Light can be used to examine the lungs of premature babies

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Emilie Krite Svanberg's studies are carried out on full-term babies, but in the future she hopes that measurements taken with the technology that detects oxygen in the lungs could be used to monitor premature babies.

Premature babies have a hard time getting the oxygen they need as their lungs are not sufficiently developed. Today you can only use X-rays to

see how much air babies' lungs contain, but, according to research from Lund University in Sweden, in the future, these types of tests could be done using laser light.

"Multiple X-ray examinations involve a certain increase in the risk of developing cancer, not least in small children. Decreasing the number of X-ray examinations would be a major advantage", says Emilie Krite Svanberg.

Krite Svanberg is an anaesthesiologist and researcher, who publicly defended her doctoral thesis on the use of light to measure oxygen in a human body this March. The basic principle of the method is to send light of a certain wavelength into the body, and then measure how much of the light can be retrieved. Based on this, it is possible to calculate the oxygen supply.

Technology that measures oxygen bound in the blood already exists. Free oxygen that exists in cavities such as lungs is much more difficult to measure. Here, the submitted light must be at exactly the right wavelength – achieving a wavelength of 760 nanometres is not enough; the light beam must be precisely 760.445 nm.

The Lund University researchers are the first ones ever to successfully perform these types of measurements. Trials with healthy newborn babies have shown that the method works. The research group, with roots in both the Faculty of Medicine and the Faculty of Engineering, has, along with private companies, received a large EU grant to continue developing the method.

"Today, the method requires one person to hold a measuring instrument against the baby's chest, while another sits by the computer, registering the results. Our goal is to simplify this technology", says Emilie Krite Svanberg, and continues:

"We hope that the measurements will be possible to perform automatically, by using small transmitters attached to the baby's chest. This would enable measuring the lung function continuously, in a way that is completely safe and that doesn't bother the child".

These measurements could help determine whether or not a premature baby needs treatment in order to improve their breathing. If intensive interventions are necessary, such as inflating collapsed parts of the lungs, light measurements could also be used to minimise the risk of injury from the treatment.

Another part of Emilie Krite Svanberg's doctoral thesis is about refined oxygen measurements to monitor severely ill adult patients. In critical conditions, such as circulatory failure (medical shock), the body focuses mainly on maintaining blood supply to the brain and the heart. The blood flow to less vital parts of the body, such as arms and legs, decreases, which can be measured through a newer method that uses short laser pulses.

"In cases of circulatory failure, time is crucial. The faster healthcare staff realise the oncoming crisis, the better the chances of the patient to survive", says Emilie Krite Svanberg, hoping that by measuring the oxygen supply, in for instance the forearm, it will be possible to detect signs of medical deterioration at an early stage and thereby save lives.

The technology is not yet available in hospitals, but could soon be introduced. Another advantage is that the technology is so simple that it could be used not only within intensive care, but also in emergency wards and other healthcare clinics.

More information: The thesis is available at www.lu.se/lup/publication/8777000

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