Complete viral history of a person revealed in a single drop of blood

A new technology called VirScan, using a single drop of blood, can identify all the viruses a person has been exposed to over his/her lifetime. Based on advanced robotics and DNA sequencing techniques, this technology was developed by researchers at the Howard Hughes Medical Institute, USA, along with researchers from eight other universities including Harvard and Johns Hopkins, Massachusetts Institute of Technology (MIT), USA and Max Planck Institute, Germany.

The researchers claim that VirScan will allow doctors to scan a patient's blood for antibodies to every known human virus simultaneously. This approach would be useful for patients with undiagnosed diseases where the doctor is uncertain about the virus.

In a paper in *Science* (5 June 2015), George J. Xu and his team reported that they created a library of mock viruses, using bacteriophages as their starting material. They then added DNA for peptides from over 1000 different strains of 206 viral species currently known to affect humans. Each bacteriophage then displayed the peptide on its surface.

When the researchers mixed the cocktail of mock viruses with a drop of blood, the antibodies in that person’s blood would bind to the peptide of whichever virus he/she had been exposed to previously, either through infection or vaccination. The antibodies were then retrieved and washed to remove everything except the few bacteriophages still clinging to them. By sequencing the DNA of the bacteriophages, the investigators were able to identify the viral peptides to which the antibodies were produced.

When VirScan was tested on a group of 569 volunteers from Peru, South Africa, Thailand and the USA, it was found that while most people had antibodies to about ten different viruses, two had antibodies to 84 different viruses.

In addition to diagnostics, this technology could eventually help scientists understand the link between viral infection and diseases such as type 1 diabetes, asthma and irritable bowel syndrome, where the cause is unclear but believed to be linked to past infections. VirScan could also help in studying the functioning of the immune system.

VirScan is currently being used as a research tool and is not yet commercially available.

P.M. NISCHAL, Bengaluru, Karnataka

‘Make in India’: Dialysis technology

Chronic kidney disease (CKD) is an important health problem in India. Haemodialysis, used in the treatment of CKD, is an expensive treatment option for the majority of patients in India. The main reasons are that the cartridges used for haemodialysis are imported and the technology for their manufacturing is patented by a select few companies. Researchers Anirban Roy, Sirshendu De, Lloyd Vincent and Shyam Vasudeva Rao of the Indian Institute of Technology (IIT), Kharagpur, in a project funded by the Department of Science and Technology, with two Bengaluru-based companies as industrial partners have engineered an indigenous, cost-effective kidney dialysis technology.

The haemodialysis cartridges are manufactured by spinning clinical grade hollow fibre membranes to precise dimensions and this technology is not available in India. The researchers at IIT Kharagpur have developed a technology using disposable syringe assemblies to spin hollow fibre membranes. This technology does not use the patented expensive spinnerets employed in the manufacturing process abroad. This work was awarded the ‘joint runner-up prize’ at the Fifth National Award for Technology Innovation in the category of polymers in public healthcare (http://chemicals.nic.in/Awardees_5NA%282014-15%29.pdf). This technology has been tested in the laboratory but animal studies and clinical trials of the product are awaited. Keeping with the Prime Minister’s ‘Make in India’ call, this technology is expected to bring down the cost of a dialysis cartridge from the current price of ₹1000–1500 to ₹200–300.

Dr V. Sivakumar, Professor and Head, Department of Nephrology, Sri Venkateswara Institute of Medical Sciences, Tirupati, stated: ‘It is true that developing indigenous technology is the need of the hour. However, diligent care should be exercised in addressing biocompatibility and biotechnology issues in achieving the results. Meanwhile, cooperative approaches may be considered in making the dream of affordable technology a reality. While the technology is being refined and developed for patients with end-stage renal disease, other measures such as “peritoneal dialysis first approach” that has been found to have comparable survival, lower cost and improved quality of life—promoting “deceased donor transplantation” —need to be explored.’

ALLADI MOHAN, Tirupati, Andhra Pradesh

Violence against doctors on the increase in India

Recently, there has been a spate of violence against doctors and hospitals in India.

In Delhi, for instance, Bhagwan Mahavir Hospital and Babu Jagiwan Ram Hospital were involved in such events. Hospitals in Mumbai, Maharashtra; Uttar Pradesh and Karnataka have also been at the receiving end. In protest, resident doctors of 22 government hospitals in Delhi went on strike for two days (22–23 June 2015) calling for a safer workplace. ‘Patient safety’ has aptly been a buzzword for some years now and there have been conferences devoted to this important, hitherto-neglected subject. However, we are now on the verge of physicians demanding ‘doctor safety’.

The safety issue has become so important that the Indian Medical Association has asked the central government to pass a law against such events. This may help reduce the immediate problem to an extent. However, the reasons for violence against healthcare workers need more than a simplistic approach. Much of the violence takes place because of a combination of unrealistic patient and family’s expectations, rising costs of healthcare and poor or mis-communication between physicians and patients as well as between physicians themselves.
Violence against doctors is not limited to India. It is a worldwide phenomenon and is particularly common in China, where such incidents tripled between 2006 and 2010. In 2012, an editorial in *The Lancet* had highlighted this problem faced by Chinese doctors. An ongoing study by the Indian Medical Association has shown that 75% of doctors have faced violence at work. Much of this happens in the intensive care or the surgical setting.

SANJAY A. PAI, Bengaluru, Karnataka

Online search engines unlikely to be the best tool for self-diagnosis

Recent research from Queensland University of Technology (QUT), Brisbane, Australia has raised the issue of self-diagnosis based on online searches being potentially detrimental to a person’s health. The study, conducted by Dr Guido Zuccon, from QUT’s Information Systems School along with colleagues from CSIRO in Brisbane and Vienna University of Technology, Austria analysed the accuracy of responses generated by search engines Google and Bing in reply to queries based on medical conditions. The study comes at a time when Google reports show that 20 billion of its 100 billion searches per month are for health-related issues. An estimated 35% of USA self-diagnoses medical conditions with online searches and nearly 70% of search engine users in the USA have performed health-related searches at some point or the other, as per a survey conducted by Pew Research Centre in 2011.

In a paper titled ‘Diagnose this if you can’, Zuccon et al. found that less than one-third of the top 10 responses generated by search engines were found to be ‘highly useful’ and less than half were ‘somewhat relevant’ to self-diagnosis of medical conditions. Accuracy was improved if medical terminology for the disease being researched was known beforehand. Empirical questions asked or generalized symptoms described in a roundabout manner elicited inaccurate or not relevant results. Thus, the term ‘urticaria’ drew more relevant web pages as compared to ‘hives all over the body’. Dr Zuccon attributed the inaccurate results to the inability of current retrieval techniques used by search engines to respond to colloquially described conditions. The researchers recommended algorithms be introduced to enable search engines to provide the most relevant results in a manner which will be easily understood by the person searching the topic online. The paper also concluded that inaccurate results either lead people to search for more answers or act on potentially incorrect advice, which may be harmful for the individual.

Dr Nobhojit Roy, Head of Department of Surgery at Bhabha Atomic Research Centre Hospital, Mumbai states: ‘With the birth of the cyber hypochondriac and cyber diagnostician, direct-to-consumer medical information is an easy way to bypass the medical practitioner. Quick and easy, 5-question self-diagnosis questions are targeted at the anxiety buttons of an already anxious patient. That way, it is easy to start an epidemic of worry in this generation that seeks all their solutions in the form of a pill.’

MAHARRA HUSSAIN, Dubai, United Arab Emirates

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*The National Medical Journal of India* is looking for correspondents for the ‘News from here and there’ section. We are particularly interested in getting newswriters from the north and northeast regions of India as well as from other countries. By news, we refer to anything that might have happened in your region which will impact on the practice of medicine or will be of interest to physicians in India. The emphasis of the news items in this column, which are usually from 200 to 450 words, is on factual reporting. Comments and personal opinions should be kept to a minimum if at all. Interested correspondents should contact SANJAY A. PAI at sanjayapai@gmail.com or nmji@nmji.in