in between the fluorescence levels of intrinsic autofluorescence and extrinsic agents such as Hoechst. Moxifloxacin based linear and nonlinear microscopies showed benefits of high-speed imaging with limited imaging depths, and moderate-speed imaging with relatively high imaging depths. Moxifloxacin based tissue imaging showed approximately 10x enhanced fluorescence in all the cells non-specifically and either cell cytoplasm or nuclear membrane was labeled. Moxifloxacin based cell imaging could be used for both clinical and biological applications. In clinical applications, it could be used for high-speed cellular examination for diagnosis. Example studies were the delineation of brain tumors and skin cancers [1, 4]. In biological applications, it could be used for high-contrast imaging of all the cells in tissues together with other molecular fluorescent markers. Moxifloxacin showed specific labeling of some cells including Paneth cells in the small intestine and goblet cells in the conjunctiva [5]. Further investigation is in progress. In conclusion, moxifloxacin-based cell imaging allows high-speed cell imaging in tissues and it has potentials for human applications owing to clinical compatibility.

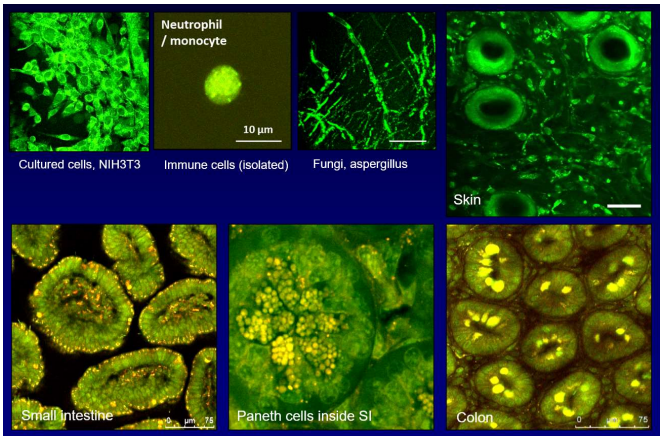

Figure 1 : Moxifloxacin based fluorescence images of various cell and tissue specimens

[1] T. Wang et al, *Sci. Rep*, **6**, 27142 (2016)
[2] S. Lee et al, *J. Biophotonics*, e20190097 (2019)
[3] S. Lee et al, *Sci. Rep*, **6**, 255398 (2016)
[4] H. Chang et al, *Laser Surg. Med.* (2019)
[5] S. Kim et al, *Sci. Rep*, 9**(1)**, 1-7 (2019)