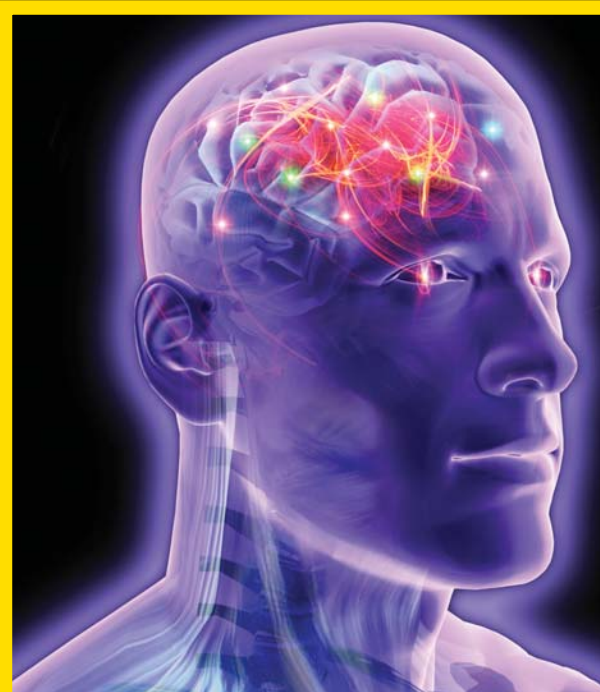


# What can you do with optics and photonics in healthcare? Well, for starters...

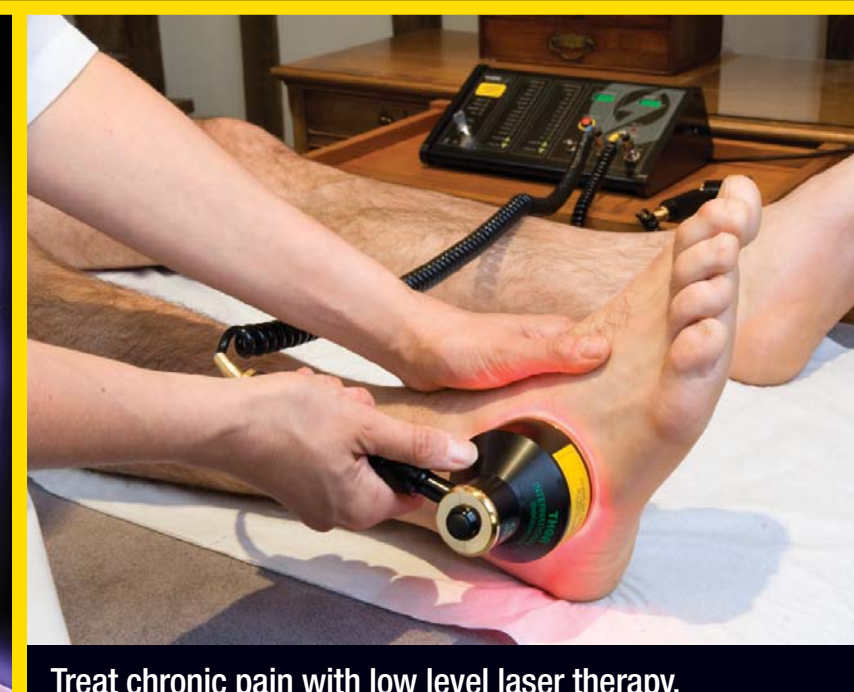
PHOTONICS IS CONSIDERED AS ONE OF THE KEY TECHNOLOGIES OF THE 21ST CENTURY. AT THE HEART OF PHOTONICS ARE TECHNOLOGIES FOR GENERATING LIGHT FOR PRACTICAL PURPOSES IN HEALTH CARE AND LIFE SCIENCES

EXPLORE THE FUTURE OF OPTOGENETICS WHERE SPECIFIC AREAS OF THE BRAIN CAN BE TREATED WITH LIGHT FOR ADDICTIONS, ASSESS OBESITY LEVELS WITH THREE-DIMENSIONAL SURFACE IMAGING SYSTEM  
HEAL · PAIN-FREE · LENS · ENDOSCOPE · LIGHT ENERGY · PATIENT · SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY · OPTICAL COHERENCE TOMOGRAPHY

WITH THESE TECHNOLOGIES YOU CAN UNDERSTAND THE AFTERMATH OF A CONCUSSION BETTER WITH DIFFUSION TENSOR MAGNETIC RESONANCE IMAGING, RESTORE BLINDNESS WITH A PROSTHETIC RETINA  
WELLNESS · NANOTECHNOLOGY · IMAGE ANALYSIS · PHOTODYNAMIC THERAPY · HEAL · PAIN-FREE · LENS · ENDOSCOPE · LIGHT ENERGY · PATIENT · WAVELENGTHS



Explore the future of optogenetics where specific areas of the brain can be treated with light for addictions.



Treat chronic pain with low level laser therapy.



Treat skin cancer with a bandage that emits light, known as photodynamic therapy.



With advanced imaging technologies, conduct a motion analysis to reduce athletic injuries.



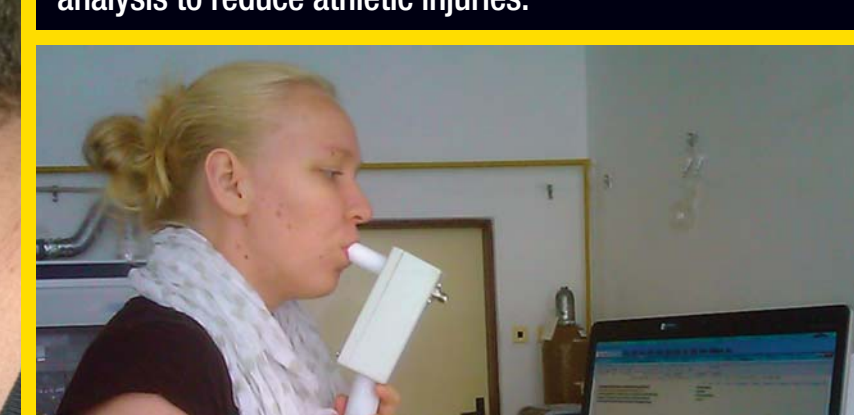
Eliminate a newborn's jaundice with phototherapy.



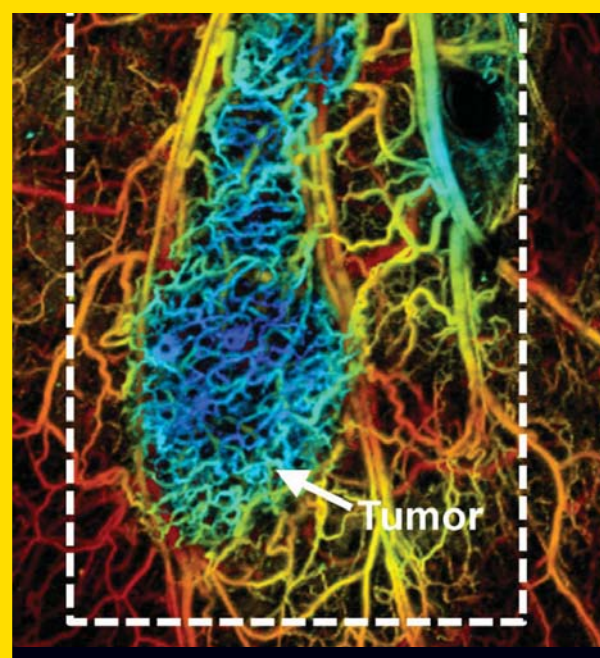
Use medical imaging to see what is going on inside the body.



Remove a tattoo with laser.



Detect cancer or other illness with a breath test.



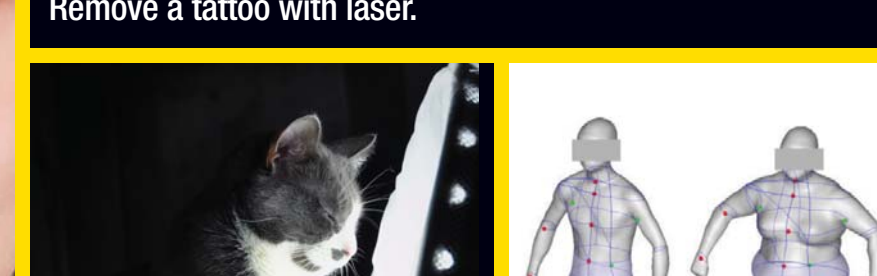
Detect cancer by measuring the increased oxygen around a tumor.



Correct your vision permanently with LASIK.



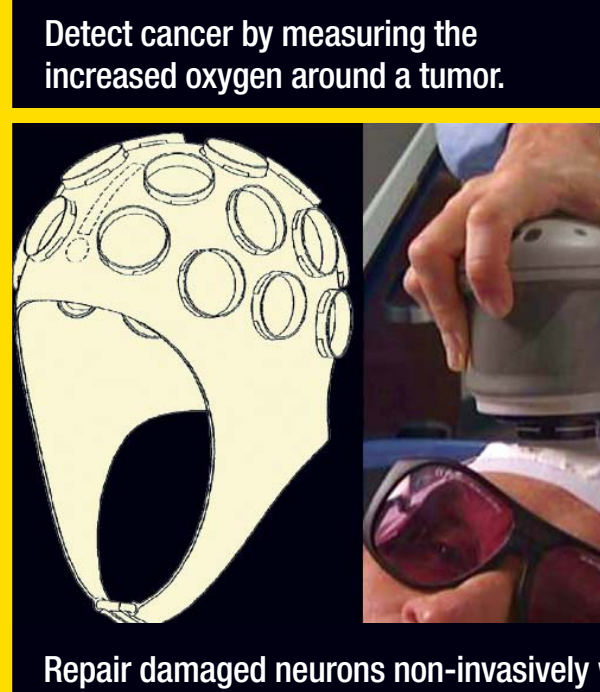
Treat complexion problems with a laser.



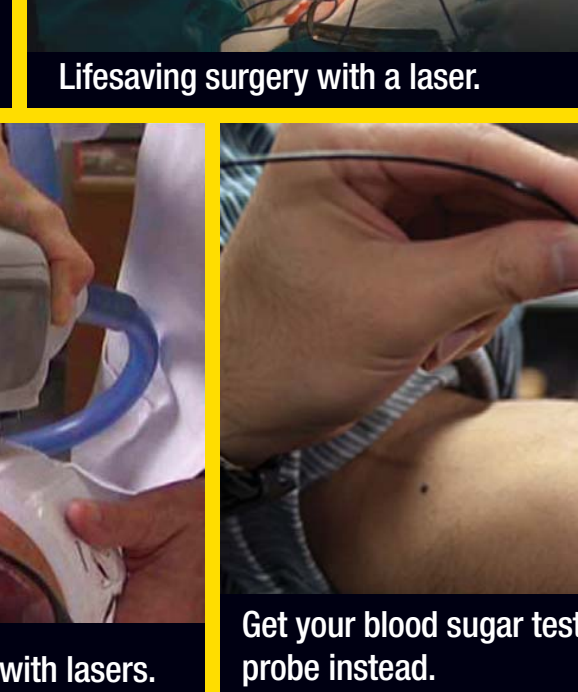
Overcome the winter blues with a full spectrum LED light.



Use optics to find disease causing pathogens.



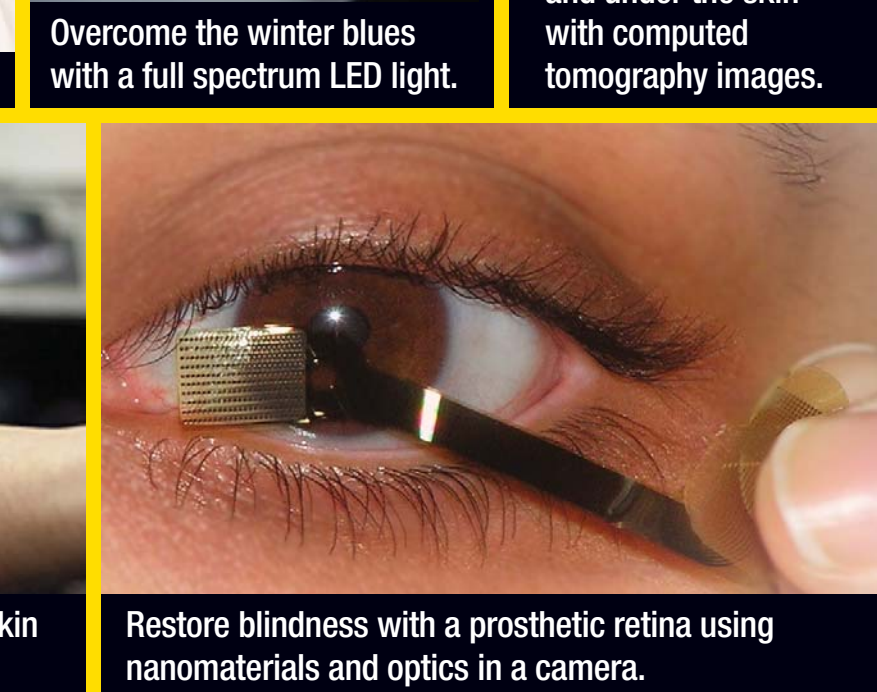
Repair damaged neurons non-invasively with lasers.



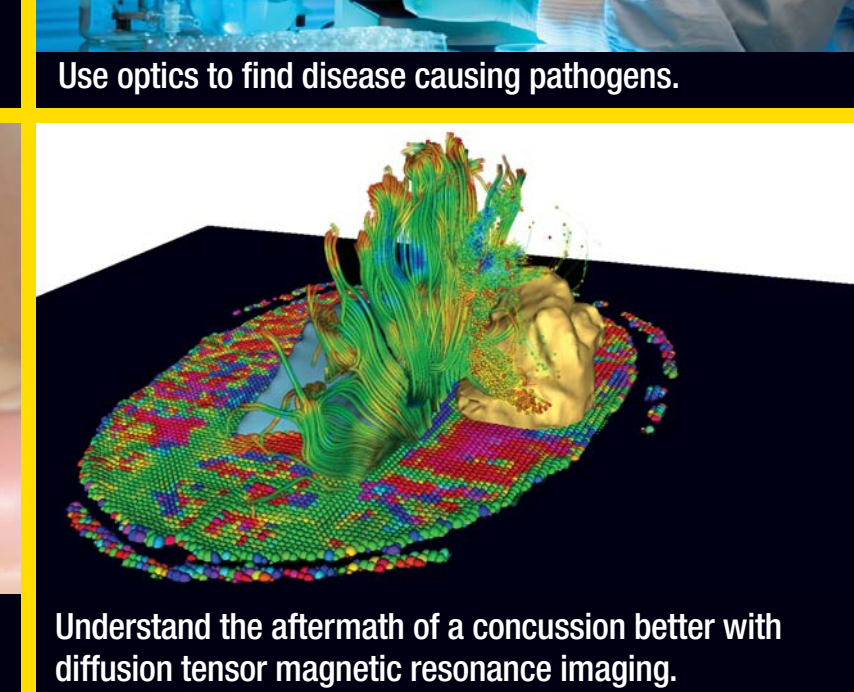
Get your blood sugar tested without a needle, using a skin probe instead.



Whiten your teeth.



Restore blindness with a prosthetic retina using nanomaterials and optics in a camera.



Understand the aftermath of a concussion better with diffusion tensor magnetic resonance imaging.

REPAIR DAMAGED NEURONS NON-INVASIVELY WITH LASERS, RESTORE BLINDNESS WITH A PROSTHETIC RETINA USING NANOMATERIALS AND OPTICS IN A CAMERA, GET YOUR BLOOD SUGAR TESTED WITHOUT A NEEDLE, USING A SKIN PROBE INSTEAD, REMOVE A TATTOO WITH LASER, TREAT COMPLEXION PROBLEMS WITH A LASER, TREAT SKIN CANCER WITH A BANDAGE THAT EMITS LIGHT, TREAT CHRONIC PAIN WITH LOW LEVEL LASER THERAPY, WITH ADVANCED IMAGING TECHNOLOGIES, CONDUCT A MOTION ANALYSIS TO REDUCE ATHLETIC INJURIES

## How exactly are optics and photonics used in healthcare?

Doctors and researchers use optics and photonics to treat disease, get images from inside our bodies, provide cosmetic treatments, and more. Medical optics and photonics helps reduce or eliminate hospital stays, diagnose disease earlier for greater chance of cure, help patients recover more quickly, and reduce pain.

Medical researchers are exploring how to use optics and photonics in ways never before imagined. Since different wavelengths of light are absorbed differently in human tissue, light can be applied in very selective areas down to the microscopic level, both on the surface of tissues or to parts of the body underneath the skin. This allows doctors to target the tissues they want while limiting the harm to the rest of the body. Light technology also has great potential to bring more and better medical care to underserved areas of the world with its portability, lower costs, and more sterile applications that reduce the risk of infection.

## Do you want to explore more?

For cool websites that explore optics and photonics visit: [spie.org/resources](http://spie.org/resources)

Photos courtesy of: Explore the future of optogenetics where specific areas of the brain can be treated with light for addictions (*Spooky Pooka*); Remove a tattoo with laser (*Calibre Medical*); Detect cancer or other illness with a breath test (*The SIFT-MS team; Professor Patrik Spanel, J. Heyrovsky Institute, Prague, and Professor David Smith, Keele University*); Treat chronic pain with low level laser therapy (*Thor Laser*); With advanced imaging technologies, conduct a motion analysis to reduce athletic injuries (*Edmund YS Chao*); Detect cancer by measuring the increased oxygen around a tumor (*Junjie Yao and Lihong Wang*); Repair damaged neurons non-invasively with lasers (*Paul A. Lapchak, Patrick D. Lyden and Pramod Butte*); Determine distribution of body fat between inside the abdomen and under the skin with computed tomography images (*Bugao Xu, Wurong Yu, Ming Yao, M. Reese Pepper, Jeanne H. Freeland-Graves*); Get your blood sugar tested without a needle, using a skin probe instead (*J. Patrick Gillooly*); Restore blindness with a prosthetic retina using nanomaterials and optics in a camera (*LLNL*)