Spectral analysis of biological tissue with embedded nanoparticles

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Abstract

In this work, we obtained the luminescence attenuation and collimated transmission attenuation spectra for various biological tissues in vitro. The goal of the work is to reveal the attenuation of the luminescence of upconversion nanoparticles by the tissues, leading to a distortion of the luminescence spectra.

Materials and methods

The luminescence attenuation and collimated transmission attenuation spectra were recorded using an Ocean Optics spectrometer. The biological tissue was placed over a sample of nanoparticles and the luminescence attenuation spectra were recorded.

Results

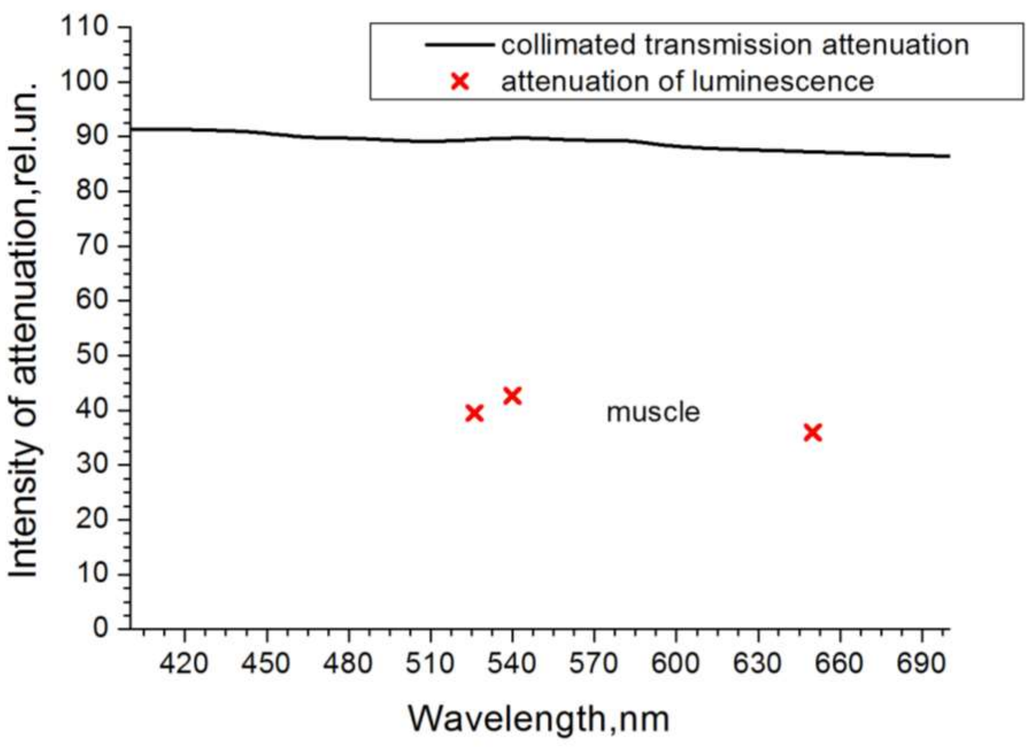

Figure 1

In figure shows the collimated transmission attenuation spectrum of a rat tissue sample. The crosses in the figure show the values of the luminescence attenuation at wavelengths of 525, 540, and 650 nm. In figure 1 shows a rat muscle tissue sample. In figure 2 shows a rat adipose tissue sample. In figure 3 shows a rat skin sample. Skin spectra were recorded from both sides. The green dots indicate the skin with the inner side to the light source, red ones - the outer side.

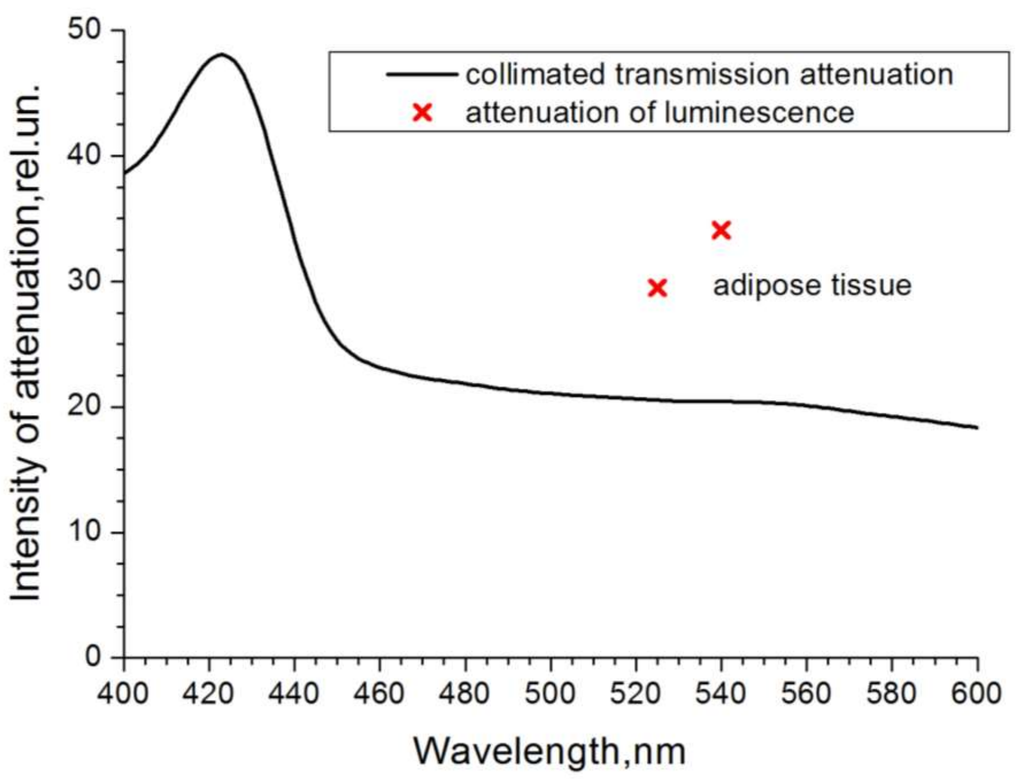

Figure 2

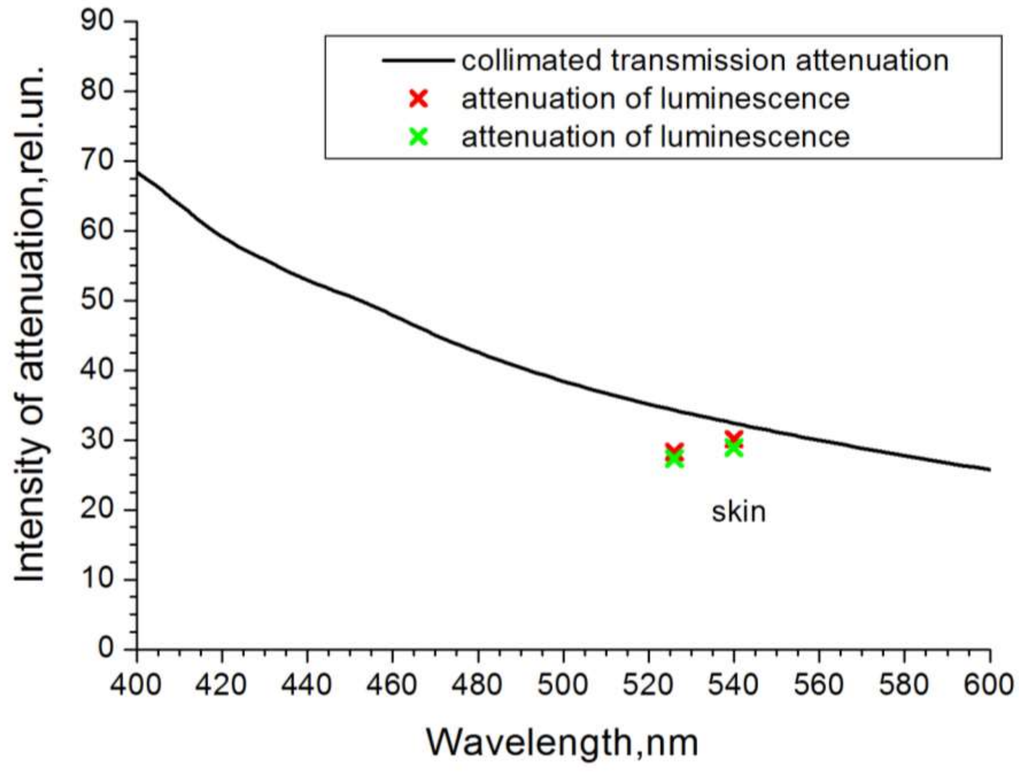

Figure 3

Conclusions

It follows from the results that the difference between the luminescence attenuation and the collimated transmissions depends on the degree of light scattering by the sample. For weakly scattering adipose tissue, the attenuation of luminescence is greater than the attenuation of collimated radiation, for the skin (average scattering) they coincide, and for strongly scattering muscle tissue, the attenuation is less.

Acknowledgements

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