Independent Evaluation on the VirClia® Dengue IgM Assay in France

Introduction

A new independent evaluation of the Dengue VirClia® IgM assay has been conducted at the Laboratory of Virology in the University Hospital of Lille, France with additional investigations in the National Reference Center for Arboviruses, Inserm-IRBA, Marseille, France, and the findings have been published in a peer-reviewed journal:

Guigon, A. *et al.* (2025). Evaluation of a Fully Automated Assay for Detection of Anti dengue IgM Antibodies in a Nonendemic Area. Journal of Tropical Medicine, 2025, 4163150. https://doi.org/10.1155/jotm/4163150

Dengue is the most rapidly spreading mosquito-borne viral disease, caused by one of the four dengue virus serotypes (DENV-1 to DENV-4). Transmission occurs mainly through *Aedes aegypti* in tropical regions and *Aedes albopictus* in temperate regions. The global burden is estimated at ~400 million infections annually, with 96 million symptomatic cases, mostly in Asia (70%), Africa (16%), and the Americas (14%). In Europe, incidence is increasing, particularly in France, where autochthonous cases rose to 65 in 2022 compared to 48 in the entire previous decade, coinciding with the spread of *Aedes albopictus*.

French guidelines recommend RT-PCR and IgM testing as reference tools, given the limited value of NS1 in low-incidence settings. However, since RT-PCR is not always available in local laboratories, **IgM represents an essential first-line tool from day 5 after symptoms, remaining detectable for up to 3 months.**

While EIAs are more sensitive than Rapid Test and remain the gold standard for dengue IgM, conventional ELISAs are constrained by batching and long turnaround times. Automated monotest platforms such as VIDAS® (bioMérieux) and VirClia® (Vircell) overcome these limitations. **This report summarizes the first independent evaluation of the VirClia Dengue IgM assay**, performed by the Laboratory of Virology in the University Hospital of Lille, with the support of the French Reference Center for Arboviruses (FRCA).

Materials and methods

Study Design

This is a monocentric evaluation that included patients with suspected dengue infection, as defined by the European Centre for Disease Prevention and Control (ECDC) criteria. Serum samples were prospectively collected between 2020 and 2024. Routine IgM testing was performed in the Lille laboratory, with confirmatory investigations carried out at the French Reference Center for Arboviruses (FRCA).

Patients and Dengue Diagnosis

A total of 104 serum samples from 104 patients were analyzed. The median age was 34.3 years, with a balanced sex distribution. Most patients had recently returned from the Caribbean (39.4%) or Africa (24.0%). The most frequent clinical features at admission were fever (88.2%), headache (68.6%), and muscle pain (64.7%). The median time since symptom onset (TSS) to the first sample was 6 days.

Dengue RT-PCR was positive in 57 patients (54.8%). Among these, DENV-2 was the predominant serotype (49.1%), followed by DENV-3 (17.5%) and DENV-1 (5.3%), while typing remained undetermined in 28.1% of cases. Most positive cases were travellers returning from the Caribbean (63.2%) and sampled within 7 days after symptom onset (77.2%). All but one case presented as mild dengue fever; a single severe case (DENV-2) was reported, with high fever, diffuse pain, gingival bleeding, haemoptysis, and gastrointestinal haemorrhage.

Technical Note
Vircell Scientific Marketing, September 2025

Laboratory Methods

The VirClia® Dengue IgM assay is a fully automated, single-sample chemiluminescent immunocapture assay. Each monotest strip contains all necessary reagents and controls, with reaction wells coated with anti-human IgM and a conjugate based on inactivated dengue virus antigens (DENV-1 to DENV-4), labelled with peroxidase. Assays were performed on the VirClia Lotus instrument, with results expressed as antibody index values according to the manufacturer's instructions.

Comparative IgM testing at FRCA was performed using either an *in-house* microplate ELISA or the commercial Euroimmun Dengue IgM ELISA, both interpreted according to established cut-offs.

Dengue virus RNA detection and serotyping were conducted at FRCA using a **validated one-step RT-PCR *in-house* protocol.**

Results

Performance of VirClia Dengue IgM Assay

A total of 104 samples were tested with both VirClia Dengue IgM and RT-PCR. Overall concordance was **79.8% (κ = 0.60)**. Stratification by time since symptom onset revealed limited agreement during the first 4 days (**53.3%; κ = 0.07**), but markedly improved performance from day 5 onwards (**90.5%; κ = 0.81**). See Figure 1.

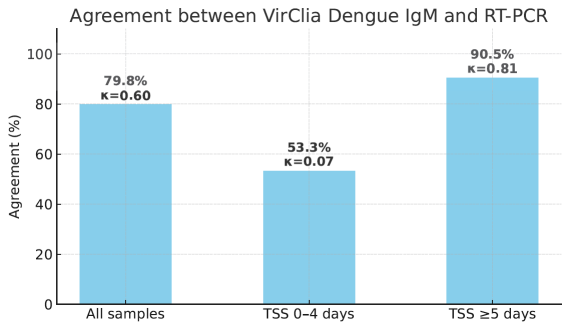

Figure 1: Agreement Dengue VirClia IgM compared to RT-PCR, in patient samples with Time Since Symptoms (TSS) 0-4 and > 5 days

When samples with five or more days since symptoms are analyzed, VirClia achieved **sensitivity of 95.7%**, **specificity of 96.4%**, **PPV 97.8%**, and **NPV 93.1%**. as shown in Figure 2.

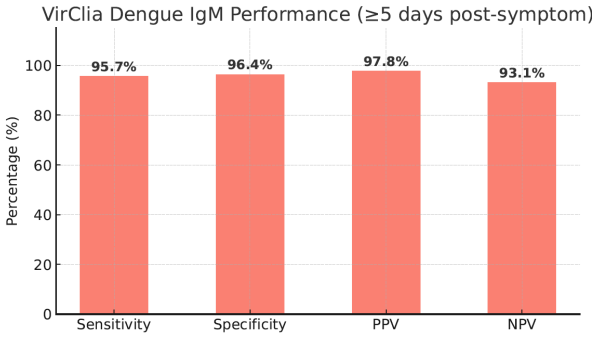

Figure 1: Performance of VirClia Dengue IgM for the diagnosis of Dengue infection in samples TSS ≥ 5 days

Most discordant results corresponded to very early infections (RT-PCR positive/IgM negative) or late cases (IgM positive/RT-PCR negative).

Comparison with ELISA

84 samples were tested with ELISA. The overall concordance between VirClia Dengue IgM and ELISA assays was **86.9% (κ = 0.74)**. Agreement was **moderate with the in-house EIA (75.9%; κ = 0.53)** but **excellent with Euroimmun (92.7%; κ = 0.85)**. Of 11 discordant cases, RT-PCR confirmed dengue infection in 8, with **7 supporting VirClia results** and only 1 supporting EIA *in-house,* mainly in early collected samples (median TSS = 5 days). See Figure 3.

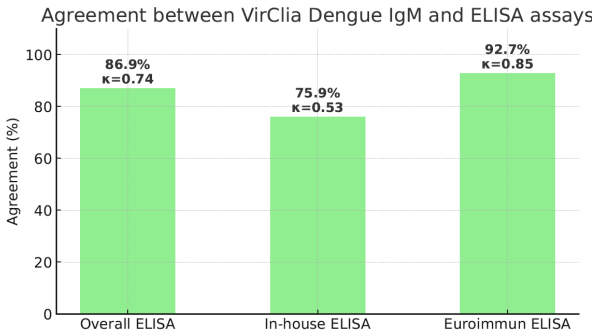

Figure 3: Agreement between VirClia Dengue IgM, in-house and Euroimmun ELISA

External Quality Assessment

Participation in an EQA program (Labquality, Finland) further validated assay performance. A total of 27 samples (6 IgM-positive and 21 IgM-negative) were tested, and **VirClia results were fully consistent with the expected outcomes, confirming excellent reliability in external benchmarking.**

Discussion

In routine clinical practice, **IgM testing is often the first diagnostic approach**, either as a standalone method or combined with RT-PCR in a dual-testing strategy. This is particularly relevant when IgM testing is available on automated platforms, where rapid results provide clinicians with **early and actionable information**.

In this evaluation authors confirm that the **VirClia® Dengue IgM assay shows excellent diagnostic performance**, particularly for samples collected from day 5 after symptom onset. In this subgroup, sensitivity and specificity exceeded **95%**, with an **excellent agreement with RT-PCR (κ = 0.81)**. These findings reinforce the value of VirClia as a reliable tool to complement molecular testing.

Importantly, the evaluators highlight that, **serology can be performed in most clinical laboratories**, while RT-PCR samples must often be referred to specialized centers, leading to longer turnaround times. Thus, a robust and rapid serological assay such as VirClia provides significant practical advantages in routine care.

In this study authors demonstrated an **excellent VirClia Dengue IgM agreement with the Euroimmun Dengue IgM ELISA 92.7% (κ = 0.85)**, a conventional plate-based assay widely used in reference settings. **This supports the consistency of VirClia's performance when compared with established ELISA methodologies.**

From an operational perspective, authors explicitly mention that the **monotest format of VirClia**, with ready-to-use reagents, offers laboratories flexibility by avoiding batch processing and minimizing reagent waste. Automation ensures **standardization, higher efficiency, and reduced turnaround times**, making the system particularly well-suited for nonendemic regions such as metropolitan France.

Finally, beyond dengue, authors also inform that **the VirClia platform provides automated serological assays for other arboviruses such as chikungunya and zika, as well as other febrile syndromes**, enabling laboratories to address a broader differential diagnosis using the same system.

Conclusion

This independent evaluation conducted Virology in the University Hospital of Lille, with the support of the French Reference Center for Arboviruses (FRCA) demonstrates that the **VirClia® Dengue IgM assay** provides **high diagnostic accuracy, with sensitivity and specificity above 95% from day 5 post-symptom onset, and excellent agreement with both RT-PCR and conventional ELISA.** Its **monotest, fully automated format** offers rapid turnaround, flexibility, and efficiency, making it particularly well adapted for nonendemic European laboratories.

Importantly, the FRCA has not only validated but also implemented in routine practice the **VirClia Zika IgM and VirClia Chikungunya IgM assays** on the **VirClia Lotus platform**, further confirming the reliability of this system and highlighting its value as a comprehensive solution for the serological diagnosis of arboviral infections.