Multiphoton identification of infectious fungi in dermatology

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Abstract--This work focuses on using multiphoton microscopy for classifying and characterizing the infectious fungi in dermatology. We imaged and found that four fungi, M.canis T.menta Fusarium Asp.flavus, can be identified using multiphoton imaging and that their luminescence is located in blue and green part of the spectrum.

Motivation

Microscopic identification of infectious fungi may be of value in the diagnose and treatment of their infections in the skin. However, traditional imaging of fungi in the skin is difficult due to the lack of contrast of the skin layers and the fungi.

Therefore, we propose to use multiphoton microscopy to acquire microscopic features capable of identifying infectious fungi in the skin.

The principles of two-photon excitation, a form of multiphoton excitation, is illustrated in Fig. 1. By using femtosecond, near-infrared excitation sources to induce the simultaneous absorption of two photons, fluorescence molecules typically excited by UV or visible photons can be used for sample excitation.

Result

We have obtained the multiphoton images of four types of fungi M.canis T.menta Fusarium, and Asp.flavus and their images along with bright field images are shown in Figs. 2-5.

Figs. 1 M.canis on optic

Figs. 2 M.canis on Two-Photon

Figs. 3 M.canis on Two-Photon

Fig. 4 T.menta on optic

Fig. 5 T.menta on Two-Photon

Fig. 6 T.menta on Two-Photon

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Fig. 7 Asp-flavus on optic

Fig. 8 Asp-flavus on Two-Photon

Fig. 9 Asp-flavus on Two-Photon

Fig. 10 Fusarium on optic

Fig. 11 Fusarium on Two-Photon

Fig. 12 Fusarium on Two-Photon

Conclusion

We have shown that multiphoton microscopy is a useful imaging modality in the identification of infectious fungi. The primary luminescence from the fungi is blue and green and their microscopic images and spectroscopic information may be useful in diagnosing fungi infection and developing efficient strategies for their treatment.

Reference

- [1] Richard Summerbell *Identifying Filamentous Fungi*, Guy St-Germain, B
Fig. 1, 4, 7, 10 from *Identifying Filamentous Fungi*