

Spring
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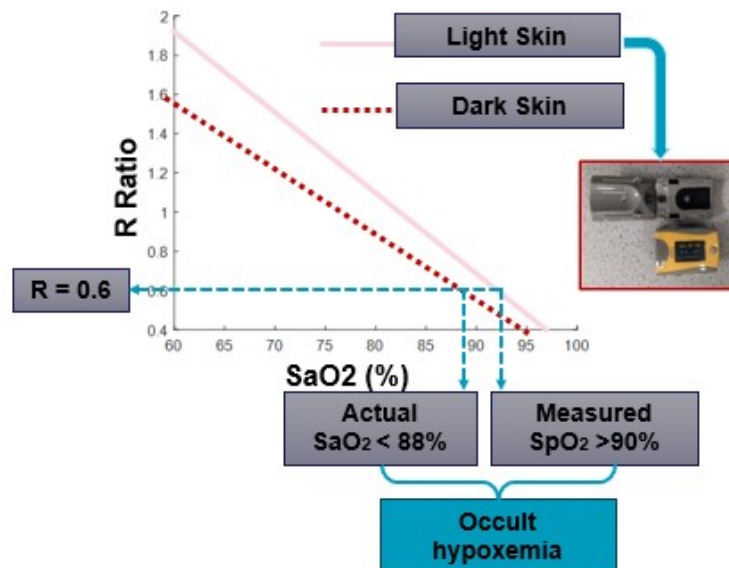
Optics & Photonics Group Lunchtime Seminar Series

University of Nottingham

Accurate measurement of oxygen saturation (SpO_2) in newborns and adults of diverse skin tones

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University of Nottingham



13:30 Wednesday 8 May 2024

Coates Building - C24



Suvvi
Swamy

Accurate measurement of oxygen saturation (SpO₂) in newborns and adults of diverse skin tones

Pulse oximeters varying performance based on skin tones has been highly publicised. Pulse oximeters tend to overestimate oxygen saturation values for people with darker skin. This phenomenon is termed as Occult hypoxemia, wherein PO reads SpO₂ >90%, despite true arterial oxygen saturation (SaO₂) <88%. This has serious implications in those affected as it could lead to delayed or denied disease detection and treatment.

In this presentation, I will talk about a developed test bench to assess commercially available home and hospital-based pulse oximeters under controlled conditions. A laboratory simulator was used to mimic different oxygen saturation values (~70% to 100%). Four neutral density filters and synthetic melanin filters were used to reproduce the effects of varying melanin attenuation levels in the skin. All tested pulse oximeters under the effects of attenuation due to filters did not change across various simulated oxygen saturation values. This does not match with the clinically observed data and one reason is that the light scattering due to tissue had not been fully replicated in the test bench. To investigate this further a Monte Carlo simulation of light propagation through the finger has been developed considering pulsatile flow and different skin tones. In reflection mode, the simulations highlight differences in measured R value and oxygen saturation with change in skin tone in the epidermal layer. However, in case of transmission mode, no change in the measured R value and oxygen saturation was observed. Further validation of these results from simulations is required to help us design pulse oximeters that are reliable and equitable for all users, regardless of skin tone.

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All are welcome



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