

# JOINT EVOLUTION

## PROJECT FOR ACCUTRON HP-D CONTRAST MEDIA INJECTOR

Sahlgrenska University Hospital,  
Gothia Medical AB and MEDTRON AG

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## CREATING A REFINED CONTRAST MEDIA INJECTOR TOGETHER

Nowadays radiological images as instruments for diagnosis and treatment have taken center stage. Imaging technology is today technically even more demanding, and tomorrow's will be even greater.

Sahlgrenska University Hospital in Gothenburg, Sweden, opened its first Hybrid Operating Room in early 2011. Shortly thereafter they started to plan and build an extension to the hospital specifically for new imaging facilities.

As it is impossible to foresee what procedures or equipment will look like 10 years from now, the design of the new building and its operational plan are characterized with a great deal of flexibility in mind. The Center for Imaging and Intervention was designed to be modern and changeable, many years to come after the building's initial completion.

The Center has theatres for both surgery with advanced imaging equipment and guided catheter-based interventional procedures, including cardiovascular and neurological as well as other organ and tumor treatment areas. The building houses nuclear medicine with gamma and PET cameras as well as diagnostic capability with radiography, computed tomography, ultrasound and magnetic resonance imaging. In May 2016, the new Radiology Department moved in on the first floor.

And in 2017, Interventional Suite 1 followed with five labs, and the Hybrid Operating Theatre was also opened. Presently, counting two Neuro labs, three Hybrid labs and four Peripheral labs, yield nine labs altogether in the two Interventional suites of the hospital.

*“The Center for Imaging and Intervention was designed to be modern and changeable.”*

They will also add a new Trauma Suite with CT and add a new ambulance entrance, which will help to improve access and circulation for the patients. In the Interventional department and in the Hybrid Operating Theatre, the Radiography department nurses work together with the operating nurses in shared facilities.



*The Sahlgrenska University Hospital\* is associated with the Sahlgrenska Academy at the University of Gothenburg, Sweden.*

The Radiology department uses the Hybrid Operating Theatre for two days each week and treat one to two patients per day. The various procedures undertaken there are usually complex and take several hours.

**MEDTRON's dual head angiographic injectors Accutron HP-D are frequently used in both the Hybrid Operating Theatre and in the Neuro-Radiology department.** The Neuroradiologists alone operate three Accutron HP-D injectors and perform four to six interventions every day. The injectors are used for Digital Subtraction Angiography (DSA), 3D angiography and VasoCT.



*\*With 17,000 employees the hospital is the largest hospital in Sweden and the second largest hospital in Europe. It provides emergency and basic care for the 700,000 inhabitants of the Göteborg region and offers highly specialised care for the 1.7 million inhabitants of West Sweden. It is named after philanthropist Niclas Sahlgren.*

## PRODUCT REDESIGN WITH CLEAR FOCUS ON CUSTOMER REQUIREMENTS

The highly experienced specialists, who use the injector frequently and for a wide range of applications, have had a significant influence on the new development.

The high pressure injector Accutron HP-D was redesigned in a joint collaboration between Sahlgrenska hospital as a customer and MEDTRON as manufacturer. Gothia Medical, the hospital's trusted partner for the equipment with medical devices, initiated the project, organized the meetings between Sahlgrenska and MEDTRON, and took part in the technical discussion. As a result, Sahlgrenska's team supported the evolution of the injector with clear user requirements.

*"We improve and facilitate the clinical everyday life through innovative high-quality products." states Stefan Welin, Division Manager at Gothia Medical AB: "We have enjoyed a long and trusting cooperation with MEDTRON. This was a good starting point for us to work together to immerse ourselves into customer requirements and technical functionalities of the Accutron HP-D."*

### These top features were most requested by Sahlgrenska's experts:

Roya Razzazian, a dedicated Radiography nurse at Sahlgrenska with more than 20 years of experience, explains which benefits she wanted to achieve in the joint development process:



Roya Razzazian and Magnus Eriksson (Sahlgrenska UH)  
with Stefan Welin (Gothia Medical)

- We wanted an injector with a higher positioned injection unit so that we had clear vision of the syringes at all times. This enabled us to visually be sure that there were no air bubbles in the syringes.
- We also wanted an injector with a higher positioned control panel, so that we could see the start/stop-button and the screen at all times. This enabled us to ensure the injector is working and see the current status of the injection.
- We wanted an injector with a swiveling control panel, so that we could operate it from both sides of the operating table. This enabled us to work alone or in a team.
- We wanted a wireless and mobile injector, so that we could move it to and from the table quickly and easily. We didn't want any cables on the injector. This enabled

us to ensure the injector fits easily into the crowded space around the operating table and does not hinder us in any way.

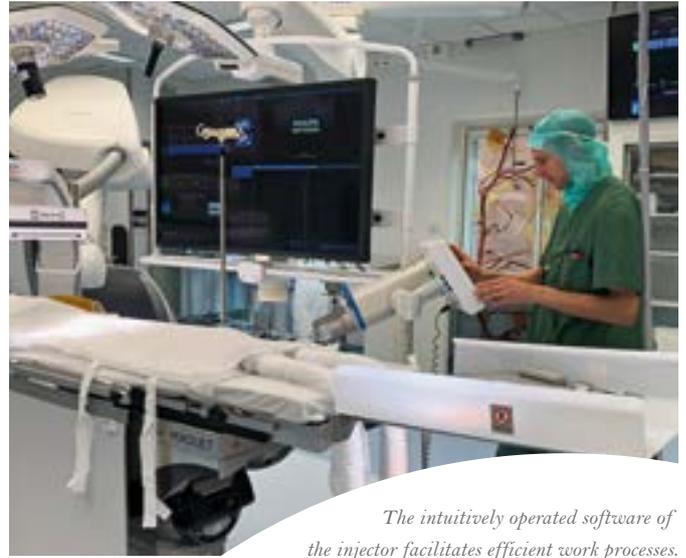
- We wanted a double head injector that could inject contrast medium and saline solution. This enabled us to ensure that our Hybrid Operating Theatre provides cutting edge equipment for various radiology procedures and in Neuroradiology.

“Clear view of the injection unit and control panel of the injector is important.”

The conditions in a Hybrid Operating Theatre are different from that of an Angio Suite. In the Hybrid Operating Theatre, the patient lies on an operating table which can be moved and tilted in various directions. Roya and her colleagues can adjust the height of the table. With the previous model of the Accutron HP-D, they could not see the syringes or the control panel of the injector when the table was in a high position. Therefore, they wanted an injector with a higher positioned injection unit and control panel, so that they could see both the syringes and the screen at all times.

***“Seeing the syringes is crucial for the detection of air bubbles. Seeing the on/off button on the control panel is important to know if the injector is working.”***

Sahlgrenska’s team also wanted an injector that could be operated from both sides of the table. Sometimes the Radiography nurses must work alone and need to be able to operate the injector from the sterile side of the table. When several nurses work in a team, one nurse is able to operate the injector from the side where the injector is positioned.



*The intuitively operated software of the injector facilitates efficient work processes.*

***“We needed an injector with a control panel that can be swiveled so that we can operate it from both sides of the table”.***

In the Hybrid Operation Theatre, it can be very crowded. There are normally two to three surgeons, two anaesthetists, two Radiography department nurses, one surgical nurse, and sometimes physicians or nurses in training. The team can total up to ten persons as a result. On top of this, there is a lot more equipment in the Hybrid Operation Theatre than in other imaging labs. Many machines are in use and the patient is draped with surgical clothes and drapey.

***“Complete access around the table is critical.”*** At Sahlgrenska, they wanted an injector without cable connections, so that they could move it to and from the table quickly. Cables can be barriers to this concept and create a safety hazard, as staff could trip over them. In emergency cases it is especially important to be able to move the injector to the table quickly, without the need to plug it into any power socket.

# CUTTING-EDGE EQUIPMENT FOR INTERDISCIPLINARY IMAGING AND INTERVENTION CENTER

Advanced imaging procedures demand for a multi talented double head injector.

The new Hybrid Operating Theatre is meant to be a shared facility for many imaging teams including Neuroradiologists. Therefore, it was crucial to have a double head injector with one syringe for contrast media and one syringe for saline. In Neuroradiology the possibility to simultaneously inject contrast media and saline solution is important.

**Technologically demanding and committed to cooperation**

*“We are innovators who push manufacturers to deliver better med tech.”*

Naturally, the hospital also looked at competitor products but didn't find another injector that would fit their needs. Asked if they searched for ways to overcome their difficulties by looking what other hospitals do to solve them, Magnus Eriksson, a biomedical engineer at Sahlgrenska and together with his colleague Anders Broman responsible for the cooperation with MEDTRON and Gothia Medical, stated that: *“No, we had no possibility to learn from other hospitals' experiences. In fact it is the other way round. At Sahlgrenska we are very innovative and aiming to use the most advanced technology. We are pushing our distributors and manufacturers of med tech equipment to offer innovative and advanced solutions”.*



*Shared facilities for advanced imaging procedures*

Sahlgrenska's imaging experts were an early adopter of the new Hybrid Operating room concept as they opened their first Hybrid OR in 2011. As a result they learned from their own experience. In the Hybrid OR they had no operating table, but instead an angio table, which created many difficulties.

Sahlgrenska has very experienced professional staff. Roya for example has more than 20 years of experience specialized as a Radiography nurse. Based on that experience and their past experiences in total, they were able to determine their needs and the technical features they were really looking for. *„We are cooperative and involve our whole team”*, was Magnus explanation for the success of the joint project with Gothia Medical and MEDTRON.

In the Nordic countries, a culture of cooperation and being sensitive to the needs of the whole team prevails. All stakeholders are involved into the process and the requirements of the doctors, nurses and technologists are listened to alike.

Everyone's input is welcome. The engineers and technologists then translate the doctors' and nurses' requirements into technical features. Those features are then given to the manufacturers, who are asked to develop corresponding med tech devices."

### Close coordination during the redesign phase

During the redesign phase, the communication with Gothia's and MEDTRON's engineers, sales managers and product specialists was very good. They were visiting Sahlgrenska hospital 3 times during the cooperation, thus gaining an on-site impression of the requirements and the environment. Sahlgrenska's experts were satisfied with MEDTRON's reaction time.

*“The new injector brings diagnostic benefits to Gothenburg.”*

They had the feeling that their needs were heard and understood, and that the answers they received from MEDTRON's staff were accurate and reliable. *“We are aware of the fact that the evolution of a med tech device is a complex project that takes some time”, says Magnus.*

**The dual head injector Accutron HP-D for the injection of contrast media and saline contributes to obtaining images of greater diagnostic significance.** It thus brings several clinical improvements or diagnostic benefits to Gothenburg. The double head injector can inject contrast media and saline simultaneously, which is very helpful in procedures e.g. in neuroradiology. For example, when contrast is injected through microcatheters to perform 3D imaging of the complex brain vasculature. In DSA, Accutron HP-D is connected

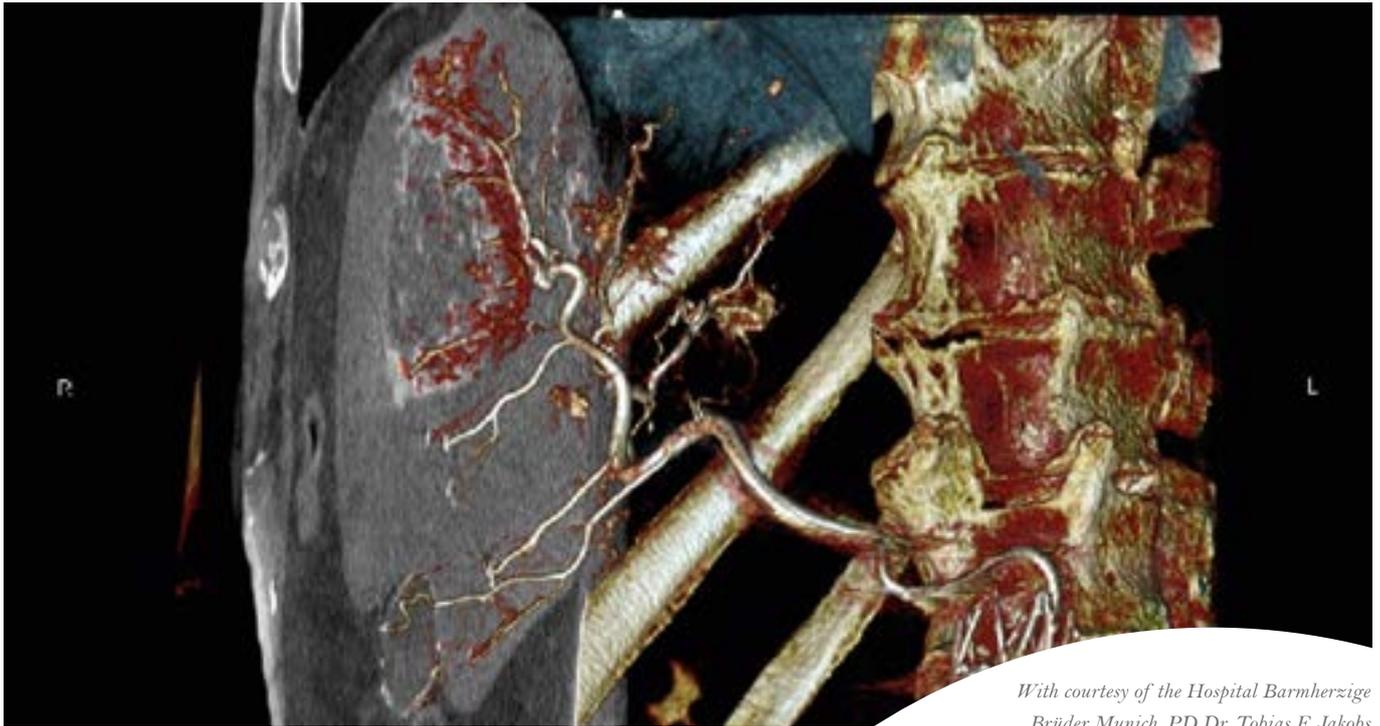
to the catheter when the radiologists and vascular surgeons are running imaging series or performing a 3D angiographic procedure. An advantage for the patient is the possibility of direct intervention in the case of narrowing or aneurysmatic vascular changes and bleeding. For example, if it turns out during the imaging that there is a constriction that can be treated with a catheter procedure, the therapy can take place in the same session.

There are also operating improvements for the nurses who are the main users of contrast medium injectors at this center. Roy's conclusion on the results after the redesign of Accutron HP-D are very positive:

*„Yes, we are satisfied with the new Accutron HP-D. We received what we wished to have – an injector that serves us well.*

- *With the injection unit that is now 10 cm higher than before we have clear vision of the syringes at all times. Thus we can make sure that there are no air bubbles in the syringes.*
- *With the control panel that is now 15 cm higher than before, we can see the on/off button and the screen at all times. Thus we can control if the injector is working, and see the current status of the injection.*
- *With the control panel that can now be swiveled by 180 degrees, we can operate it from both sides of the operating table. Thus we can work alone or in a team.*
- *The wireless and mobile injector can be moved to and from the table quickly and easily. Thus the injector fits easily into the crowded space around the operating table. There are no cables that could hinder us in any way.”*

Most importantly, by improving the procedures in the above described way, the new Accutron HP-D offers enhanced safety for the patients.



*With courtesy of the Hospital Barmherzige Brüder Munich, PD Dr. Tobias F. Jakobs*

## DOUBLE HEAD INJECTOR OFFERS ADDITIONAL BENEFITS

As previously mentioned, the double head injector enables simultaneous injection of contrast media and saline solution. This can help to reduce the contrast dose impact on the patient without affecting the image quality.

**Patients with kidney problems can receive a simultaneous injection of contrast and saline to protect their kidneys.** During procedures performed to detect aneurysms a high concentration of contrast medium is needed, as aneurysms are difficult to see. Also, in some procedures involving the kidneys a high concentration of contrast medium is needed.

### Most reliable device

Reliability is important in Sahlgrenska's busy Imaging and Intervention Centre. Magnus confirms:

*“The Accutron HP-D is a very reliable device that always works. We don't have any issues or problems with it. It just works.”*