

Molecular Innovators

More than 160 years ago Werner von Siemens founded his company on the working philosophy of “being innovators”. Today, the Siemens Company is a global entity composed of three business sectors: Industry, Energy and Healthcare, with more than 400,000 employees worldwide.

The staying power of Siemens is further matched by its incredible resilient history; almost half the company was lost in World War I, and nearly all of it was destroyed in World War II. By the latter half of the 20th century, the company bounced back to develop and produce such industry milestones as the world’s first cardiac pacemaker, and the fastest neurocomputer – just several of many Siemens creations.

Healthcare innovation continues to be one of the largest driving forces of the company today and notably so at the Hoffman Estates world headquarters of Siemens Healthcare’s Molecular Imaging Division where “gamma cameras”, used in Nuclear Medicine and Molecular Imaging, are developed, manufactured and shipped to virtually all countries worldwide.

We sat down with Markus Lusser, Global VP Sales & Marketing of Siemens Molecular Imaging to learn about molecular imaging, and the benefits we can expect to derive between technology, nuclear medicine and disease management.

Technology & Nuclear Medicine

Nuclear medicine has been a recognized medical specialty for almost 50 years. Initially developed to investigate patients with various disorders of the thyroid gland, the field now offers a wide variety of diagnostic and therapeutic procedures to aid in the management of patients with a broad spectrum of conditions, including malignant and benign tumors, kidney disorders, pulmonary (lung) diseases, and bone diseases, to name a few. One of the major strengths of these techniques, which use small quantities of radioactive materials for diagnosis,



The Siemens Biograph TruePoint PET-CT located at Northwestern Memorial Hospital. NMH is one of the first three institutions worldwide to use the high definition scanner. Scans can be performed in 10-20 minutes and unlike an MRI, the whole body is not inside the tunnel. During the development phase, “even deciding the color of this machine was researched,” says Lusser. “For example, the inside of the tunnel is white because research showed us that it is more aesthetically pleasing to people.”

-Photo by Lee Balgemann

and larger quantities for treatment, lies with the physiologic basis of most Nuclear Medicine examinations. Rather than relying solely on anatomic (structural) changes in body tissues, which often occur later in the disease process, Nuclear Medicine techniques often map the underlying physiologic disorders which represent the cause of illness. As such, Nuclear Medicine belongs to one of the emerging categories of tools widely referred to as ‘Molecular Imaging’.

Over the past several years, the

addition of Positron Emission Tomography (PET) scanning has provided an even more sensitive and accurate tool for patient assessment. Now used primarily in patients with malignant tumors, this imaging technique is also very valuable in evaluating individuals with dementia, seizure disorders, and cardiovascular disease. The combination of PET scanners with CT scanners in a single device is a recent innovation which makes this technique even more valuable. - Dr. Stewart Spies, Medical Director Nuclear Medicine, Northwestern Memorial Hospital

CWM What exactly is Molecular Imaging and Nuclear Medicine?

ML Molecular Imaging, also called, Nuclear Medicine, refers to imaging techniques that use very small radioactive substances to detect and treat disease. It allows physicians to visualize, characterize and measure biological processes within our bodies at molecular and cellular levels. Nuclear Medicine was first coined in 1953 – over time the definition has changed and expanded beyond molecular imaging to include therapy, technology etc.

From the patient’s perspective, a molecular imaging test is non-invasive, with only a small injection of a “tracer” prior to the exam. This molecular imaging tracer, known as an imaging biomarker, enables a physician to see a patient’s metabolic processes as they are happening.

CWM What areas of healthcare encompass nuclear medicine and molecular imaging?

ML Molecular imaging techniques, such as SPECT, (Single-Photon Emission Computed Tomography), PET, (Positron Emission Tomography), hybrid SPECT/CT (Computed Tomography) and PET/CT imaging are typically used in oncology, cardiology and neurology cases. That means that patients get imaged using these techniques when their doctors are trying to stage and manage their cancer treatment; to assess

the strength of the heart muscle, or to look for evidence of diseases. Molecular imaging techniques are also used to find infections and for assessment of thyroid, liver, lung and kidney function.

CWM If you were to draw a chronological timeline of imaging technology, what would it start with and how has it evolved?

ML Well, of course, it all starts with the discovery of the X-ray in 1895. Siemens was already involved in this historic milestone as we manufactured the first X-Ray tube for Conrad von Roentgen. From there, medical advancements have grown by leaps and bounds, as CT, MRI and molecular imaging have been introduced in the second half of the 20th century and are now accepted as a valuable part of diagnostic imaging.

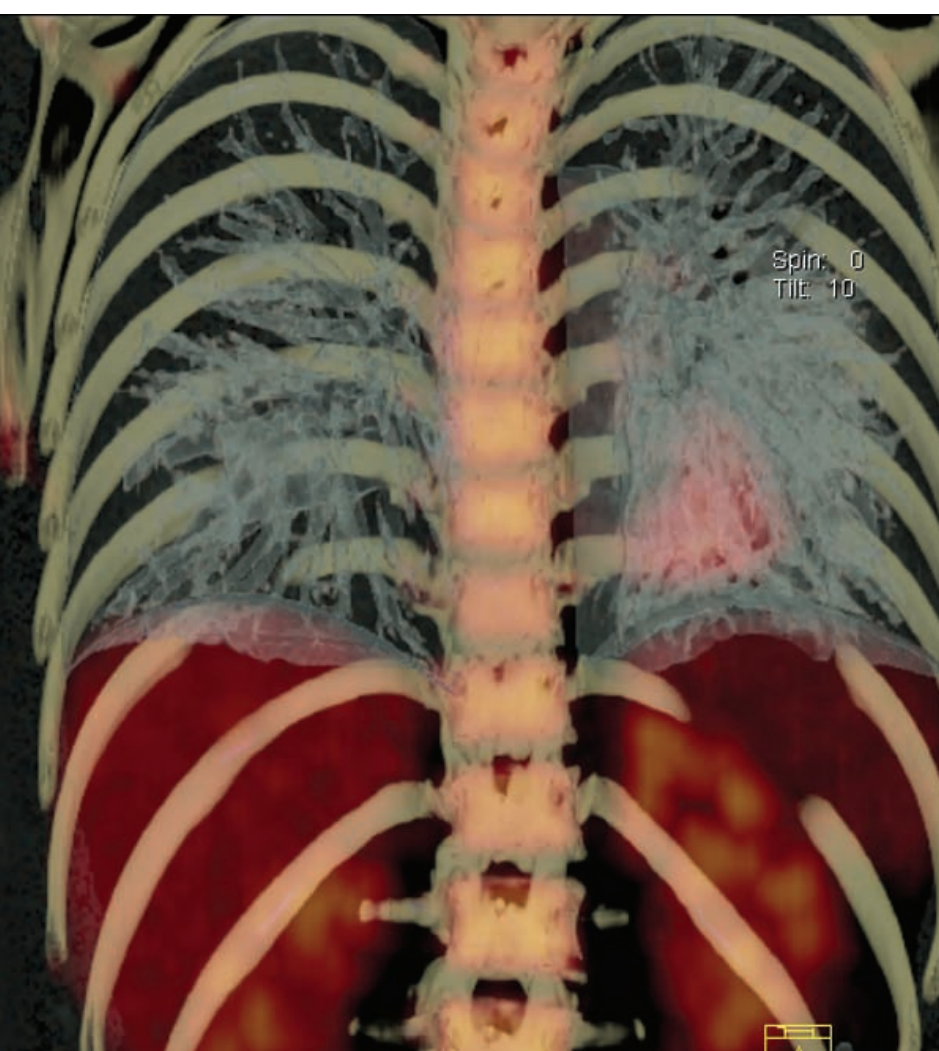
The newest technologies in imaging include PET/CT, which was invented by the Molecular Imaging Division of Siemens. PET/CT imaging uses very specific tracers to pinpoint diseases inside the human body.

CWM How difficult is it to develop a new technology today with regard to time, cost, trial, etc.? What are the biggest obstacles you face in doing so?

ML In 2006, the U.S. spent more than 2 trillion dollars for healthcare. The US government predicts that spending will nearly double within the next 10 years and represent more than 20% of the gross domestic product (GDP) by 2016. One major driver in this trend is the increasing life expectancy of the population as a result of better healthcare.

Taking cost, life expectancy and an increasing population into consideration, new technologies have to be able to detect diseases earlier, have the ability to treat all patients individually and offer physicians increased confidence to locate, manage and follow up on the treatment of disease in their patients.

In addition, Siemens Healthcare is consistently striving to increase the



This picture shows the amazing detail that is possible with the hybrid PET-CT imaging technology which provides a combination of anatomical and functional imaging. - Data picture, courtesy of Karolinska University Hospital in Solna, Sweden