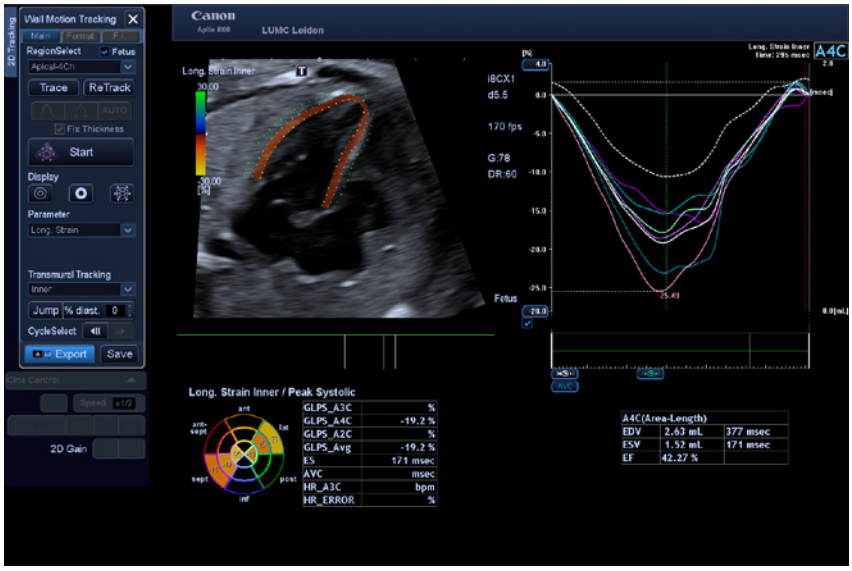
*VISIONS spoke with Dr. M.C. Haak, from LUMC, Leiden, the Netherlands.*

# Detecting Congenital Heart Defects in the Womb

Canon Medical's Aplio i-series delivers outstanding clinical precision and helps clinicians get diagnostic answers quickly and reliably. Monique C. Haak, MD, PhD, fetal-maternal medicine consultant, fetal surgeon and head of obstetric ultrasound at Leiden University Medical Centre in the Netherlands, explained how the system's image quality and options such as speckle tracking have helped her improve her diagnostic confidence when detecting fetal abnormalities.

## Challenges in fetal imaging

Leiden University Medical Centre (LUMC) is a referral centre and performs all fetal procedures in the country. Dr. Haak's team includes fetal medicine specialists, prenatal nurses, five sonographers and physicians specialising in ultrasonography, residents in training, fellows and administrative and social workers.




"My daily work is to care for fetuses with congenital abnormality. A big part of my work is to sort out what is wrong in unborn babies," Dr. Haak said.

"With the advancement of technology and improved visibility of the machines, we can detect more and more abnormalities, but we do not always know what they really mean for the life of the fetus, yet it is very important to make a proper prognosis," she said.

This gap is especially true for fetal brain imaging, where researchers have made huge strides in the past 15 years, but still struggle to get good long-term outcome studies in sufficiently high numbers.

"Follow-up studies are difficult to do, you need parent consent for everything. Your data is sometimes three years old. So you gather a lot on a particular abnormality, but can't connect it to the outcome. However you need that if you want to do proper parent counselling," she explained.

LUMC has a very good follow-up programme for fetal surgery and the largest service in the world for Twin-to-Twin Transfusion Syndrome (TTTS), a serious disorder that occurs in identical twins and higher order multiples who share a placenta. Each year, the hospital carries out around 50 to 60 laser surgeries for TTTS as well as ten fetal shunts and 60 fetal blood transfusions.

## Image quality, speckle tracking and other cutting edge technologies

Ultrasound is of course the first choice modality in fetal imaging and good equipment with the latest technology available is key. Dr. Haak and her team have been working with three Aplio i800 systems for the past three years, a decision they have never regretted.

"The system's image quality is superb, especially in challenging patients, for example obese mothers-to-be. We typically obtain less clear images in these patients. The Aplio i-series is the best system at the moment. I am surprised on a daily basis how good the images are in these patients," she said.

With the Aplio i-series, Dr. Haak can examine more patients in a reduced time, a clear benefit in fetal surgery. "If you have to put a shunt or needle in the chest of an unborn baby, image quality during the procedure is crucial and will determine how long the procedure will take," Dr. Haak said.

Dr. Haak is coordinator of the Fetal Heart Programme, with around 100 new patients with congenital fetal heart defects each year. To detect heart defects, she increasingly relies on new technologies like speckle tracking, in addition to standard 2D and Doppler ultrasound.

*"The system's image quality is superb."*

*Dr. M.C. Haak, Fetal-maternal medicine consultant, Fetal surgeon and head of obstetric ultrasound LUMC, Leiden, the Netherlands.*

*From left to right: Dr. Katinka Teunissen, Dr. Manon Gijtenbeek, Annemarie de Veld (Fetal therapy nurse), Dr. Monique Haak (Fetal-maternal medicine consultant, surgeon and head of obstetric ultrasound).*

"Innovation in ultrasound is very welcome. Canon was one of the first to offer excellent speckle tracking, enabling us to check strength of the heart, if contractility is reduced or not. It is a challenge to look if modalities that are suitable and important in adults can have a role in fetal cardiology. I expect a lot from these new technologies for our youngest patients," she said.

Other features that will be interesting to explore are Myocardial Performance Index (MPI) and Wall Motion Tracking (WMT), especially in fetuses with conditions that affect one chamber of the heart. "Sometimes you see progressive valve stenosis, and at 20 weeks, you don't know yet if that will progress to, for example, fibrotic heart disease. MPI and WMT may be able to predict which fetuses will develop this condition and which will end up with preserved left ventricle of the heart," she explained.

Another useful technique on the Aplio i-series is Superb Micro-vascular, which expands the range of visible blood flow and provides visualisation of low micro-vascular flow. Benefits compared to conventional Doppler technologies are high frame rates, high resolution, high sensitivity and fewer motion artefacts, offering clinicians new means to reveal minute vessels when evaluating fetal brain, kidneys or any other tiny vessels.

## The future will be automated

These new modalities have convinced Dr. Haak. "Ten years ago, I could not have foreseen that image quality would improve that much. It's pretty remarkable."

In the future, she expects 3D technology to help make bigger strides with ultrasound, just as it did with MRI. Another area she believes will peak is automation of image analysis, to help determine which patients need referral and not.

"Automation could help to look at the volume of anatomical structure to detect whether a specific organ is abnormal or if it's too small or too big. We still need someone to measure this manually now, but within a decade, that kind of technology will be available. However we still need proper research if this is really beneficial or not," Dr. Haak said.

Genetic innovation will have a great impact on daily practice. Image quality will be the corner stone in fetal dismorphology and brain imaging.

There is a huge psychological impact when reporting fetal abnormalities and technology that helps provide more accuracy is essential. "You have to be absolutely sure of your diagnosis, because it may lead to pregnancy termination. You have to be very accurate."

"The Aplio i-series has not failed to deliver and the unmatched support from Canon Medical Systems has been equally flawless", Dr. Haak concluded. "I am really grateful to Canon and their service. They're reactive and can fix a problem within just a few hours." //