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# ICGEB finds distinct biomarkers for dengue, chikungunya

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Researchers at Delhi's International Centre for Genetic Engineering and Biotechnology (ICGEB) have identified specific metabolites that can potentially be used as biomarkers for distinguishing dengue and chikungunya infections and co-infection by these two viruses. The results were published in the journal *Scientific Reports*.

Both these virus infections exhibit similar and overlapping symptoms in patients because of which making differential diagnosis becomes challenging. It gets further complicated in the case of a co-infection.

Currently, antigen-based and antibody-based diagnostic tools are available for dengue, and the diagnosis can be made within the first few days after infection. However, in the case of chikungunya, the diagnostic tool is antibody-based. Antibodies take time to develop in a patient and so diagnosis gets delayed. Currently, there is no tool to diagnose co-infection by dengue and chikungunya viruses.

"There is great need to develop new tools for diagnosing these two infections, especially co-infection by these viruses," says Sujatha Sunil from the Vector Borne Disease group at ICGEB and one of the senior authors of the paper. Another study by her group published this year found that nearly 10 per cent of dengue patients in Mumbai were, in fact, co-infected by dengue and chikungunya viruses.

A team led by her and Dr. Neel Sarovar Bhavesh from the Tran-



OVERLAPPING SYMPTOMS (From left) Dr. Neel Bhavesh, Dr. Sujatha Sunil and Jatin Shrinet have identified distinct metabolite signatures for dengue and chikungunya infections and co-infection  
PHOTO: SPECIAL ARRANGEMENT

scription Regulation group at ICGEB set out to identify metabolome or collection of metabolites in the blood that are specific to dengue and chikungunya mono-infection and co-infection.

"The problem with dengue and chikungunya diagnosis is that we won't be able to identify an ongoing infection vis-à-vis a past infection," says Dr. Sunil. "This is because the diagnostic tool used looks for antibodies." In India, even though antigen-based testing is available for dengue, it is not approved by the government, making it difficult for government hospitals to use it.

"Diagnostics based on metabolites is highly sensitive as we are looking at changes at a molecular level. The sensitivity is

high enough to identify minor changes that may occur in co-infections as well as in mono-infections by the viruses," she says.

The researchers are not relying on particular metabolites but looking at a cluster (combination of 5-6 metabolites) of metabolites instead. They found the metabolite cluster signatures to be very distinct and, hence, the sensitivity high in the case of mono-infection and co-infection. "The crux of the study was to identify a metabolite cluster for co-infection as there is no diagnosis for it," says Dr. Bhavesh.

Though metabolites are routinely looked for in many conditions (such as creatinine to know the health of kidneys) and diseases, the knowhow to look at metabolites for these two infec-

tions in a more sensitive manner has come only recently. "We are now able to detect even subtle differences or perturbations during disease condition. This has become possible because of newer tools such as the nuclear magnetic resonance (NMR) spectroscopy," says Dr. Bhavesh.

The metabolite clusters can be used for various applications — biomarkers, studying disease progression, evaluating therapeutic potential of drugs and disease management. The present study was restricted to a small patient population — 11 patients with dengue, 15 with chikungunya and 12 co-infected. The results have to be validated on a larger patient population before distinct metabolites and clusters can be exploited for differential diagnosis.