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Japan Institute for Health Security

Toward User-Friendly Gold-Standard Diagnostics for Rickettsial Diseases

■ Researcher Information

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■**Expertise:** Rickettsial and chlamydial infections
■**Achievements:** Development of diagnostic methods

■ Research Idea / Technology Seeds

Next-Generation Serology Through Standardized and Automated Indirect Immunofluorescence assay (IFA)

■ Technical Expertise & Resources
・Multiple domestic clinical strains available
・Patient serum panels for quality control
・In-house production of IFA plates using inactivated rickettsia-infected cells
・Extensive experience in IFA serodiagnosis
”Integrated workflow from antigen preparation to diagnosis”

■ Development Concept
・Standardized and automated antigen plate production
・AI-assisted digital interpretation
・Expandable to ELISA and other assay platforms based on IFA technology
“Highly reproducible serological testing systems”

■ Objectives
・Move beyond manual, skill-dependent testing
・Establish reproducible assay systems adaptable to diagnostic reagents
”Toward sustainable and practical serological diagnostics”

■ Proposal for Collaboration
Collaborative development of standardized and automated serological diagnostics

■ Background and Challenges to be Addressed

■ Clinical Importance
・Scrub typhus: 300–500 cases annually in Japan
・Japanese spotted fever has rapidly increased, surpassing scrub typhus in 2024
・Fatal cases continue to be reported for both diseases

■ Current Limitations in Clinical Practice
・Clinical suspicion based on patient activity and local epidemiology is essential
・Serology remains indispensable for definitive diagnosis
・Serological testing also contributes to epidemiological surveillance and feedback

■ Current Limitations in Diagnostic Systems
・IFA is the established gold standard, but remains highly operator-dependent and difficult to standardize
・Maintaining expertise and testing capacity is increasingly challenging
“High diagnostic accuracy, but limited operational consistency”

Serological testing is essential, but sustainable diagnostic systems remain a challenge

■ Research Overview

■ Skill-dependent IFA→ Standardization & AI-assisted automation→ Reduced operator dependency→ Diagnostic reagent development

■ Future Plans

■ Standardize antigens and interpretation conditions
■ Multi-center validation using clinical specimens
■ Commercial development of diagnostic reagents