

Individualizing alpha-gal syndrome care through development of tools to predict patient reactions

The Challenge

Alpha-gal syndrome (AGS) is a tick-caused allergy to red meat that can trigger reactions ranging from stomach upset to life-threatening anaphylaxis. Because doctors cannot predict how severely any individual patient will react, everyone receives the same advice: avoid all mammalian meat products. This is especially burdensome in rural Midwest and Southern communities, where ticks are most common and access to allergy specialists is limited.

The Approach

We are combining patient health records, blood-based immune markers, and genetic data with artificial intelligence (AI) to build the first personalized management tools for AGS.

- Review health records from 500 AGS patients to identify patterns in symptoms, triggers, and reactions.
- Analyze blood samples to find immune markers linked to reaction severity.
- Study genetic factors that may explain why some patients react more severely than others.
- Build and test AI models that combine this information to predict individual patient risk.
- Create a software tool that gives any provider real-time, personalized guidance for managing AGS patients.

The Impact

This work will produce tools for developing individualized management plans for patients with AGS. AGS patients' dietary restrictions will be tailored to their individual reaction profile. Clinicians across primary care, allergy, and dermatology will gain decision support to match each patient's risk level. Results will be scalable to 12 academic centers and 20 million patients through an existing research network, bringing this approach to communities nationwide.

RESEARCH HIGHLIGHTS

- **First tools to predict AGS severity**, ensuring consistent diagnosis and classification
- AI models using blood markers, genetics, and medical records for **personalized dietary counseling**
- **Scalable** to 12 research centers and 20 million patients through national infrastructure

Key Benefits

The Personalizing Alpha-Gal Syndrome Care study will result in **clinical** and **community** benefits.



Clinical

Diagnostic procedures: Provide a validated tool to identify and classify AGS patients by disease severity, reducing diagnostic delays and uncertainty. *(Potential)*



Clinical

Investigative procedures: Establish methods for using personalized health information to develop a framework for studying and treating environmentally triggered diseases. *(Potential)*



Clinical

Software technologies: Equip providers with real-time, personalized guidance for managing alpha-gal syndrome patients. *(Potential)*



Clinical

Therapeutic procedures: Guide dietary counseling using individual risk prediction. *(Potential)*



Community

Health care accessibility: Deliver precision care tools to communities facing a high burden of AGS and limited access to expert care. *(Potential)*

The team:

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