



THE UNIVERSITY
of ADELAIDE

IMAGENDO®

Non-invasive diagnosis of endometriosis with imaging and artificial intelligence

Benefits

- a faster and safer diagnostic and treatment timeframe for patients, potentially safeguarding their future fertility;
- more comprehensive imaging reports for general practitioners, gynaecologists and fertility specialists;
- negates the need for a diagnostic laparoscopic surgical procedure and associated cost and recovery time; and
- enables sonographers to be upskilled resulting in an increased number of imaging clinics able to offer TVUS services for endometriosis.

Background

By the age of 44, one in nine Australian women and people assigned female at birth are diagnosed with endometriosis, a condition that caused 34,200 hospitalisations in 2016 (*Australian Institute of Health and Welfare 2019*). Worldwide, diagnosis is often delayed, with an average of 7-12 years between onset of symptoms and diagnosis. This delay in diagnosis ultimately leads to disease progression and associated complications such as chronic pelvic pain and infertility, which greatly affects patients' quality of life and economic productivity. Endometriosis is reported to cost the Australian society \$9.7b each year with \$6.5 b of these costs attributed to a loss in productivity and approximately \$3.2b attributed to direct healthcare costs (*Endometriosis Australia 2020*).

Currently, a diagnosis of endometriosis is obtained via laparoscopic surgery by direct visualisation of lesions. If deep endometriosis is discovered at the time of surgery, patients will often be scheduled for a repeat procedure to remove the deposits. This typically requires a multidisciplinary surgical team that includes bowel surgeons.

We do not have a non-invasive diagnostic test for endometriosis, that is accurate for all subtypes of the disease. Blood biomarkers

are not accurate enough to replace surgery. Imaging modalities including transvaginal ultrasound (TVUS) and magnetic resonance imaging (MRI) performed by experts are accurate at detecting deep and ovarian endometriosis, but are less sensitive at detecting superficial endometriosis. Using multimodal Artificial Intelligence (AI) methods, we can combine and train the digital data from TVUS and MRI to improve sensitivities and specificities, and assess the data without human error. The objective analysis will then be available to treating clinicians.

Developing the high-level expertise required for specialised imaging for endometriosis requires years of education and experience beyond a doctor or sonographers' primary qualification. The quality of an endometriosis TVUS is highly dependent on the skills and experience of the sonographer. This is currently highly variable, with few sonographers able to perform a high-quality endometriosis TVUS worldwide. IMAGENDO® aims to provide real time feedback and guidance based on AI algorithms to improve scan quality and sonographer skill sets.

Technology overview

IMAGENDO® is an automated and guided diagnostic imaging system for the identification of specific endometriosis features during TVUS and MRI scans, driven by an AI algorithm trained to locate a specific set of features visible during real-time TVUS and on MRI.

The consolidation of the diagnostic imaging features identified will yield scores indicating the probability of a diagnosis of endometriosis and, if present, the likely severity.

IMAGENDO® will also be an educational tool to increase the skill of ultrasound operators in the performance of TVUS, to ultimately improve the quality of endometriosis TVUS and MRI scans.

Development Status

IMAGENDO® is funded by an MRFF Primary Health Care Research Data Infrastructure Grant provided by the Australian Federal Government. The development team includes the University of Adelaide's Robinson Research Institute and Australian Institute for Machine Learning; UNSW: Specialist Imaging Partners (South Australia); Benson Radiology (South Australia); Austin Health (Victoria); Omni Gynaecological Care (New South Wales); and Specialized Ultrasound In Gynecology & Obstetrics (SUGO) Clinic (Hamilton, Canada).

Opportunity

The IMAGENDO® team has launched their participant recruitment website to participate.

The IMAGENDO® system is actively under development and we continue to train the model. The initial Pouch of Douglas Sliding Sign marker for TVUS is currently performing at a 95% accuracy (*Maicas et al*) and four markers in MRI scans have an ability to discriminate between positive and negative cases 92% of the time.

We are establishing worldwide collaborations with imaging service providers to grow our learning database and clinical research collaborations. We have been approached by imaging equipment manufacturers and pharma companies interested in women's health for integration trials.

Commercial Contact

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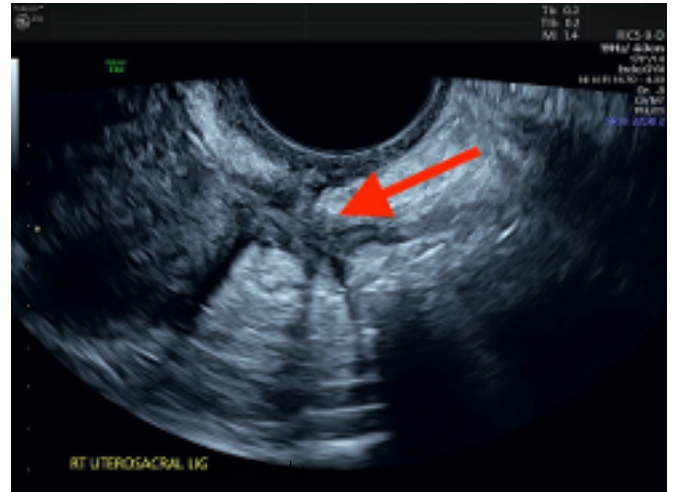


Figure 1: Transvaginal ultrasound image of endometrial lesion on the right uterosacral ligament

Further enquiries

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