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Myocardial infarction and post-myocardial management: Yesterday through the scope of traditional healthcare and tomorrow the view of preventive and personalized medicine

Atherosclerosis is the leading cause of death worldwide. Myocardial infarction causes almost 7.3 million deaths each year worldwide. In spite of optimal interventional and medical therapy, the risk for acute coronary syndromes is still very high, and heart failure remains one of the top killers in the world since the reliable treatments to get the patients healthy and their lives safe are lacking so far.

Metabolic risk factors have been increasing due to the westernization and urbanization of life-style. This justifiably raises a concern that the incidence of coronary heart disease in the world will increase over time, and indeed, recent epidemiological studies suggest the incidence of acute myocardial infarction is increasing. And despite advances in coronary artery disease treatment and prevention, myocardial damage due to acute myocardial infarction (MI) remains a major cause of morbidity and mortality in the population. And current treatments are more palliative than curative.

Over the past two decades there have been dramatic changes in the diagnosis, treatment and prognosis of acute coronary syndrome (ACS). Several new treatment modalities have been added and the prognosis has improved dramatically.

Unlike some organs, the heart has a limited ability to regenerate, and dysfunction resulting from significant cardiomyocyte loss under pathophysiological conditions (such as myocardial infarc-tion) can lead to heart failure. Following significant injury, the heart undergoes induced compen-sation and gradually deteriorates towards impending heart failure. After an extensive myocardial infarction, restoration of heart function in either of the cases depends on the ability of the heart to promote regeneration and prevent adverse ventricular remodeling. And current therapy slows but does not halt the resultant adverse remodeling. Unfortunately, for patients with end-stage heart failure, heart transplantation remains the main alternative, and it is insufficient, mainly because of the limited availability of donor organs. Moreover, translation of basic science into clinical practice has not been a great success.

Meanwhile, exciting progress has been made to establish cell transplantation techniques in recent years, and new preclinical studies in large animal models have shed light on the promises and challenges that lie ahead. Stem cell therapy has gained the potential to regenerate or repair in-farcted heart tissue and therefore is becoming a promising therapeutic strategy undergoing intensive investigation. For instance, there has been a large increase in basic science activity in cell therapy and a growing portfolio of cell therapy trials. In a reality, regenerating the human heart is a challenge that has engaged researchers and clinicians around the globe for nearly a century.