ULTRASOUND SHEAR WAVE ELASTOGRAPHY

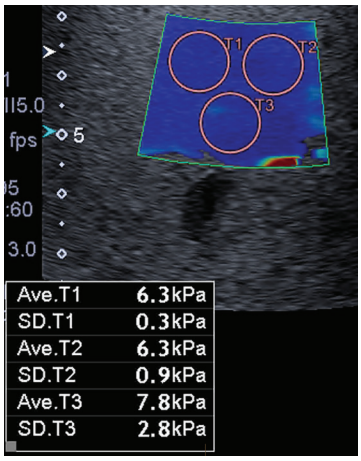
Information for Referrers

CHATSWOOD & RYDE Radiology

Shear wave Ultrasound Elastography is a non-invasive quantitative assessment of the liver giving an indication of the level of fibrotic liver disease.

Hepatic fibrosis is a consequence of chronic liver disease which can progress towards cirrhosis and possibly cancer. The diagnostic results stage hepatic fibrosis and help determine the appropriate treatment.

The photos below show the difference between a Normal Liver (Left) and one that is Cirrhotic (Right). The Stiffness, measured using Shearwave Elastography, is clearly visible. The 3 circles indicate the 3 sampled locations and the measurements for each are listed



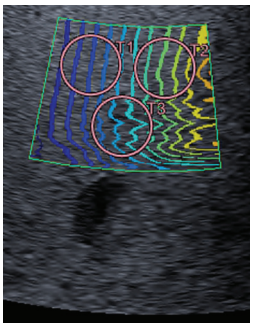
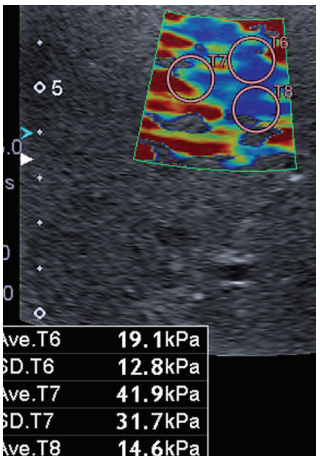


Exhibit 1: Normal Liver



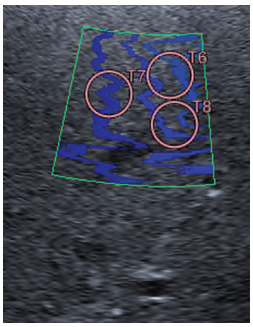


Exhibit 2: Cirrhotic Liver

Liver Biopsy is the gold standard method for assessing Liver Fibrosis. However, by providing a non-invasive alternative some key advantages are achieved, including:

- Greater patient comfort
- Liver texture is visualised ensuring accurate sampling (rather than sampling vessels, cysts, masses, etc)
- Eliminating biopsy-associated procedure complications (eg bleeding or infection)
- Minimal patient cost.

Enhanced consistency in repeat examinations enables effective follow-up. Dynamic measurements also allow you to assess viability of a good reading.

When compared with Fibroscan it is useful to note that with Shear wave a B-mode image is acquired first which ensures you are sampling the liver at the appropriate place (ie not over a vessel, bile duct or in ascites)

Clinical Assessment

US Elastography is suitabile in patients:

- with Hepatitis B and C
- with Hepatitis due to alcohol or medications.
- with an abnormal liver function test.
- where a non-invasive assessment of disease severity is required for clinical management.

US Elastography is not suitable in patients:

- with acute hepatitis, transaminase flares, congestive heart disease, extra-hepatic cholestasis.

Patient Preparation

Preparation is required to ensure a clear view of the liver and other upper abdominal organs.

- Fasting (no food, drink or smoking) for 8 hours prior to the examination
- No chewing gum
- No Alcohol for 12 hours prior to the examination.
- No exercise for 20 mins prior to examination.
- Patients will be asked to arrive 20 minutes prior to their examination to allow for 10 minutes rest time.

Please advise patients to bring referral, Medicare and Pensioner Health Care Cards, plus any relevant previous imaging.

How Shear Wave Elastography Works

In Shear wave Elastography, the US machine measures the speed of shear waves made in the liver from an US beam.

The speed at which these waves travel can give an indication as to the stiffness of the liver which then relates to liver disease. It is known that Shear waves travel faster in stiffer or fibrotic livers and this can be used to assess and follow liver disease.

The information and associated images are assessed by the Radiologist who reports the key measurements and associated diagnostic conclusions.

Elastography Requests and Medicare Overview

Request Option/s	US Abdo + Elastography	US Vasc Abdo + Elastography	Elastography
Appointment Qty	One	One	One
Regions Examined	Liver Pancreas Kidneys Gall Bladder Spleen Bile Ducts Portal Veins Liver Stiffness	**Aorta** **Liver** **Pancreas** **Kidneys** **Gall Bladder** **Spleen** **Bile Ducts** **Hepatic Veins** **Hepatic Arteries** **Portal Veins** **Liver Stiffness**	Portal Veins Hepatic Veins Hepatic Arteries Liver Stiffness
Medicare	US Abdomen: Medicare eligible Elastography: Not Medicare Eligible	US Abdomen Vascular: Medicare eligible Elastography: Not Medicare eligible	Elastography: Not Medicare eligible

Examination Considerations

Elastography examinations include an abdominal US examination where liver lesions and other key abdominal organs are investigated and an Abdominal Vascular US examination where the region's blood supply is also evaluated.

Monitoring frequency depends on the patient's treatment requirements. It is important to be aware that the stiffness measurements (KPa) obtained are not comparable to results obtained from other Ultrasound manufacturers' systems.

Reporting

Diagnostic Results for Elastography are generally classified by Liver according to Fibrosis in this way:

Classification	Metavir Score	Hep B	Hep C
Normal - Low risk	Fo-F1	<6.0kPa	<6.6kPa
Significant	F2	6.0-9.2kPa	6.6-9.4kPa
Advanced	F3	9.2-16.7kPa	9.4-11.2kPa
Cirrhosis	F4	>16.7kPa	>11.2kPa

SERVICE AVAILABILITY	CHATSWOOD & RYDE RADIOLOGY
Elastography	Chatswood Ryde

Clinical Evidence For Research Into Liver Disease

1 - Iijima H 2014 'Approaches to the Diagnosis of Liver Fibrosis', Toshiba Medical Systems Corporation, p. 1-6.
2 - Abstract 1- Multi Center European Study: Ferraioli G, Maiocchi L, Lissandrin R, Tinelli C & Filice C 2015, 'Accuracy of the latest release of 2DShear wave elastography method for staging liver fibrosis in patients with chronic hepatitis C: Preliminary results', Digestive and Liver Disease, 48S, e42-e64.
3 - Abstract 2- Multi Center European Study: Lim AK, Ronot M, Ferraioli G, Mueller HP, Friedrich-Rust M, Cosgrove DA & Filice C 2016 '2D Ultrasound Shear Wave for staging liver fibrosis: Preliminary results of a Multi- Centre European Study, RSNA, Chicago.
Australian Clinical Evidence for comparison to existing technique:
O'Hara S, Hodson S, Hernaman C, Wambeek N & Olynyk J 2017 'Concordance of transient elastography and shear wave elastography for measurement of liver stiffness', Sonography, doi:10.1002/sono.12122.

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