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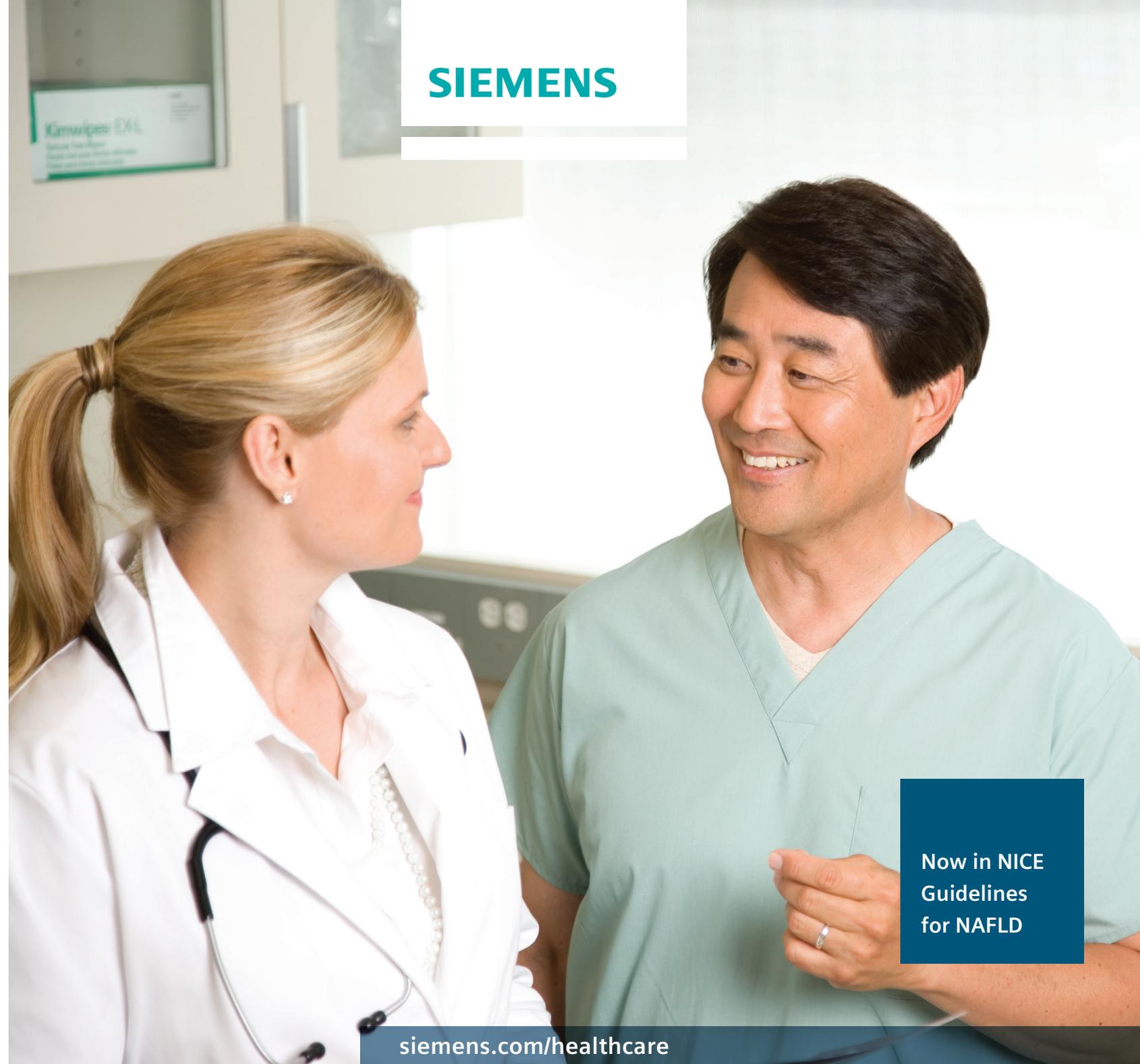
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Setting a New Standard in Liver Fibrosis Assessment

Enhanced Liver Fibrosis (ELF) Test

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Setting a New Standard in Liver Fibrosis Assessment

Prevalence of Liver Fibrosis

Liver fibrosis is the scarring process that represents the liver's response to injury or disease. All chronic liver disease (CLD) can lead to liver fibrosis and eventually cirrhosis, liver cancer, and death. Cirrhosis and liver cancer are now among the top ten causes of death worldwide, and in many developed countries, liver disease is now one of the top 5 causes of death in middle age.^{1,2}

The major causes of liver fibrosis are:

- Viral hepatitis B and C infections
- Fatty liver disease (non-alcoholic fatty liver disease [NAFLD]) associated with obesity
- Alcohol abuse

Over 900 million individuals are at risk of chronic liver disease worldwide.

Progression of Liver Fibrosis

In response to chronic liver injury, stellate cells in the sinusoidal space are activated and deposit a collagen matrix (fibrosis). Over time, the fibrosis may become severe, leading to cirrhosis that may require a liver transplant or result in death.

The current standard of care to assess liver fibrosis is an invasive liver biopsy. Numerous problems with obtaining and interpreting liver biopsies have fueled the search for additional methods for assessing the severity of liver fibrosis. Serum direct biomarkers of liver fibrosis such as those used in the Siemens Enhanced Liver Fibrosis (ELF™) test are attractive for liver fibrosis assessment because they are minimally invasive, standardized, and highly automated. The ELF test complements existing diagnostic tools to help manage patients with chronic liver disease.

The ELF Test

New Clinical Guidelines

The European Association for the Study of the Liver (EASL) approves use of non-invasive methods instead of liver biopsy to assess the degree of liver fibrosis in hepatitis C patients.*

The National Institute for Health and Care Excellence (NICE) NAFLD guidelines† recommend the use of the ELF Test to test for and monitor advanced liver fibrosis in people diagnosed with NAFLD.

- Consider using the ELF test in people who have been diagnosed with NAFLD to test for advanced liver fibrosis
- Offer retesting for advanced liver fibrosis for people with an ELF score less than 10.51 every 3 years to adults and every 2 years to children and young people
- Consider using the ELF test for retesting people with advanced liver fibrosis

The ELF Test**

The ELF test is a simple, routine blood test that allows you to assess the severity of liver fibrosis. Use of the test has been established in viral hepatitis,³⁻⁵ NAFLD,^{3,6,7} and alcoholic patient groups.³

The ELF test is convenient to request compared to other tests:

- Requires only a routine serum sample
- Easily requested along with other routine blood tests

Figure 1: Liver fibrosis at a microscopic level

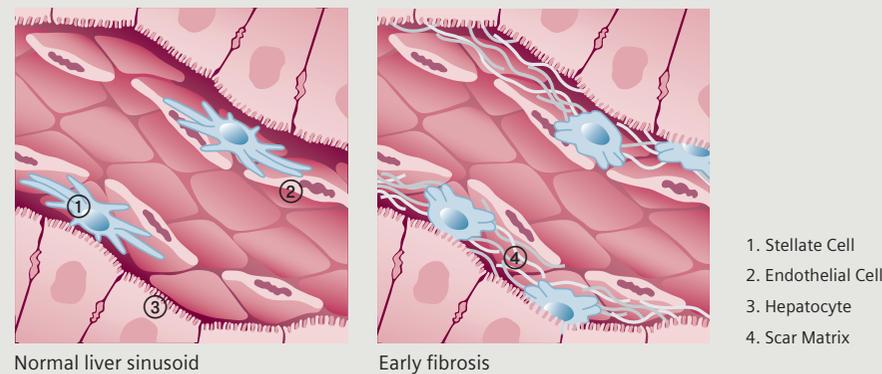
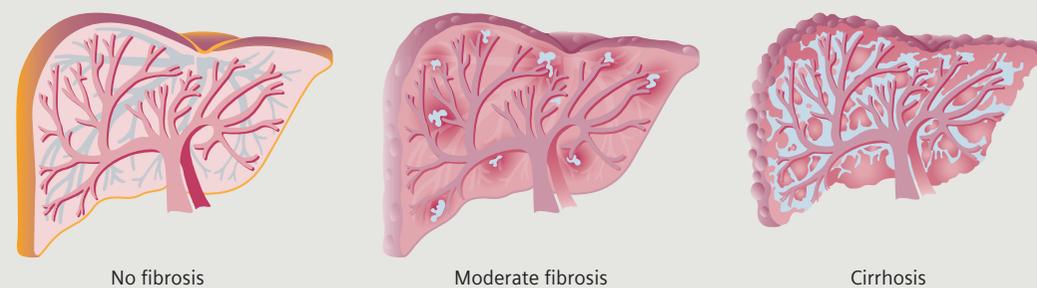


Figure 2: Liver fibrosis at a macroscopic level



Use the ELF test as an aid in the diagnosis and assessment of the severity of liver fibrosis in patients with signs and symptoms of chronic liver disease.

*European Association for the Study of the Liver (EASL) "Clinical Practice Guidelines: Management of hepatitis C virus infection," Berlin 2011.

**The ELF test is not available for sale in the U.S.

†NICE guideline "Non-alcoholic fatty liver disease (NAFLD): assessment and management." Published 6 July 2016.

The ELF Test

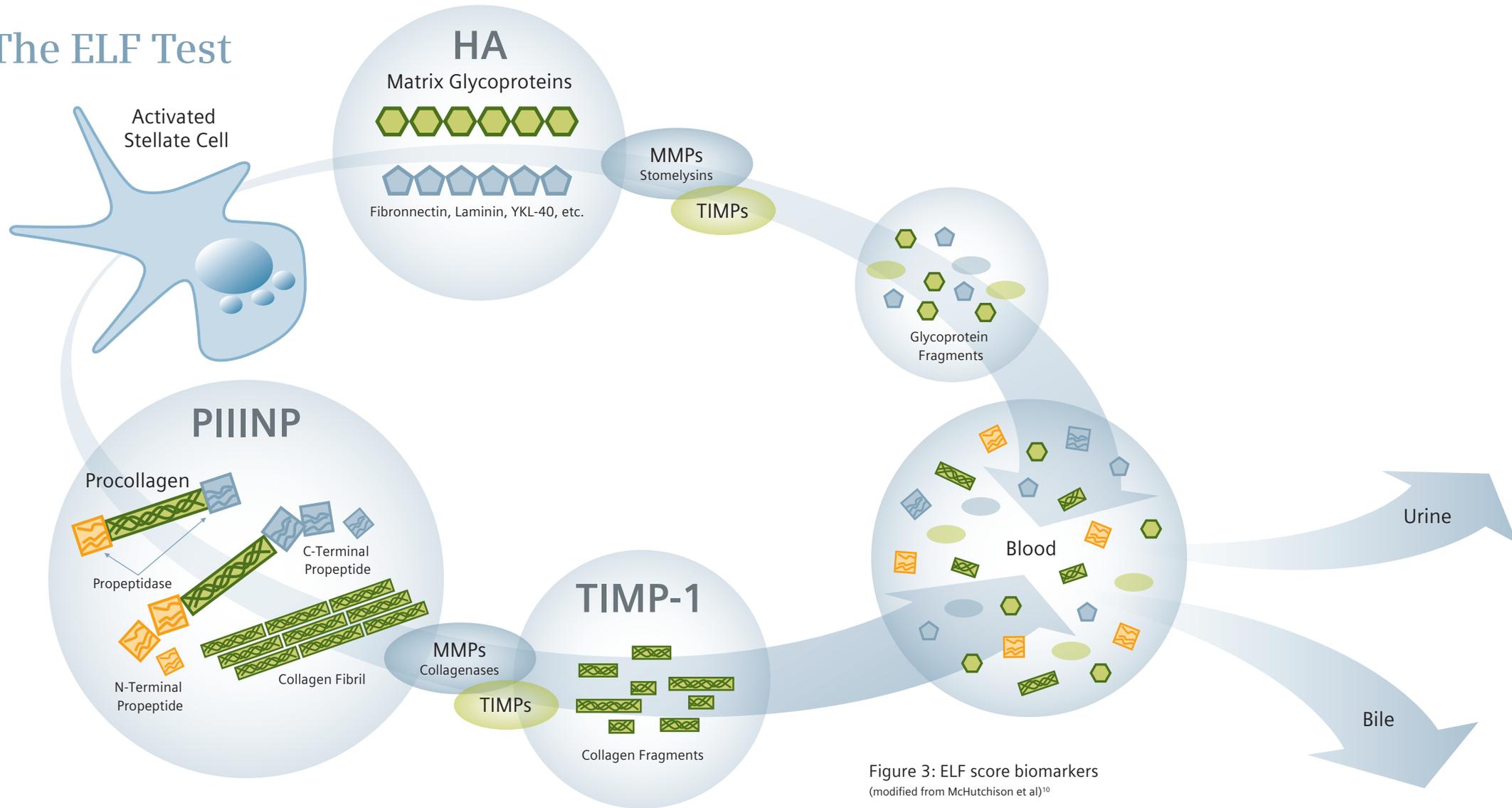


Figure 3: ELF score biomarkers (modified from McHutchison et al)¹⁰

The ELF Test

The ELF test is the first routine, standardized, direct-biomarker panel for liver fibrosis assessment. The ELF score combines three serum biomarkers:

- Hyaluronic acid (HA)
- Procollagen III N-terminal peptide (PIIINP)
- Tissue inhibitors of matrix metalloproteinases (TIMP1)

These individual biomarkers reflect integral extracellular matrix (ECM) components of fibrogenesis and fibrolysis processes (Figure 3).

In contrast, indirect-biomarker panels merely reflect a mixture of biochemical abnormalities found in CLD.

Each ELF test biomarker assay is:

- Standardized to ensure reproducible analytical and clinical quality
- Designed and validated for the sole purpose of liver fibrosis assessment

When the three direct biomarkers are combined in an algorithm (Figure 4), the resultant ELF score correlates to the level of liver fibrosis assessed by liver biopsy.³

Clinical Studies on IMMUNO1 System

The ELF test was clinically validated in an international multicenter study³ with a mix of patient groups and was found to be accurate to differentiate mild, moderate, and severe fibrosis. The ELF test subsequently has been

shown to be at least as accurate as biopsy at predicting liver disease-related outcomes in a mixed patient group^{8,11} and provided useful prognostic information in patients with primary biliary cirrhosis.⁹

ADVIA Centaur and ADVIA Centaur XP/XPT Systems

$$\text{ELF score} = 2.278 + 0.851 \ln(C_{\text{HA}}) + 0.751 \ln(C_{\text{PIIINP}}) + 0.394 \ln(C_{\text{TIMP-1}})$$

ADVIA Centaur CP System

$$\text{ELF score} = 2.494 + 0.846 \ln(C_{\text{HA}}) + 0.735 \ln(C_{\text{PIIINP}}) + 0.391 \ln(C_{\text{TIMP-1}})$$

Concentrations (C) of each assay is ng/mL.

Figure 4: ELF score algorithm

The ELF Test on the ADVIA Centaur Systems[‡]



ADVIA Centaur[®] XPT System—
Engineered to provide quality results with continuous operation to meet the immunoassay workload demands of the future—today.



ADVIA Centaur[®] XP System—
Proven technology with enhanced productivity to meet the peak workload demands of the busiest labs, and the flexibility to easily connect to Siemens Healthcare laboratory diagnostics automation systems.



ADVIA Centaur[®] CP System—
Powerful system providing optimal productivity, speed, and efficiency in a compact design.

Ask your laboratory about the availability of our ELF test.

For more information, see siemens.com/ELF

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