Real Time Monitoring of Mechanical Heart Valves

Roth, Dekel

Adar, Ariel

Heart valves regulate unidirectional flow of blood in the heart. Various valvular defects may affect proper function (insufficiency-regurgitation, stenosis, rupture, deformation). These conditions may require surgical replacement to a prosthetic valve – mechanical or biological. Currently, there is no available method for community –based continuous monitoring of the prosthetic valve, thus subjecting the patient to periodic hospital visits for follow-up. Life-threatening problems may occur over time without knowledge of the cardiac surgery staff. We have developed a home based device for real-time monitoring of prosthetic mechanical heart valves and detection of various problems such as: valvular stenosis or restriction of blood flow, valvular insufficiency or regurgitation of blood, stuck valve and changes in heart rate. The system can alert the patient about any of these issues. Our system uses the RFID (radio frequency identification) technology, which enables data transmission from a passive tag to a transmitter-receiver (reader) via radio waves. It includes an external transmitter-receiver that operates by the patient and a miniscule passive tag that is applied on the mechanical valve leaflet. The transmitter-receiver communicates with the tag and identifies the changes in the valve's angle by monitoring the changes of the electro-magnetic field. The reader then translates these changes to the corresponding physiological measures. In the future we aim to enable transmission of the system's data through the patient's smartphone to cloud based processing, archiving and continuously present the data to the surgeon and the primary care physician.

Awards Won: