

Enable Biosciences' Antibody Detection by Agglutination-PCR (ADAP)

Enable Biosciences' Antibody Detection by Agglutination-PCR (ADAP) technology is a new gold standard for clinical diagnostics. With 1,000-10,000x increased analytical sensitivity, ADAP can detect antibody markers of disease in the earliest stage, when treatment is most effective. ADAP harnesses the power of the Polymerase Chain Reaction (PCR) to detect antibody molecules with exquisite sensitivity. Traditionally used to detect nucleic acids, ADAP uses synthetic antigen-DNA conjugates in a ligation-based assay to create an ultrasensitive and solution-phase immunoassay. Due to its high sensitivity, ADAP only requires very small volumes (~1 uL) of blood or saliva, making ADAP assays highly useful in clinical areas where sample collection is challenging, such as public health screening and pediatrics. Through the use of DNA barcoding, ADAP can be highly multiplexed to meet the information-dense requirements of precision and personalized medicine. Finally, thanks to a "two-step" verification process, ADAP is resistant to interference from common PCR contaminants found in blood or saliva, and has shown near 100% sensitivity and specificity in detecting diseases such as HIV and Type 1 Diabetes.

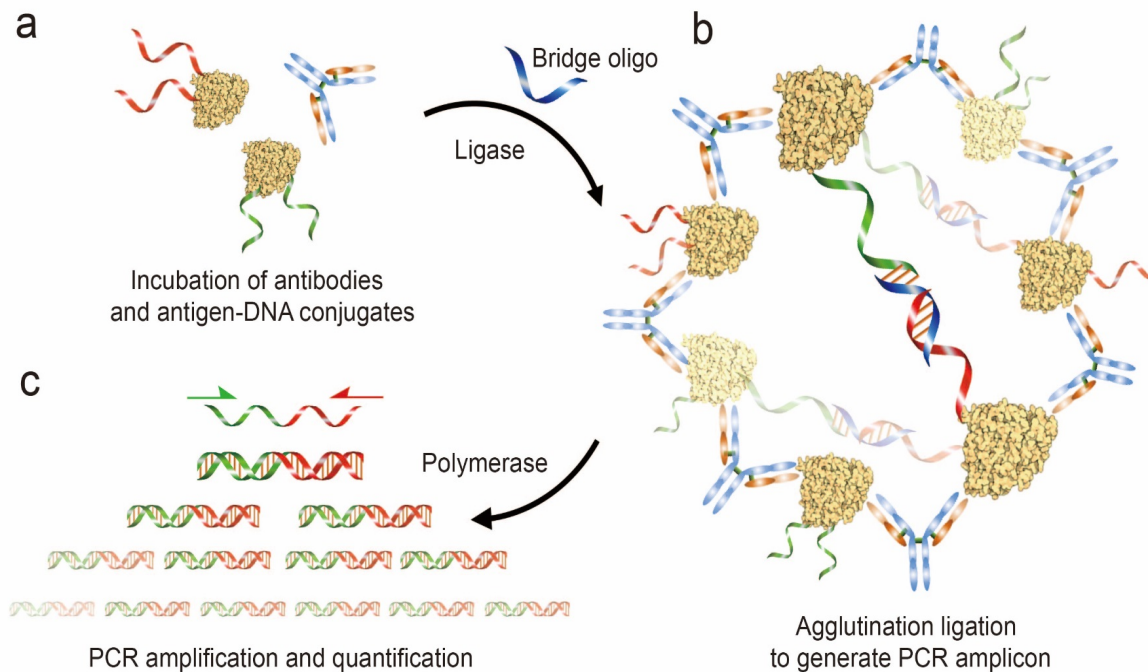


Figure 1. Antibody Detection by Agglutination-PCR (ADAP). ADAP uses antigen-DNA conjugates to detect antibody molecules with high sensitivity. The antigen-DNA conjugates are added to an antibody-containing sample (a). The antibodies bind to and assemble the antigen-DNA conjugates into a dense immune complex (b), which positions the DNA strands for ligation and ultrasensitive quantification by qPCR (c).

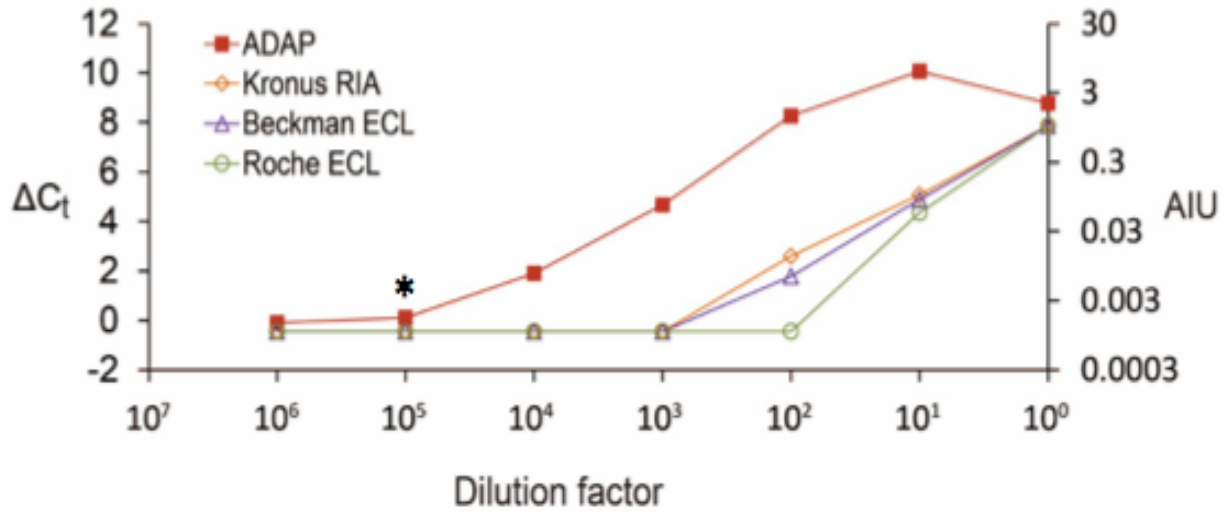


Figure 2. ADAP is 1,000-10,000x more sensitive than current assays. A dilution series of an antibody-containing serum sample was analyzed by ADAP (red line) and three commercial antibody tests (orange, green, and purple lines). ADAP was able to continue detecting the antibody molecule down to 1:100,000 dilution factor, improving upon the commercial assays by several orders of magnitude.

	Singleplex	Multiplex			
Technology	Immunofluorescence (IFA), double diffusion (DD)	Micorarray	Line immune assay (LIA)	Bead-based assay	Enable's ADAP assay
Manufacture	INOVA	Research Use	Fujirebio	Bio-rad, INOVA	Enable Biosciences
Test principle	Cell-based or diffusion-based	Microarray	Western blot	Luminex bead	ADAP
Sample volume	4 mL	10-50 μL	15 μL	5-50 μL	1μL
Disease coverage	One at a time	>10	5	5	7
Clinical sensitivity	High	Low	as low as 60%	as low as 65%	High
Clinical specificity	High	Low	as low as 60%	as low as 50%	High
Detection of antibody class	IgM, IgG, IgA	IgG	IgG	IgG	IgM, IgG, IgA

Table 1. Technical features of ADAP compared to similar platforms.

References:

Tsai, Cheng-ting, et al. "Ultrasensitive antibody detection by agglutination-PCR (ADAP)." *ACS central science* 2.3 (2016): 139-147.