Press Release

‘Listening to light’ to transform diagnosis of skin cancer

Scientists are developing a new device that listens to light and could be capable of detecting skin cancer and other diseases more accurately than ever before, eliminating the need for unnecessary and invasive biopsies.

With around 232,000 people around the world, estimated to have been diagnosed with malignant melanoma in 2012, and with 55,500 deaths, early diagnosis of the disease could see hundreds of thousands of lives saved over the next ten years, improve quality of life and reduce healthcare costs.

Traditionally, skin diseases are diagnosed visually by a physician using the naked eye or a magnifying glass and personal experience to make a decision. Invasive, uncomfortable, and potentially damaging procedures such as biopsies are often performed to confirm or exclude the presence of disease. This new breakthrough would give physicians an accurate and reliable way to objectively identify serious skin diseases for the first time.

“We are essentially listening to light, allowing us to see not just structures but molecules and biology on and under the skin, at depths and contrast never visualized before. It will enable physicians to make accurate and objective diagnosis of skin conditions for the first time.” said Professor Vasilis Ntziachristos, INNODERM Coordinator and Chair for Biological Imaging at the Technical University of Munich.

The method uses opto-acoustics, sending light waves of different wavelengths into the skin and detecting ultrasound waves generated within tissue in response to light absorption to build up an image of the skin tissue and specific molecules therein.

The prototype can visualize at depths up to 5mm under the skin, measures 4cm x 4cm x 7cm, no bigger than a small apple and can be placed on the skin to generate a high-resolution image in less than a minute. Being portable and of small form factor means that it could be used on expeditions or in remote areas of the world where a young doctor with little experience can make accurate, objective diagnoses.

“The device allows us to see blood vessels, skin oxygenation and potentially several novel pathophysiological features which are an integral area in the development of diseases. No one has ever been able to see like this before.” continued Professor Ntziachristos.

INNODERM, or Innovative Dermatology Healthcare based on Label-Free Spectral Optoacoustic Mesoscopy , combines the expertise of world-class engineers, scientists and clinicians in a consortium comprising 5 partners from 4 European countries.

The project has been awarded a grant of €3.8 million from Horizon 2020, the EU framework programme for research and innovation under the Photonics21 Public Private Partnership.

About INNODERM

The Technical University of Munich (TUM) is heading a European research project, where engineers and physicians together develop a new handheld instrument for early diagnosis of skin cancer.

The concept may facilitate earlier detection, improved disease monitoring and immense savings for the executing clinical centers.

Over the next five years, a research team consisting of engineers, bioengineers and physicians will research an innovative new imaging device that promises to revolutionize detection and treatment monitoring of a wide variety of skin conditions ranging from wounds and scar healing to autoimmune disease and cancer. The new device sends short light pulses to the skin and detects ultrasound waves generated in response to light absorption by skin molecules and structures. Tomographic analysis of the ultrasound waves can reveal unprecedented volumetric views of skin constituents and disease manifestations at resolutions and depths never reached before by an optical method. Then, by using light pulses at different colors, accurate spectroscopic information is revealed not only for morphological, but also biochemical features of skin, providing accurate and specific diagnostic information.

The goal is to provide the physicians with a tool that allows on site-assessment of morphological, physiological and cellular changes of the skin area examined not only by inspecting the skin surface, but also sub-surface features within several millimeters of depth. In contrast to ultrasound skin imaging, Multi-Spectral Optoacoustic Mesoscopy (MSOM) considered in INNODERM can visualize features of healthy and morbid skin with markedly superior contrast and specificity. The research team will investigate the new MSOM device in different dermatology conditions, including cancer, cosmetics, hair growth / restoration and inflammatory diseases and establish a set of features that can aid the dermatologist to achieve earlier detection and more accurate treatment follow-up. Overall, the new technology promises to lead to healthcare cost savings by reducing the number of unnecessary biopsies and offering individualized treatment monitoring towards precision dermatology.

About Photonics21

Photonics21 is the European Technology Platform (ETP) for photonics –a technology encompassing all of the products and processes around the emission, manipulation and detection of light. It is integral to a wide range of industries that include the medical, healthcare, transport, manufacturing, and telecommunications sectors. In December 2005 "Photonics21" was set up to bring the community of photonics professionals and industries together.

In September 2009, the European Commission defined photonics as one of five European Key Enabling Technologies (KET's) and shortly after the European Research & Innovation Program "Horizon 2020" invited Photonics21 to become a "Public Private Partnership" (PPP). In November 2013 the "Photonics 21 Association", a legal entity under Belgium law, became the private contract partner in a Public Private Partnership (PPP) in conjunction with the EU Commission.

Today Photonics21 represents more than 2500 personal members from all over Europe. Our members are experts in the photonics industry, research organisations and universities who actively engage with us to develop a joint photonics strategy for future research and innovation in Europe.

With the global photonics market growing at twice the world economic growth rate, from 350 Billion Euros in 2011 to 615 Euros in 2020, Photonics21 stands in a secure global market position. The production of European photonics alone accounts for 60 billion Euros and employs over 350,000 people directly.

With strong growth forecast, current industry trends like digitalisation, resource efficiency, individual and zero failure production will drive the photonics industry further.

For more information about Photonics21 please go to:http://www.photonics21.org/index.php