

# Image-guided Surgery

Image-guided surgery - developed in collaboration with surgeons and biomathematicians at Leiden University Medical Centre and Leiden University Mathematics Institute, respectively - uses fluorescent markers to help the surgical team 'see' the tumour in real time during surgery. This powerful technique drastically increases the success of tumour-resection surgery. In the future, image-guided surgery will also increase diagnostic success and will provide an invaluable tool for studying blood flow.

## Image-guided surgery at a glance

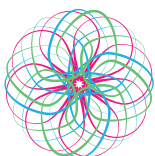
- Image-guided surgery is an emerging multidisciplinary technique for improving cancer diagnostics and the success of surgical treatment.
- A fluorescent label attached to a marker (e.g. a monoclonal antibody) binds specifically and selectively to tumour cells, helping the surgeon 'see' the tumour and metastatic tissue in real time.
- Fluorescent markers can be used with a wide range of procedures, including classic ('open') surgery, laparoscopic surgery, and diagnostic procedures such as colonoscopy.
- The fluorescent markers are pharmacologically inactive and are safe to use in both healthy volunteers and patients.

## Diverse applications: minimally invasive surgery, diagnostics, and measuring blood flow

Image-guided surgery is the latest breakthrough in the surgical treatment of cancers and other diseases. In endoscopic surgery, the surgeon uses a laparoscope to minimise trauma and recovery time. Image-guided surgery shows the surgeon where to cut, maximising patient outcome.

The labelled markers can also be used to visualise tumour cells during a diagnostic procedure such as a colonoscopy, bronchoscopy, or cystoscopy.

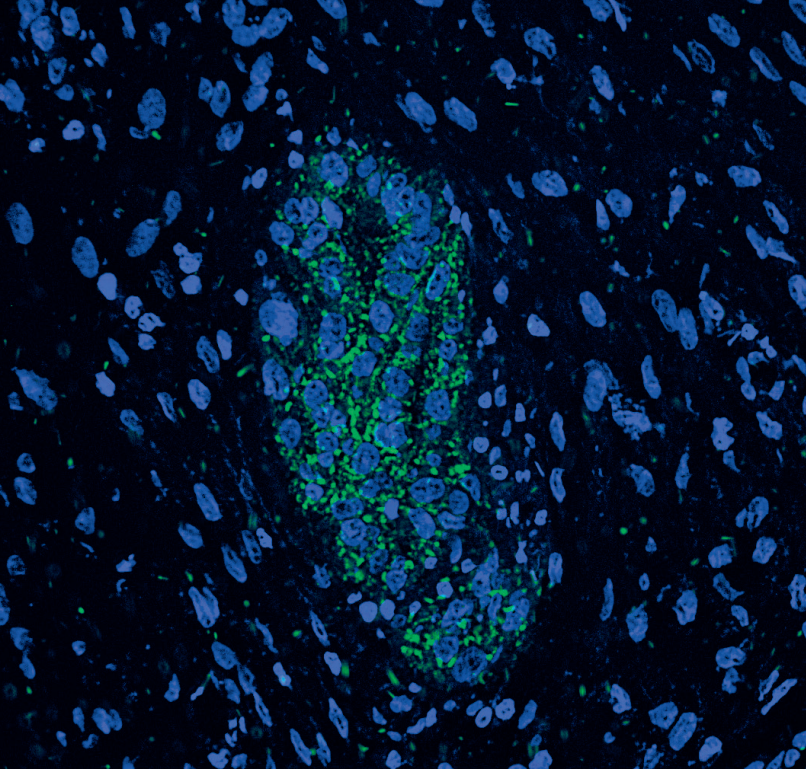
Fluorescent compounds are also used to study blood flow, for example to confirm blood vessel integrity following vascular surgery. At CHDR, these fluorescent substances are being used to study drugs that might affect blood flow through capillaries, for example in patients with haematological conditions such as sickle cell anaemia.



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## The Image-guided Surgery Team

The Image-Guided Surgery (IGS) team is a unique collaboration between CHDR, Leiden University, and the Leiden University Medical Centre (LUMC). Working together, the team develops powerful image-guided approaches for use in surgery, diagnostics, and other clinical applications.

The combined effort of surgical oncologists and CHDR's world-class drug-development group opens exciting new opportunities, bringing important medical breakthroughs to the clinic.

In addition to its extensive experience with preclinical research, the group has also performed sponsored clinical studies in this emerging field, leading to several important advances, including:

- Improved outcome in both open and laparoscopic procedures;
- Development of imaging devices with a wide range of wavelengths for use in both academic and commercial applications;
- A wide variety of applications in the field of oncological surgery; and
- A comprehensive panel of tumour-targeting fluorescent probes for clinical applications.

The IGS team draws on the clinical expertise at CHDR and LUMC's surgical departments, including General Surgery,

Surgical Oncology, Gynaecology, Thoracic Surgery, Urology, Neurosurgery, and Head-and-Neck Surgery. In addition, affiliations with the departments of Pathology, Radiology, Endocrinology, and Image Processing have led to advanced knowledge regarding the development and preclinical validation of fluorescent probes. The IGS team also works closely with mathematicians at Leiden University to develop PK/PD models of new and existing fluorescent probes.

Based on our vast experience with preclinical and clinical research development and our established, proven infrastructure, the IGS team is a one-stop shop for accelerated clinical translation. We offer a unique combination of expertise and research infrastructure to research groups and companies who are developing near fluorescent probes for targeting specific structures. At any point in the development trajectory we can offer our services for a fast, high quality translation from preclinical validation to human studies, ultimately improving surgical outcome and patient care.

## Why choose CHDR?

The Centre for Human Drug Research specialises in early-phase clinical drug research. CHDR's overall mission is to improve the drug development process by collecting as much information as possible regarding the candidate drug in the early phases of development. This information helps sponsors make informed decisions regarding the course of clinical development for their product.

Research at CHDR covers a wide range of fields, including the central nervous system (CNS) and pain, the cardiovascular system, haemostasis, immunology, and dermatology. In addition, CHDR is at the forefront in developing novel biomarkers and methods for measuring drug-related effects in all of these research areas.

## Contact us



+31 (0)71 524 64 00  
info@chdr.nl  
[www.chdr.nl](http://www.chdr.nl)



+31 (0)71 526 23 09  
A.L.Vahrmeijer@lumc.nl  
[www.igos.nl](http://www.igos.nl)