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Indian scientists develop platform to detect effect of alcohol on RBCs in blood

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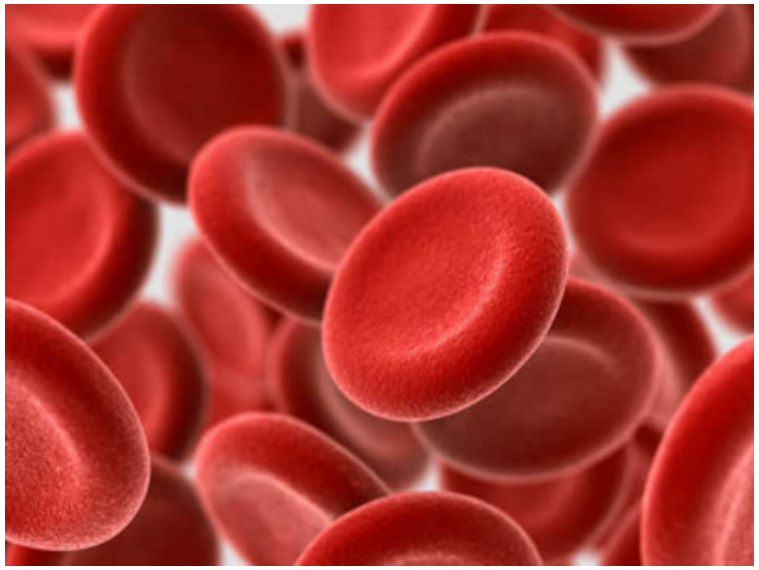

NEW DELHI: Indian scientists have developed a platform to detect the effect of prolonged alcohol exposure on red blood cells (RBCs) through high-resolution measurements. The device that shows reduction in size of RBCs on alcohol exposure can be tuned for a point-of-care screening of multiple conditions that alter the size and count of RBCs in blood. Although it is known that alcohol affects RBCs, the exact physiological changes are very subtle and difficult to measure. To overcome this challenge, scientists from Raman Research Institute (RRI), led by Professor Gautam Soni, have developed an electro-fluidic platform that can detect the changes by measuring the cell size in enhanced resolution.

Cell volume changes are an important biomarker for multiple diseases, especially blood-related conditions. Accurate measurement of volume changes of RBCs has applications in detection and mechanistic studies of diseases such as sickle cell anaemia and malaria. Similarly, small volume changes of RBCs could also be an indicator of malnutrition, a statement of the department of science and technology said.

The research work, recently published in ACS Sensors journal of the American Chemical Society, was carried out by three RRI researchers under the guidance of Dr Soni and Dr V Sundaramurthy from the National Centre for Biological Sciences, Bangalore.

“We introduce a high-resolution device for quantitative electro-fluidic measurement of changes in RBC volume upon alcohol exposure. We present an exhaustive calibration of our device using model cells to measure and resolve volume changes down to 0.6 fL. We find an RBC shrinkage of 5.3% at 0.125% ethanol (the legal limit in the US) and a shrinkage of 18.5% at 0.5% ethanol (the lethal limit) exposure,” says the research paper.

“Further, we also measure the time dependence of cell volume shrinkage (upon alcohol exposure) and then recovery (upon alcohol removal) to quantify shrinkage and recovery of RBC volumes. This work presents the first direct quantification of temporal and concentration-dependent changes in red blood cell volume upon ethanol exposure,” it said.