Kochi Medical School Hospital, Center for Photodynamic Medicine

What Is “Center for Photodynamic Medicine”
Center for Photodynamic Medicine is the Japan’s first department of practice, research and education dealt with special medical technology using special light source. We develop and spread KOCHI’s original medical technology such as photodynamic diagnosis (PDD) employing 5-aminolevulinic acid (5-ALA), and indocyanine green (ICG) in fluorescence imaging with near-infrared light (NIR) to the world.

Organizational Structure
Center for Photodynamic Medicine is organized by several cross-sectoral departments dealt with special medical technology using special light source Kochi Medical School Hospital, such as Department of Surgery (Digestive system surgery, Breast surgery, Cardiovascular surgery, Thoracic surgery, Plastic surgery), Neurosurgery, Dermatology, Ophthalmology, Urology, for medical examination, development research, education of photodynamic medicine, based on the collaboration between universities such as School and Graduate School of Bioscience and Biotechnology, Tokyo Institute of Technology, and Graduate School of Engineering Osaka University, and also between industry and academia.

Target Illness
cancer of digestive system (esophageal cancer, gastric cancer, colon cancer), breast cancer, cardiovascular disturbance, lung cancer, brain tumor, cerebrovascular disturbance, skin cancer (solar keratosis, Bowen’s disease, extramammary Paget’s disease), bladder cancer, prostate cancer, renal pelvic/ureter cancer, etc.

Special medical technologies using special light source
(1) Photodynamic diagnosis (PDD) employing 5-aminolevulinic acid (5-ALA)
5-aminolevulinic acid (5-ALA) induced PpIX possesses photoactivity, it emits red fluorescence when it is excited by light irradiation at a specific wavelength, mainly visible blue light (375-445 nm), and cancer cells can be accurately identified by detecting the red fluorescence (600-740nm).
(2) Photodynamic therapy (PDT) employing 5-aminolevulinic acid (5-ALA)
5-aminolevulinic acid (5-ALA) induced PpIX is excited by light irradiation at a specific wavelength and low output, mainly visible red light (600–740nm) or green light (480–580nm), reactive oxygen, such as singlet oxygen, is produced in and injures cancer cells upon energy conversion from the excited state, in which PpIX absorbs photo energy, to the baseline condition.

(3) Indocyanine Green (ICG) in Fluorescence Imaging with Near–Infrared Light (NIR)
Near infrared light (NIR) fluorescence imaging with indocyanine green (ICG) with light at the excitation wavelength (about 780nm) while observing it at longer emission wavelengths (about 830nm) is used to visualize lymph nodes, lymphatic pathways and vessels and tissue borders.

(4) Near–Infrared Ablation Therapy with Indocyanine Green (ICG)

(5) Near–Infrared Spectroscopy for observing vessels and blood flow

(6) Narrow Band Imaging (NBI)
Special imaging technique for endoscopic diagnostic medical tests, where light of specific blue (390–445nm) and green (530–550nm) wavelengths is used to enhance the blood vessels to allow for better visualization of the cancerous lesion.