

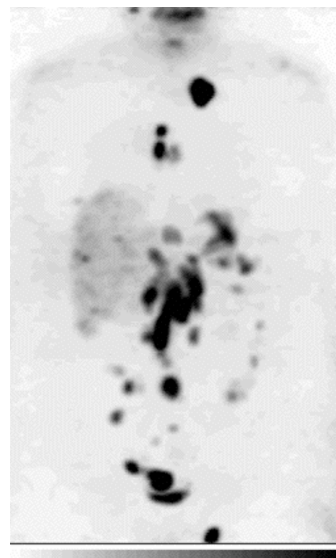
What is Molecular Imaging?

Molecular imaging is a rapidly emerging field of diagnostic medicine that combines the disciplines of chemistry, biology, medicine and radiology. It enables researchers and doctors to visualize biological processes in a non-invasive way – seeing biology in action. The potential to use molecular imaging for disease diagnosis is limitless, however the current primary uses are the diagnosis of cancer, neurological and cardiovascular diseases. Molecular imaging further contributes in unexpected ways to improving patient care and treatment options by reducing costs – diagnosing diseases faster and more accurately – and by shortening the time needed to identify and evaluate promising new medications – using imaging in drug development and clinical trials.

Imaging probes are a special class of pharmaceuticals, sometimes called contrast agents, radiopharmaceuticals or dyes, which are used in conjunction with medical imaging scanners such as MRI, ultrasound and nuclear imaging. The major difference compared to traditional pharmaceuticals is that molecular imaging probes are designed not to elicit a biological response and the associated imaging studies are minimally or entirely non-invasive.

For example: Following an injection with the molecular imaging probe ^{18}F -FDG a patient suspected of having metastasized cancer is scanned using a positron emission tomography scanner (PET scanner). FDG is designed to seek out tumours based on the fact that active cancer collects and consumes glucose (FDG is a glucose mimic) to a greater extent than healthy cells. The distribution of the probe is detected and appears as dark spots in this image. The information can be used to diagnose or stage disease, guide the course of therapy and monitor the effect of treatment.

(Image courtesy of Dr. Karen Gulenchyn, Chief of Nuclear Medicine, Hamilton Health Sciences)



Because changes in biochemistry occur before diseases reach an advanced stage, molecular imaging using probes that follow specific biological processes will foster earlier and more personalized diagnosis of disease.