Tropical & Vector-Borne Diseases

ANTIGENS & ANTIBODIES FOR COMMERCIAL IMMUNOASSAY DEVELOPMENT

meridian BIOSCIENCE
LIFE DISCOVERED. LIFE DIAGNOSED.

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 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*
- Leptospirosis
- Malaria
- Marburg Virus
- Newcastle Disease
- Nipah Virus
- 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.

Antibody Pairs

	CAPTURE	DETECTION
Dengue Virus NS1	C01914M	C01913M
	C01914M	C01652M
	C01652M	C01649M
	C01652M	C01650M
	C01652M	C01651M
Ebola NP	C01964M	C01965M
Japanese Encephalitis Virus NS1 (JEV NS1)	C01976M	C01978M
	C01976M	C01979M
	C01976M	C01980M
	C01977M	C01978M
	C01977M	C01979M
	C01977M	C01980M
Malaria HRP-2	C01817M	C01816M
Malaria pLDH	C01834M	C01835M
	C01833M	C01835M
Malaria (specific *P. falciparum* HRP-2)	C01584M	C01586M
	C01584M	C01585M
	C01836M	C01837M
Nipah Virus G protein	C01975M	C01974M

	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
Zika Virus NS1	C01867M (R)	C01868M
	C01887M	C01888M
	C01888M	C01888M
	C01887M	C01889M
	C01888M	C01890M
	C01889M	C01888M

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
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
C01968M	(VP40), ELISA, WB
C01969M	(VP40), ELISA, WB
C01970M	(VP40), ELISA, WB
C01971M	(VP40), ELISA, WB
C01972M	(VP40), ELISA, WB
C01973M	(VP40), ELISA, WB
C01964M	(NP), ELISA, LF, WB, pair
C01965M	(NP), ELISA, LF, WB, pair
C01966M	(NP), ELISA, WB
C01967M	(NP), ELISA, WB

Japanese Encephalitis Virus (JEV)

C01550M	ELISA, IFA

Japanese Encephalitis Virus NS1 (JEV NS1)

C01976M	ELISA, pair
C01977M	ELISA, pair
C01978M	ELISA, pair
C01979M	ELISA, pair
C01980M	ELISA, pair

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
C01629M	(Ribonucleoprotein) ELISA, IFA, IHC

Nipah Virus G Protein

C01974M	ELISA, pair
C01975M	ELISA, pair

West Nile Virus, Envelope Protein

C01538M	ELISA, IFA
C01541M	ELISA, IFA
C01542M	ELISA, IFA

Yellow Fever Virus NS1

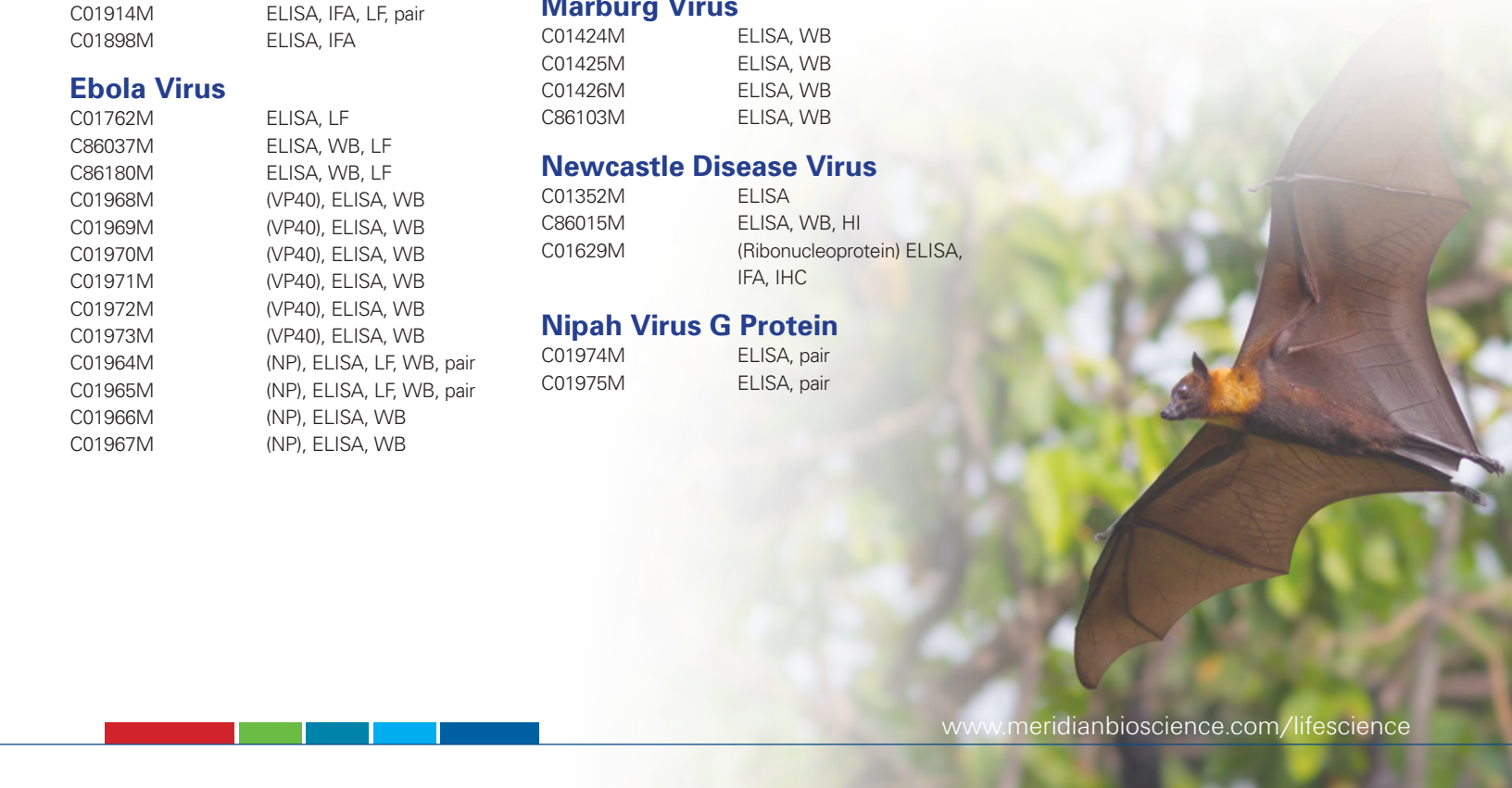
C01906M	ELISA, LF
C01907M	ELISA, LF
C01908M	ELISA, LF
C01909M	ELISA, LF
C01910M	ELISA, LF
C01911M	ELISA, LF
C01912M	ELISA, LF

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

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
R01768, Insect	(E1, E2, E3) ELISA

Dengue Virus Type 1

R01687, Native	ELISA, LF
R01656, Drosophila	(NS1) ELISA, LF
R01659, Drosophila	(Envelope) ELISA, LF

Dengue Virus Type 2

R02220, Native	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
R01767, Insect	(prM Envelope) ELISA

Dengue Virus Type 3

R01688, Native	ELISA, LF
R01661, Drosophila	(Envelope) ELISA, LF
R01658, Drosophila	(NS1) ELISA, LF

Dengue Virus Type 4

R01689, Native	ELISA, LF
R01662, Drosophila	(Envelope) ELISA, LF
R01591, *E.coli*	(NS1) ELISA, LF, WB
R01663, Drosophila	(NS1) ELISA, LF

Ebola Virus

R01577, *E.coli*	(Sudan NP) ELISA, WB, LF
R01578, *E.coli*	(Zaire NP) ELISA, WB, LF

Leishmania

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

Japanese Encephalitis Virus

R01435, *E.coli*	ELISA, WB

Nipah Virus

R01766, Insect	(G protein) ELISA, pair

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
9050, Insect	Zero-X-React™ (Modified Envelope) ELISA, 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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