Each year in the United States, nearly 400,000 patients are treated for sudden cardiac arrest. Fewer than 1 in 5 of those victims survive after an in-hospital arrest, and fewer than 1 in 10 out-of-hospital.

Even among patients who survive, less than one third make it to hospital discharge, often dying as a result of further complications.

- **25 SECONDS**: A coronary event occurs in the United States approximately every 25 seconds.  
  
  *American Heart Association/American Stroke Association, 2012, 4/12DS5479*

- **6 MINUTES**: The time it takes victims to begin experiencing brain damage during cardiac arrest.  
  
  *Centers for Disease Control and Prevention, 30 Apr 2015*

- **50%**: The approximate mortality rate of cardiogenic shock (a complication of cardiac arrest, myocardial infarction, and congestive heart failure.)  
  
  *Auxiliary Board of Northwestern Memorial Hospital*

- **45%**: Nearly 45% of out-of-hospital cardiac arrest victims survived when given CPR by bystanders.  
  
  *American Heart Association: https://cpr.heart.org/en/resources/cpr-facts-and-stats*

- **73%**: The amount of sudden cardiac arrest victims in the United States who die before reaching the hospital.  
  
  *Demographic and Survival Characteristics of OHCA,” CARES Summary Report, 05 Mar 2018*

- **18%**: The percentage of out-of-hospital cardiac arrests that occur in public settings.  
  
  *American Heart Association: https://cpr.heart.org/en/resources/cpr-facts-and-stats*
“Survival for these [out-of-hospital cardiac arrest] patients decreases with every minute there is a delay in therapy. ...Many who do survive to hospital discharge do not return to their pre-arrest function due to brain injury.”

—Robert Neumar, M.D., Ph.D., Professor and Chair of Emergency Medicine at Michigan Medicine

The MCIRCC Solution

To help meet the need for next-generation cardiovascular diagnostic tools and therapeutics, MCIRCC has developed a comprehensive approach to understanding the pathophysiology of cardiac arrest, cardiogenic shock, and other critical cardiovascular conditions.

Sample MCIRCC innovations in cardiac care include:

**Electrocardiomatrix**
The Electrocardiogram (ECG) has been used for the diagnosis of cardiac diseases for more than a century. MCIRCC researchers have developed a new method that organizes 2D-ECG signals into 3D electrocardiomatrix (ECM) that will permit accurate, intuitive, and efficient detection of cardiac abnormalities.

**Microvascular Oximetry**
One of the most difficult tasks of any critical care specialist is to rapidly determine if a patient’s tissues are receiving enough oxygen. MCIRCC members have engineered a device that, placed in a patient’s mouth, utilizes Resonance Raman spectroscopy (RSS) to measure tissue oxygenation from the inside of the patient’s cheek.

**AngioAid**
An automated, computer-based platform capable of analyzing coronary angiogram videos and generating assessments in real-time. The AngioAid platform can identify specific areas of coronary arteries with suspected disease for more intense study and can also estimate the width of blood vessels to determine the presence and percentage of arterial blockages.

For more information

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