

## MULTIPHOTON TISSUE IMAGING BY USING MOXIFLOXACIN

Ki Hean Kim, Dept. of Mechanical Engineering and Div. of Integrative Biosciences and Biotechnology, Pohang University of Science and Technology, Pohang, Gyeongbuk, Rep. of Korea  
kiheankim@postech.ac.kr

Taejun Wang, Div. of Integrative Biosciences and Biotechnology, Pohang University of Science and Technology, Pohang, Gyeongbuk, Rep. of Korea

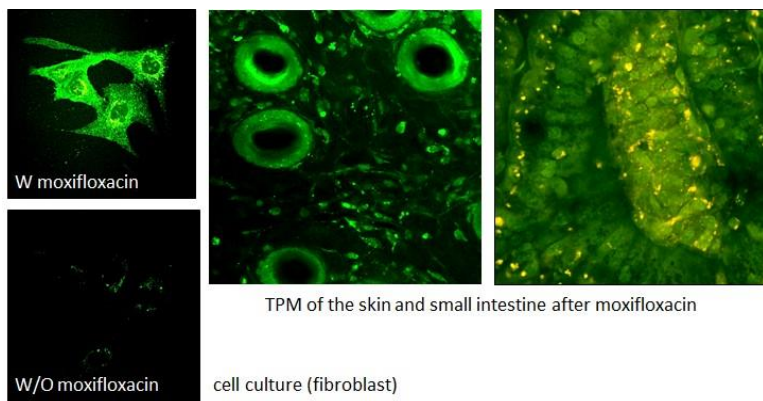
Euiheon Chung, Department of Biomedical Science and Engineering, Institute of Integrated Technology (IIT), Gwangju Institute of Science and Technology, Gwangju, Rep. of Korea

Myung Joon Kim, Department of Ophthalmology, Asan University of Ulsan College of Medicine, Asan Medical Center, 88 Olympic-ro, 43-gil, Songpa-gu, Seoul 05505, Rep. of Korea

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Multiphoton microscopy has been widely used for in-vivo tissue imaging of various biological studies. However, its application to clinical studies has been limited due to either lack of clinically compatible exogenous contrast agents or weak autofluorescence of tissues. We investigated moxifloxacin as a contrast agent of cells for multiphoton tissue imaging. Moxifloxacin is an FDA approved antibiotic with relatively good pharmacokinetic properties for tissue penetration and intrinsic fluorescence. Two-photon microscopy (TPM) of moxifloxacin treated mouse corneas showed good tissue penetration and high concentration inside the corneal cells [1]. Cell labeling of moxifloxacin was tested in both cultured cells and isolated immune cells. Moxifloxacin tissue applications were tested in various mouse organs such as the skin, small intestine, and brain. Most of tissues were labeled well via topical administration, and only the skin required additional gentle removal of the outermost stratum corneum by tape stripping. TPM of these tissues showed non-specific cell labeling of moxifloxacin and fluorescence enhancement [2]. Although most of experimental results were from mouse tissues, its clinical application would be possible. Clinical application is promising since imaging based on moxifloxacin labeling could be 10 times faster than imaging based on endogenous fluorescence.

Moxifloxacin labeling of cultured cells was demonstrated by comparing TPM images with and without moxifloxacin treatment. Bright fluorescence inside cells were observed only with moxifloxacin at the same imaging condition. TPM of the skin dermis visualized many dermal cells with increased fluorescence, and TPM of the villus in the small intestine showed the covering epithelial cells and cells inside the villus clearly.



*Figure 1 – Moxifloxacin labeling of cell cultures and tissues (mouse skin and small intestine, ex vivo)*

1. Lee S, et. al. "In vivo 3D measurement of moxifloxacin and gatifloxacin distributions in the mouse cornea using multiphoton microscopy", Sci Rep. 2016 May 3;6:25339.
2. Wang T, et. al., "Moxifloxacin: Clinically compatible contrast agent for multiphoton imaging", Sci Rep. 2016 Jun 10;6:27142