Tropical & Vector-Borne Diseases

ANTIGENS & ANTIBODIES FOR COMMERCIAL IMMUNOASSAY DEVELOPMENT

Meridian Life Science, Inc.
Innovative Solutions. Trusted Partner.®

Tropical and vector-borne diseases account for more than 17% of all infectious diseases, causing more than 1 million deaths annually. Recognizing infected patients early in their clinical course is critical to preventing outbreaks. Meridian Life Science offers a range of antigens and antibodies suitable for the development of sensitive and specific immunoassays that detect tropical and vector-borne diseases.

TROPICAL & VECTOR-BORNE DISEASES

- Alphavirus
- *Borrelia burgdorferi* (Lyme)
- *Borrelia garinii*
- Chagas
- Chikungunya
- Dengue
- Ebola
- Japanese Encephalitis Virus
- *Leishmania chagasi*
- *Leishmania donovani*
- Leptospirosis
- Malaria
- Marburg Virus
- Newcastle Disease
- Tick-borne Encephalitis Virus
- West Nile Virus
- Yellow Fever Virus
- Zika Virus

Antibody Pairs
Reagents Suitable for Rapid Assays

ABOUT TROPICAL & VECTOR-BORNE DISEASES

Tropical and vector-borne diseases are among the most complex of all infectious diseases to prevent and control. Tropical diseases typically thrive in hot, humid conditions, and include infections such as malaria, leishmaniosis, dengue and chagas. Many of these pathogens are also vector-borne diseases, transmitted between humans by a vector which is typically a blood-sucking anthropod (e.g. mosquitoes, ticks, fleas, lice and mites).

Serological point-of-care (POC) diagnostics are the most rapid and convenient methods available for tropical and vector-borne diseases. Tests either detect antigens from the infectious agent or virus specific IgG/IgM antibodies using formats such as solid-phase dip-sticks (ELISA), particle agglutination, and lateral flow. Ideally screening assays should have minimal cross-reactivity with other infectious diseases and have a high sensitivity, especially during the early stages of the infection.

There have been numerous approaches used to improve the specificity of these assays including (1) using smaller and more specific regions (sub-units) of the epitopes (2) using multiple antigens to different epitopes within a single assay and (3) incorporating antigens which represent common genetic variations of the disease.

Antibody Pairs

	CAPTURE	DETECTION
Dengue Virus NS1	C01914M	C01913M
	C01914M	C01652M
	C01652M	C01649M
	C01652M	C01650M
	C01652M	C01651M
	C01838M	C01839M
Malaria HRP-2	C01817M	C01816M
Malaria pLDH	C01834M	C01835M
	C01833M	C01835M
Malaria (specific *P. falciparum* HRP-2)	C01584M	C01586M
	C01584M	C01585M
	C01836M	C01837M
Zika Virus NS1	C01867M (R)	C01868M
	C01887M	C01888M
	C01888M	C01888M
	C01887M	C01889M
	C01888M	C01890M
	C01889M	C01888M

	CAPTURE	DETECTION
Yellow Fever NS1	C01912M (R)	C01906M
	C01912M	C01907M
	C01912M (R)	C01911M
	C01912M (R)	C01910M
	C01912M (R)	C01909M
	C01906M (R)	C01911M
	C01906M	C01907M
	C01906M (R)	C01909M
	C01906M (R)	C01910M
	C01909M	C01911M
	C01909M	C01910M
	C01909M	C01907M
	C01907M (R)	C01911M
	C01907M	C01910M
	C01910M	C01911M

R - Reversible

ANTIBODIES

Alphavirus
C01643M ELISA, IFA

Borrelia burgdorferi
C65551M ELISA, IFA, LF
C65550M ELISA, IFA, LF
B65302R ELISA, IFA, IHC(p), WB (Rabbit PAb)

Chikungunya Virus
C01640M ELISA, IFA, LF
C01641M ELISA, IFA, LF
C01642M ELISA, IFA, LF

Chikungunya Virus, Envelope Protein
C01891M ELISA, LF
C01892M ELISA, LF
C01893M ELISA, LF
C01894M ELISA, LF
C01895M ELISA, LF

Dengue Virus
C03045M (Types 1, 2, 3, 4) ELISA, IFA, DB
C01551M (Type 2 Ep) IFA

Dengue Virus NS1
C01649M ELISA, IFA, pair
C01650M ELISA, IFA, pair
C01651M ELISA, IFA, pair
C01652M ELISA, IFA, pair
C01838M ELISA, LF, pair
C01839M ELISA, IFA, pair
C01896M ELISA, LF
C01899M ELISA, IFA
C01913M ELISA, IFA, LF, pair
C01914M ELISA, IFA, LF, pair
C01898M ELISA, IFA

Ebola Virus
C01762M ELISA, LF
C86037M ELISA, WB, LF
C86180M ELISA, WB, LF

Japanese Encephalitis Virus
C01550M ELISA, IFA

Leptospira biflexa
B65401R ELISA, IFA (Rabbit PAb)

Malaria
C66509M (pLDH) ELISA, LF
C01816M (HRP-2) ELISA, LF, pair
C01817M (HRP-2) ELISA, LF, pair
C01835M (pan pLDH) ELISA, LF, pair
C01834M (pan pLDH) ELISA, LF, pair

Plasmodium falciparum (Malaria)
C01584M (HRP-2) ELISA, LF, pair
C01585M (HRP-2) ELISA, LF, pair
C01586M (HRP-2) ELISA, LF, pair
C01836M (HRP-2) ELISA, LF, pair
C01837M (HRP-2) ELISA, LF, pair
C01833M (pLDH) ELISA, LF, pair
C86943M (MSP-1) ELISA, WB
C01930M (HRP-2) ELISA, LF, pair

Plasmodium vivax (Malaria)
C86328M (CSP) ELISA, WB
C86634M (MSP1) ELISA, WB
C86636M (MSP1) ELISA, WB

Marburg Virus
C01424M ELISA, WB
C01425M ELISA, WB
C01426M ELISA, WB
C86103M ELISA, WB

Newcastle Disease Virus
C01352M ELISA
C86015M ELISA, WB, HI
C86019M ELISA, WB, HI
C01629M (Ribonucleoprotein) ELISA, IFA, IHC

West Nile Virus, Envelope Protein
C01538M ELISA, IFA
C01539M ELISA, IFA
C01540M ELISA, IFA
C01541M ELISA, IFA
C01542M ELISA, IFA

Yellow Fever Virus NS1
C01906M ELISA, LF
C01907M ELISA, LF
C01908M ELISA, LF
C01909M ELISA, LF
C01910M ELISA, LF
C01911M ELISA, LF
C01912M ELISA, LF

Zika Virus, Envelope Protein
C01860M ELISA, LF
C01861M ELISA, LF
C01862M ELISA, LF
C01863M ELISA, LF
C01937M ELISA, IFA

Zika Virus, NS1 Protein
C01864M ELISA, LF
C01865M ELISA, LF
C01866M ELISA, LF
C01867M ELISA, LF, pair
C01868M ELISA, LF, pair
C01869M ELISA, LF
C01870M ELISA, LF
C01887M ELISA, IFA, LF, pair
C01888M ELISA, IFA, LF, pair
C01889M ELISA, IFA, LF, pair
C01890M ELISA, IFA, LF, pair
C01885G ELISA, PAb (Goat), Total IgG
C01886G ELISA, PAb (Goat), Affinity Purified

ANTIGENS

Borrelia afzelii
R14210, Native ELISA, WB
R01576, *E.coli* (Osp-C) ELISA, WB
R01609, *E.coli* (VlsE) ELISA, WB
R01707, *E.coli* (p41), ELISA, WB

Borrelia burgdorferi
R70610, Native (B31 strain) ELISA, LF
R8A131, *E.coli* (Osp-a) ELISA, LF
R8A123, *E.coli* (Osp-c) ELISA, LF
R01523, *E.coli* (VlsE) ELISA, WB
R01526, *E.coli* (p14 Flagellin), ELISA, LF, WB

Borrelia garinii
R01521, *E.coli* (p14 Flagellin) ELISA, LF, WB, DB
R01610, *E.coli* (VlsE) ELISA, LF, CLIA, WB

Chagas *(Trypanosoma cruzi)*
R01589, *E.coli* (FRA) ELISA, LF, WB
R01587, *E.coli* (1F8) ELISA, LF, WB
R01436, *E.coli* (1F8) ELISA, LF
R01364, *E.coli* (PEP-2, TcD, TcE and SAPA) ELISA, LF
R01684, *E.coli* (Chimeric) ELISA, LF
R01685, *E.coli* (Chimeric) ELISA, LF

Chikungunya Virus
R01653, Insect (W.T. gp E1) ELISA, LF, WB
R01654, Insect (mutant gp E1) ELISA, LF, WB
R01702, Insect (E2) ELISA, LF, WB
R01703, *E.coli* (Capsid) ELISA, LF, WB
R01704, *E.coli* (Capsid) ELISA, LF, WB
R01711, Insect (E1-E2) ELISA, LF

Dengue Virus Type 1
R01687, Native ELISA, LF
R01556, Drosophila (Envelope) ELISA, LF, WB
R01552, Drosophila (NS1) ELISA, LF
R01656, Drosophila (NS1) ELISA, LF
R01659, Drosophila (Envelope) ELISA, LF

Dengue Virus Type 2
R02220, Native ELISA, LF
R01557, Drosophila (Envelope) ELISA, LF, WB
R01553, Drosophila (NS1) ELISA, LF
R01432, *E.coli* (NS1) ELISA, LF
R01657, Drosophila (NS1) ELISA, LF, WB
R01660, Drosophila (Envelope) ELISA, LF
R01431, *E.coli* (Envelope) ELISA, LF

Dengue Virus Type 3
R01688, Native ELISA, LF
R01558, Insect (Envelope) ELISA, LF, WB
R01661, Drosophila (Envelope) ELISA, LF
R01554, Drosophila (NS1) ELISA, LF
R01658, Drosophila (NS1) ELISA, LF

Dengue Virus Type 4
R01689, Native ELISA, LF
R01559, Drosophila (Envelope) ELISA, LF, WB
R01662, Drosophila (Envelope) ELISA, LF
R01555, Drosophila (NS1) ELISA, LF
R01591, *E.coli* (NS1) ELISA, LF, WB
R01663, Drosophila (NS1) ELISA, LF

Ebola Virus
R01577 (Sudan NP) ELISA, WB, LF
R01578 (Zaire NP) ELISA, WB, LF

Leishmania
R01513, *E.coli* (*L. donovani* KMP-11) ELISA, WB

Japanese Encephalitis Virus
R01435, *E.coli* ELISA, WB

Plasmodium falciparum (Malaria)
R01478, *E.coli* (HRP-2) ELISA, LF
R01596, *E.coli* (HRP-2) ELISA, LF, WB
R01597, *E.coli* (pLDH) LF
R01595, *E.coli* (pAldolase) LF
R01603, *E.coli* (MSP1) ELISA, LF
R01604, *E.coli* (MSP1) ELISA, LF
R01710, *E.coli* (HRP-2) ELISA, LF, pair

Plasmodium vivax (Malaria)
R01439, *E.coli* (MSP1) ELISA, LF
R01440, *E.coli* (CSP) ELISA, LF
R01598, *E.coli* (pLDH) ELISA, LF, WB
R01601, *E.coli* (MSP1) ELISA, LF
R01602, *E.coli* (MSP1) ELISA, LF

Tick-borne Encephalitis Virus
R18082, *E.coli* ELISA, WB

West Nile Virus
R8A104, *E.coli* ELISA, LF, WB
R8A560, *E.coli* (Pre-M) ELISA, LF, WB

Yellow Fever
R01706, Insect (NS1) ELISA, LF, WB
R01709, Insect (Envelope) ELISA, LF

Zika Virus
R01635, Insect (Envelope) ELISA, CLIA, LF
R01636, Insect (NS1) ELISA, CLIA, LF

TROUBLESHOOTING & USAGE TIPS

The *Flavivirus* genera (e.g. Dengue, Zika, Japanese encephalitis virus, West Nile, etc) share epitopes which induce the development of cross-reactive antibodies. This leads to great difficulty in differentially diagnosing flaviviral infections, especially where flaviviruses co-circulate such as in tropical climates.

Flaviviruses are enveloped, single-stranded RNA viruses that share several common traits such as size (40–65 nm), symmetry (icosahedral nucleocapsid) and appearance (spherical geometries). Their genomes encode a single, large polyprotein, which is proteolytically processed to yield various structural domains (Envelope protein, Membrane precursor and Capsid protein) and several non-structural (NS) proteins (NS1, NS2a, NS2b, NS3, NS4a, NS4b, and NS5).

Envelope (E) Protein: This is the dominant protein present on the surface of the flavivirus virion and it is a major target for neutralizing antibodies. It contains very highly conserved regions therefore antibodies directed to the envelope protein tend to be cross-reactive. Specifically the domain III of the E protein contains a panel of highly immunogenic epitopes, and peptides representing this domain can be used as antigens for serologic diagnosis.

NS1 Protein: NS1 is a glycosylated, membrane-associated, secreted glycoprotein with replication and immune evasion functions. NS1 antigens can be detected very early in infection (as early as 1 day post infection). In addition NS1 is serotype-specific, and for viruses such as Dengue where more than one serotype circulates, NS1 antigens enable virus serotyping by ELISA.

Methods to increase IgG and IgM sensitivity

1. **IgM-Capture Assays:** Use anti-human IgM Fab fragment antibody as the capture (as opposed to a full-length anti-human IgM antibody). More Fab fragment antibodies are able to bind to the surface area of the solid substrate increasing the number of binding sites available for total IgM antibody that can be captured.
2. **Lateral Flow Assays:** Employ the bridging method in which colloidal gold-labelled disease specific antibody (e.g. MAb or PAb to Dengue NS1) is pre-mixed with recombinant antigen (e.g. Dengue NS1) and biotinylated anti-human IgM. Conjugating colloidal gold directly to the antigen can inhibit its ability to bind to captured IgM. Furthermore, using a gold-conjugated PAb, which has a broad reactivity, can further increase assay sensitivity. A PAb can bind to different antigen epitopes therefore enabling more than one PAb to bind to the same antigen simultaneously to generate a stronger signal.

Reducing cross-reactivity between flaviviruses in EIA assays

To improve assay specificity, it is necessary to remove any cross-reacting antibodies that could bind to the antigen and cause a false result. Defined epitope blocking ELISAs have successfully been used to increase the specificity and for differentiating flaviviral infections through targeting epitopes on NS1 or E protein. By including low concentrations of unconjugated antigens representing the potential cross-reactive species, it is possible to block their binding to the target antigen.

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