

Hashimoto's
thyroiditis

Celiac
disease

Polyautoimmunity

Is your lab ready for the rise in autoimmune diseases?

Enhancing patient outcomes in polyautoimmunity: How laboratories can help to reduce time to diagnosis with the right autoimmune disease testing menu and clinical decision support

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Summary

When multiple autoimmune diseases occur together—known as polyautoimmunity—patients can face overlapping symptoms and uncertainty while on their diagnostic journey. Laboratories play a pivotal role in changing this narrative. With early, accurate testing, they can empower clinicians to deliver clear answers and effective care, helping patients move forward with confidence.

As autoimmune diseases become more prevalent worldwide, laboratories are stepping up as leaders in the effort to improve detection and support diagnosis. This manuscript offers insights and strategies to optimize testing protocols, streamline workflows and provide clinicians with the data they need. By advancing these efforts, laboratories not only enhance patient care but also reinforce their essential role as partners in the fight against autoimmune diseases—driving better outcomes and brighter futures for those who need it most.

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What is polyautoimmunity?

Fatigue. Joint pain. Rash. Nausea. Inflammation.

These symptoms could indicate a single autoimmune disease, but they could also signal different autoimmune diseases simultaneously. This creates a diagnostic puzzle that is increasingly common in clinical practice.¹⁻³

Autoimmune diseases are rising globally, now affecting approximately 10% of the population, and are cumulatively the third leading cause of illness and mortality.^{4,5} Labs should be aware of the rising prevalence of autoimmune diseases as a growing concern, yet diagnosing these conditions remains challenging due to overlapping symptoms and complex patient presentations.^{1,4,6}

Polyautoimmunity, where a patient has two or more autoimmune diseases,⁷ although complex, presents an opportunity for laboratories and physicians to work together to reduce time to diagnosis and prevent disease progression.^{1,7-9} Misdiagnosis or underdiagnosis can delay treatment, negatively impact patient outcomes and lead to unnecessary follow-up testing and invasive procedures such as biopsies.⁸⁻¹⁰ This can disrupt workflow efficiency and increase costs for laboratories, affecting their overall performance.¹¹

While over 80 autoimmune diseases exist, even the most prevalent and widely recognized among them frequently exhibit overlapping symptoms.^{2,12}

| Symptom | Common conditions ^{10, 12-14} |
|--------------|---|
| Fatigue | Autoimmune thyroid disease (AITD), celiac disease, multiple sclerosis, Sjögren's syndrome, systemic lupus erythematosus (SLE) |
| Joint pain | Inflammatory bowel disease (IBD), psoriatic arthritis, rheumatoid arthritis, SLE |
| Rash | Celiac disease (dermatitis herpetiformis), IBD, psoriasis, SLE |
| Inflammation | AITD, celiac disease, IBD, multiple sclerosis, rheumatoid arthritis, SLE |

Why polyautoimmunity matters to diagnostic laboratories: The key role of laboratory autoimmunologists

The rise in autoimmune diseases has put a larger focus on the growing field of autoimmunology. This discipline is now recognized as a subcategory of clinical immunology or internal medicine, or even as a distinct branch, due to the heightened awareness of its complexity and the resulting demand for highly specialized expertise and operators.⁵

In recent years, laboratories around the globe have been establishing autoimmunology units. While attending physicians interpret lab test results, some antibody tests require specialized knowledge not typically held by clinicians. In these cases, laboratory autoimmunologists play a crucial consulting role, supporting clinicians in appropriate test requests and data interpretation.⁵

Given the complexity and potential long-term harm of undiagnosed polyautoimmunity, specialists in autoimmune diagnostics play a crucial role in managing unexpected results and identifying conditions. Their consultancy is especially valuable to non-autoimmunity specialists and general practitioners.⁵

Understanding polyautoimmunity is crucial for laboratories, as it has the potential to impact the accuracy and comprehensiveness of testing algorithms, particularly when clear guidelines are lacking. Effective management of polyautoimmunity can lead to improved patient outcomes, optimized use of laboratory resources and enhanced collaboration with clinicians.³

Importance of accurate autoantibody testing

Autoantibody testing is essential for diagnosing autoimmune diseases.^{15,16} Laboratories must implement robust quality control procedures, including the use of control materials, regular calibration of equipment and external quality control schemes. Accurate autoantibody detection supports clinicians in making informed decisions about patient care and treatment.^{5,15-18}

Best practices for better detection include:^{5,16-18}

Use of control materials:

Regular testing with known positive and negative control samples verifies that the assay performs consistently and accurately, ensuring that false positive or false negative test results are minimized.

Regular calibration of equipment:

Calibration of testing instruments, following manufacturer specifications, such as automated immunoassay platforms, maintains precision in measurements.

Standardized testing protocols:

Adopting standardized methodologies for autoantibody testing, such as those in line with international guidelines, contributes to the reliability and reproducibility of results across laboratories and over time.

Ongoing staff training:

Ensuring lab technicians and operators are trained in the latest diagnostic techniques and QC protocols further enhances accuracy and consistency in autoantibody detection.

External quality schemes:

Engaging in external quality assessment programs allows laboratories to compare their performance with others, ensuring alignment with industry standards and identifying potential areas for improvement in assay accuracy and consistency.



Challenges in autoantibody testing

Autoantibody testing presents several challenges requiring state-of-the-art solutions. Besides the lack of assay standardization, a study revealed that autoantibody measurements exhibit higher imprecision than those observed in clinical chemistry and hematology.¹⁸ Laboratories face the task of ensuring test sensitivity and specificity while managing complex workflows. Advanced laboratory systems are designed to help diagnostic laboratories deliver successful test results efficiently, minimizing time and reagent waste.

Clinical sensitivity

Sensitivity is important in autoantibody testing to accurately identify the presence of autoimmune diseases. Due to the diverse nature of autoimmune conditions, high sensitivity ensures that subtle but clinically significant antibody levels are detected, which is crucial for early and accurate diagnosis.¹⁹

Clinical specificity

Specificity refers to a test's ability to correctly identify individuals without a disease (true negatives). High specificity is critical in autoantibody testing to minimize false positive test results. This is particularly important in the field of autoimmune diseases, as they have low prevalence and healthy individuals may test positive for certain antibodies.²⁰ Prioritizing specificity over sensitivity helps avoid unnecessary treatments, reduces patient anxiety and limits additional testing, thereby supporting accurate diagnoses and improving patient outcomes.¹⁹⁻²¹



Workflow complexity

Autoantibody testing workflows differ significantly from other testing workflows, such as clinical chemistry, due to their complexity and variability. Unlike the straightforward interpretation of markers like glucose or cholesterol, autoantibody testing often initiates a cascade of additional tests to confirm or refine a diagnosis. Reflex testing algorithms, which combine various techniques such as immunofluorescence, enzyme-linked immunosorbent assay (ELISA), fluorescent enzyme immunoassay (FEIA) or multiplex assays, highlight this complexity but also pose challenges in standardization across laboratories and test manufacturers.²²

To address these challenges, adopting universal protocols and guidelines is essential to ensure consistency. Technological advancements, such as automated systems and integrated platforms, can simplify and streamline workflows by combining multiple testing techniques. Furthermore, specialized training programs for laboratory personnel can improve the accuracy and reliability of test interpretations.^{17,18,22,23}



Quality control

Quality control aims to ensure accurate and reliable results for all patient samples processed in a laboratory. In autoantibody testing, this is particularly critical due to inherent challenges such as variability in assay methods and the subjective interpretation required in techniques like indirect immunofluorescence.²⁴ These complexities necessitate strict adherence to protocols provided by test manufacturers, the use of high-quality control materials and the incorporation of multiple layers of verification, such as external control schemes. Addressing these challenges requires significant resource allocation and staff training to maintain accuracy and consistency, ultimately supporting dependable diagnostic outcomes.^{5,17,18}

The role of laboratories in guiding clinical decisions

Diagnostic laboratories play a pivotal role in guiding the diagnostic decisions of physicians and clinicians. The test results generated are critical for helping to diagnose and manage autoimmune diseases. However, the value of diagnostic laboratories extends beyond providing test results.

Laboratory autoimmunologists offer invaluable consultancy services, particularly in their interactions with non-autoimmunity specialists and general practitioners. A survey by the American Medical Association found that general internal medicine and family physicians value laboratory advice across key areas, including appropriate test ordering, sample collection and interpretative comments.⁵ This consultancy is crucial in managing unexpected results and investigating conditions like autoimmune diseases and presence of polyautoimmunity, which may not be easily recognized by individual physicians.

Moreover, diagnostic laboratories are involved in controlling analytical processes, continuous quality improvement, defining reference intervals, correcting errors, reporting results and providing consultant advisory services. This comprehensive involvement ensures that the diagnostic process is accurate and reliable, ultimately improving patient care.⁵



Polyautoimmunity: Key considerations for laboratories

Polyautoimmunity presents unique diagnostic and management challenges. Understanding the prevalence and clinical implications of polyautoimmunity is essential for effective patient care.

Prevalence and clinical implications

Polyautoimmunity is more common than previously thought, with estimates indicating that about 25% of patients with one autoimmune condition will develop additional autoimmune diseases.²

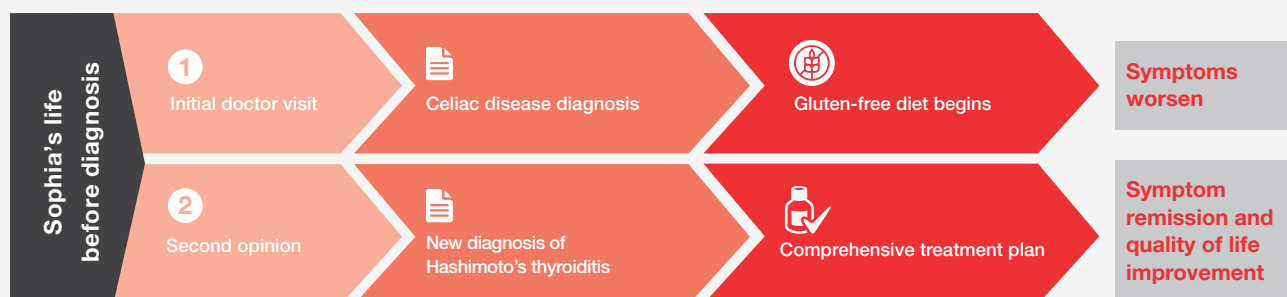
Diagnostic challenges

Diagnostic laboratories should integrate diagnostic algorithms to recommend tests that help clinicians identify potential polyautoimmunity cases that may have been overlooked.^{22,25}

Impact on patient management

Accurate identification of polyautoimmunity can significantly impact patient management. It enables personalized treatment plans that address multiple autoimmune conditions simultaneously, improving overall patient outcomes.^{1,3,26}

Patient journey: Sophia's story*



At 29, Sophia, an active and health-conscious woman, was struggling with persistent digestive issues, fatigue and weight loss. Her doctor diagnosed celiac disease through positive anti-tTG IgA antibody tests confirmed by a biopsy. Following her doctor's advice, Sophia eliminated gluten from her diet, expecting her health to improve. Months passed. Symptoms persisted.

Frustrated by the lack of improvement, Sophia decided to seek a second opinion. Concerned about the possibility of polyautoimmunity, her new doctor ordered additional diagnostic tests. These revealed elevated TSH levels and anti-TPO antibodies, confirming Hashimoto's thyroiditis. Further tests for other autoimmune diseases came back negative. With a treatment plan combining thyroid hormone therapy and her gluten-free diet, Sophia's health and energy gradually improved.

This case highlights the critical role of laboratory testing in identifying coexisting conditions and enabling accurate and timely diagnoses.

*fictional case inspired by real scenarios

As polyautoimmunity cases rise, labs must be prepared for increasing test requests from general practitioners and secondary care specialists handling these cases. To avoid being overburdened, labs need:

- 1. Automation:** Key for speeding up processing times, and managing higher testing volumes. Automated methods enhance both accuracy and efficiency in autoimmunity testing.
- 2. Communication with clinicians:** Helps labs guide further testing when initial results highlight the possibility of more than one autoimmune disease, supporting more informed and accurate diagnoses.⁵
- 3. Minimal diagnostic errors:** Requires the selection of appropriate tests rather than increasing test quantity. Studies show that cases with diagnostic errors had 2.4 times more unnecessary tests, highlighting the need for targeted testing rather than over-testing.¹¹
- 4. Proactive testing:** Aids early detection and treatment for often overlooked conditions. Disease-specific panels, such as testing for tissue transglutaminase antibodies (tTG) in thyroid autoimmune cases, can help detect celiac disease early, supporting improved patient outcomes.^{27,28}

How advanced diagnostic solutions can improve your lab's efficiency

Advanced diagnostic solutions, such as those offered by Thermo Fisher Scientific, help laboratories address the unique challenges of autoimmune testing. Clinically relevant tests with high specificity can help to reduce false positive results, preventing unnecessary follow-ups and providing clinicians with reliable data to support accurate diagnoses and patient care. Automation enhances laboratory workflows by reducing manual tasks, improving consistency and ensuring accuracy across testing processes. These solutions allow laboratories to efficiently manage increased testing demands while maintaining high-quality standards.

Conclusion

As the prevalence of autoimmune diseases and polyautoimmunity continues to rise, diagnostic laboratories have a pivotal opportunity to enhance efficiency and improve patient outcomes. Comprehensive testing, supported by advanced diagnostic solutions, enables labs to streamline workflows, improve accuracy and manage increasing testing volumes with efficiency. By integrating these approaches, labs can optimize their operations while providing clinicians with accurate results and actionable insights needed to support timely and accurate diagnoses.

A proactive approach to implementing comprehensive and advanced diagnostics is not just an operational improvement—it's a commitment to supporting better outcomes for patients facing challenging diagnostic journeys.

Learn more

Visit thermofisher.com/polyautoimmunity to discover how advanced diagnostic solutions can improve your lab's efficiency, accuracy and patient outcomes.





Crohn's
disease

Celiac
disease

Polyautoimmunity

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