

Introduction

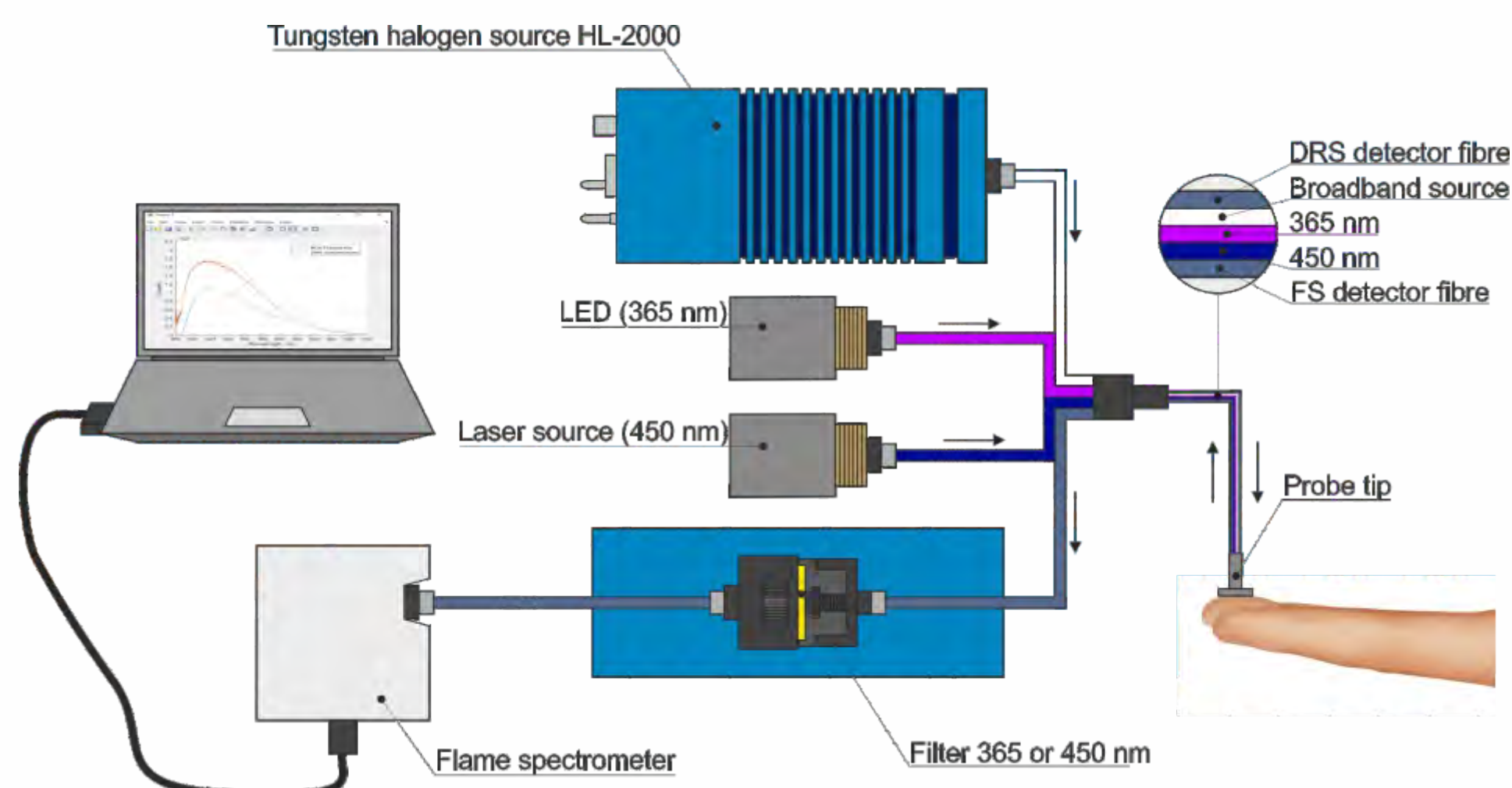
Today, fluorescence spectroscopy (FS) and diffuse reflectance spectroscopy (DRS) are widespread methods frequently used in various fields of medicine. Combined implementation of these methods makes possible to compensate of fluorescent radiation absorption by blood in biological tissues. Compensation of blood content will provide accurately estimation fluorescence of biomarkers.

The aim of research

In this work an approach is proposed for compensating the blood content parameters of a biological tissue.

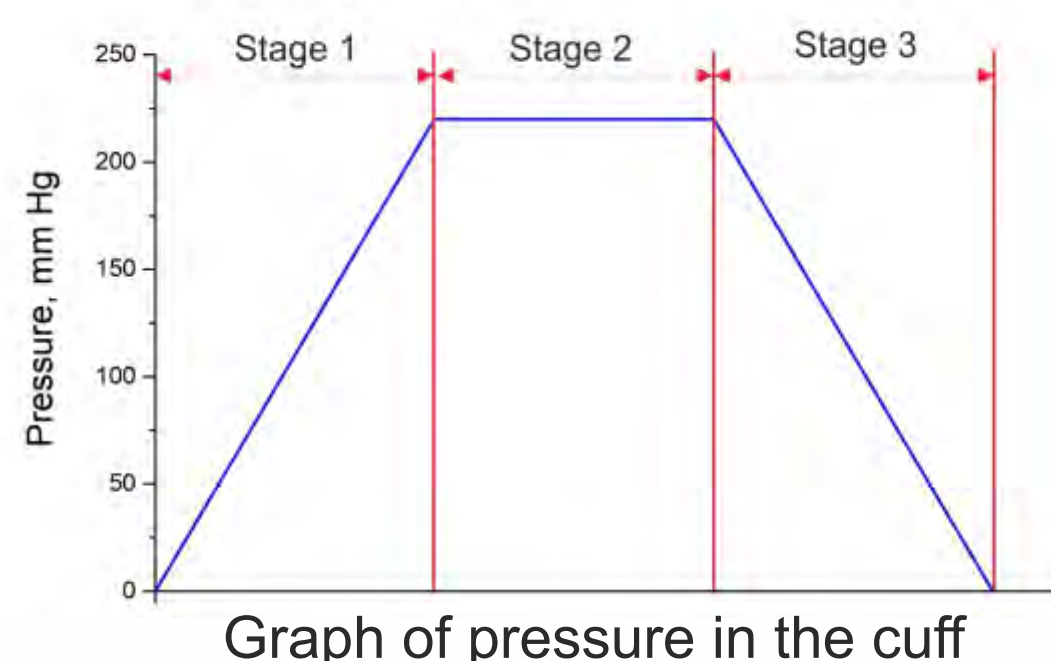
Experimental equipment

The experimental setup was established based on FLAME spectrometer (Ocean Optic, USA), 365 and 450 nm light sources for excitation, a broadband tungsten halogen source HL-2000 (Ocean Optic, USA), a fibre-optic probe that combines a fluorescence channel and diffuse reflection channel.



The concept

A total of 20 healthy volunteers aged 22 ± 3 years were engaged in the research.

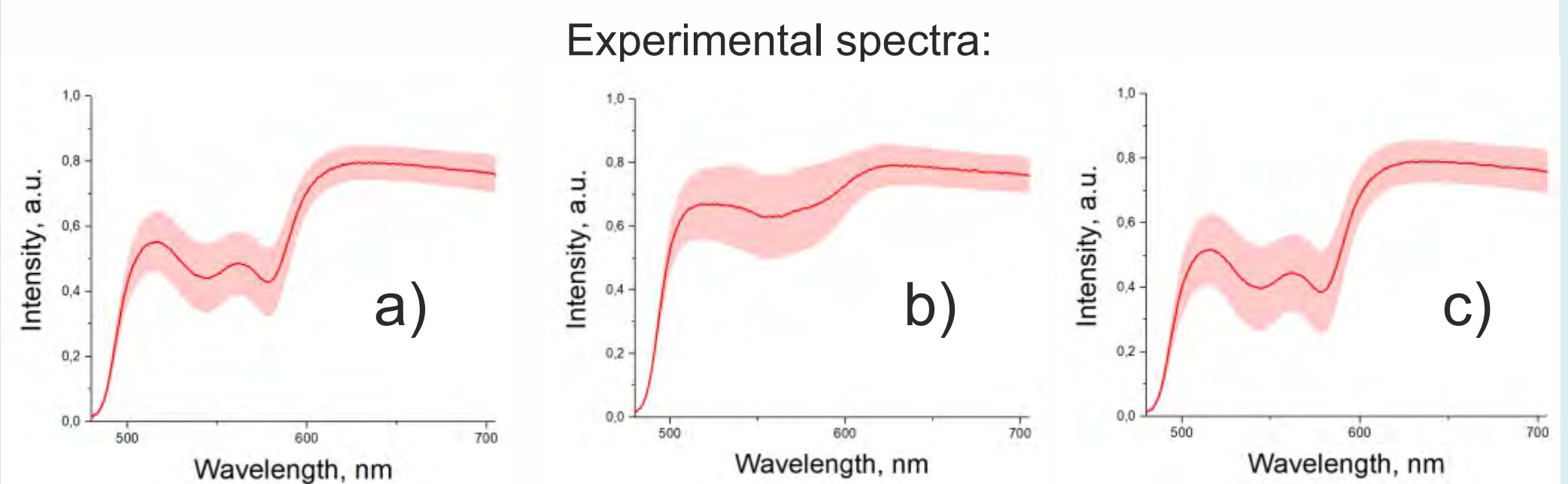


The study consisted of obtaining fluorescence spectra and diffuse reflectance spectra of the palmar surface of distal phalanx of hand fingers before, during (artificial ischemia) and after (hyperemia) arterial occlusion test (the pressure reached 220 mm Hg).

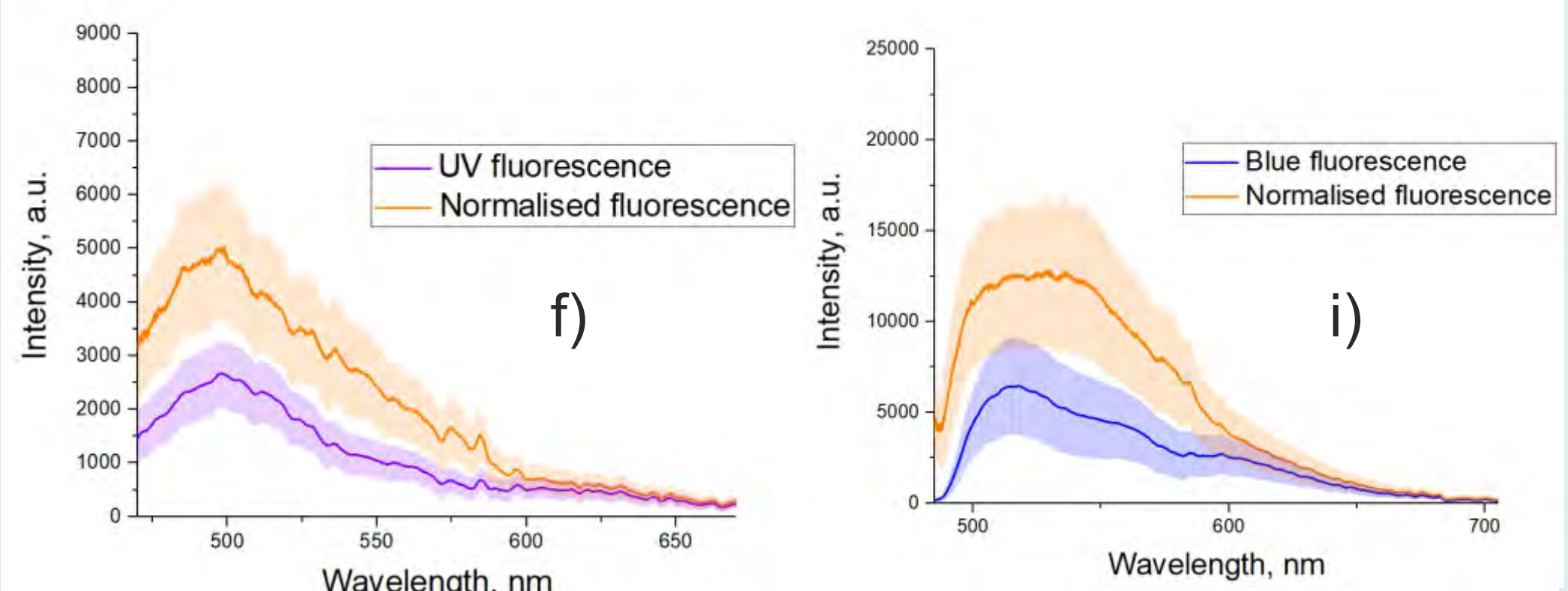
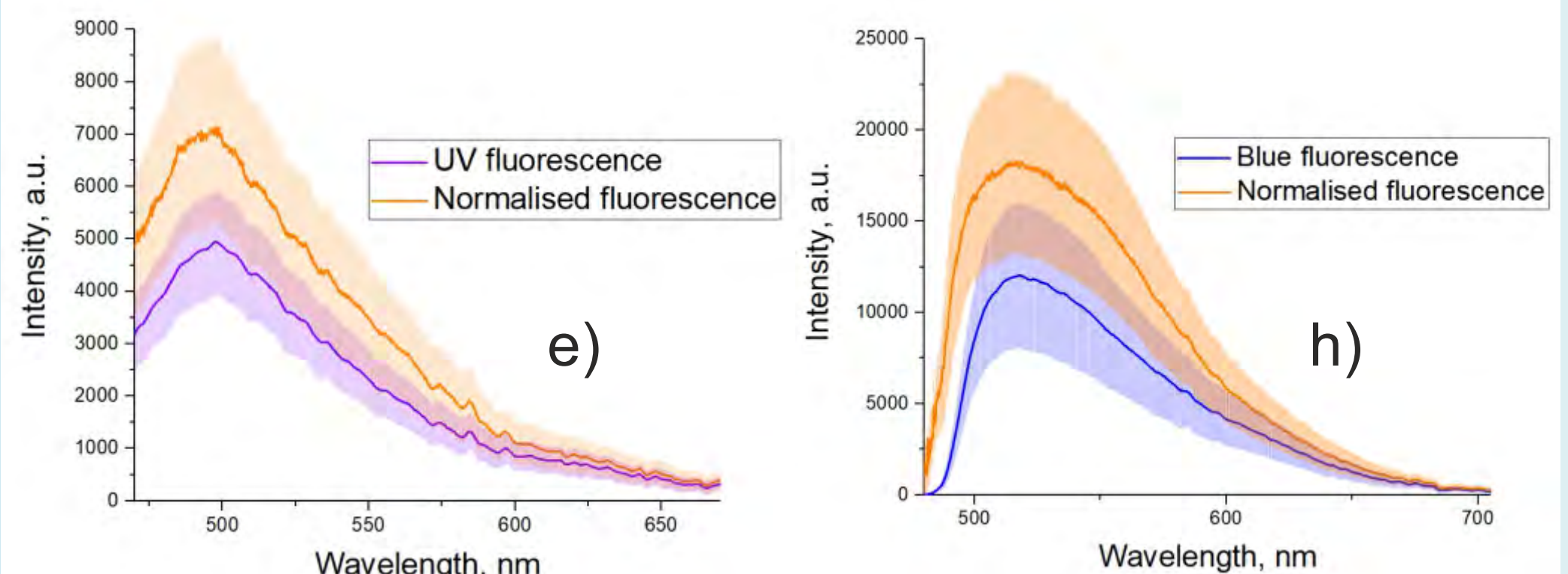
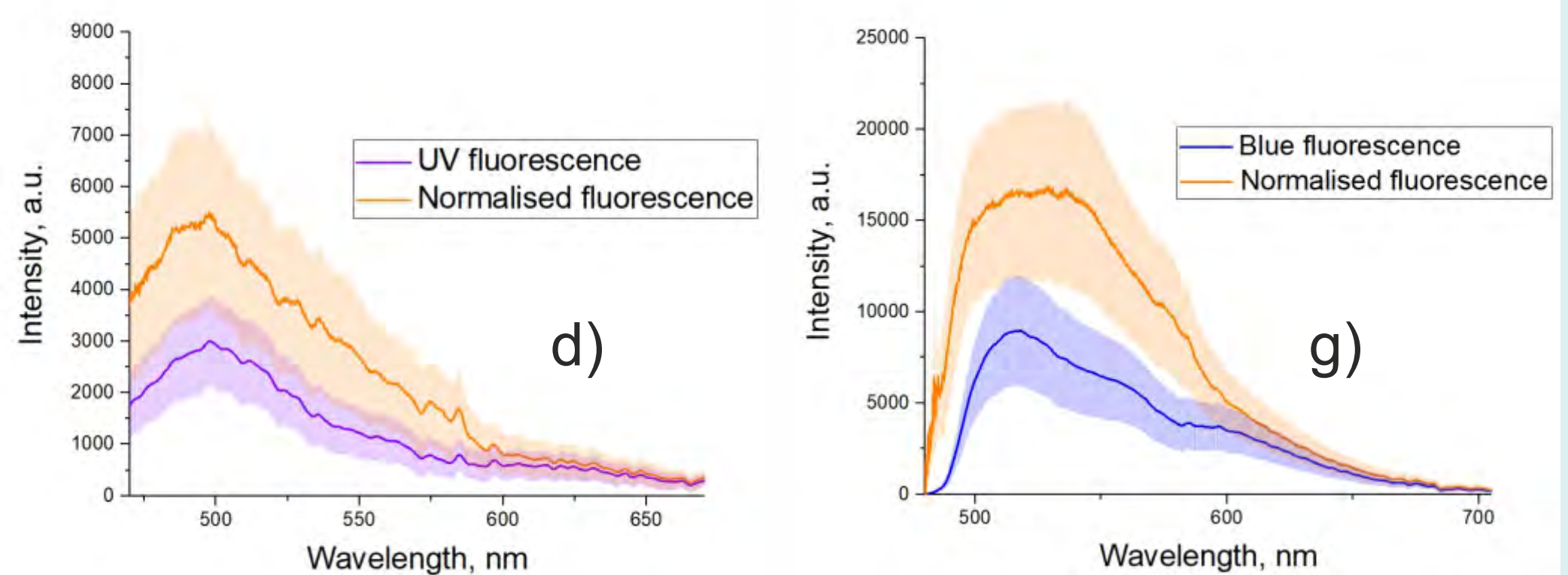


Results

Normalised spectra from the biological tissue was calculated by dividing the experimentally obtained spectra FS into spectra DRS. As a results, were obtained compensated fluorescence spectra.



Mean and SD of diffuse reflectance spectra before (a), in during (b) and after (c) occlusion test



Mean and SD of raw fluorescence spectra and normalized fluorescence spectra at UV (365 nm) before (d), in during (e) and after (f) occlusion test
Mean and SD of raw fluorescence spectra and normalized fluorescence spectra at Blue (450 nm) before (g), in during (h) and after (i) occlusion test

Conclusion

Based on the obtained results, it was concluded that:

- the proposed approach for compensation of blood perfusion is a fairly accurate and rapid method;
- the developed equipment is compact, and its software is automated which in the future can be used for mass screening.

Acknowledgements

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