



# Non-invasive Evaluation of Cardiac Function

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## Introduction

This issue of the Journal of Tehran University Heart Center features three papers which focus on non-invasive methods to investigate various aspects of cardiovascular function. The history of cardiology and medicine is replete with examples of the contribution of non-invasive observations to our understanding of cardiac and vascular function, starting at the bedside using our natural senses of visual inspection, palpation, and auscultation.

The stethoscope was perhaps the first tool used to augment our natural senses. Later, X-rays were used to produce silhouette images of the heart and lungs, and the electrocardiograms were utilized to record the electrical activity of the heart in a visual format. We have used ultrasound for the last 50 years to interrogate the internal structures of the heart and blood vessels and to measure hemodynamic performance. Nuclear imaging is also widely used to non-invasively assess myocardial perfusion and cardiac function. Cardiac magnetic resonance imaging and cardiac computed tomography are more recent additions to our non-invasive armamentarium.

Dr. Sadeghian and colleagues<sup>1</sup> used the electrocardiogram to assess differences in the prognosis of patients presenting with acute myocardial infarction, clearly demonstrating that those with ST segment elevation fare poorly compared to those without ST segment elevation. This observation, using a simple 12-lead electrocardiogram, can have major prognostic implications for patients with acute myocardial infarction. The impact of these observations on management and final patient outcome, however, was not studied.

Dr. Esmailzadeh and colleagues<sup>2</sup> employed echocardiography to quantify the severity of aortic regurgitation by measuring the difference between the left and right ventricular stroke volumes. Their non-invasive measurements compared favorably to the assessment of the degree of aortic regurgitation by cardiac catheterization. How to use this information to decide on the timing of aortic valve surgery remains to be determined.

Dr. Rahgozar and colleagues<sup>3</sup> used Doppler ultrasound to investigate changes in the stiffness of the carotid artery. Their non-invasive method does not require measurement of local blood pressure and thus may be more easily applied to a clinical population in the future.

All three of these papers employ diagnostic methods which are widely available, relatively simple to apply, and pose no risk to patients. While there is a low threshold for the clinical application of non-invasive diagnostic tools such as those employed by these three papers, further studies are needed to demonstrate that the additional information produced in these experimental studies is useful in routine clinical practice.

Our powers of observation are greatly enhanced by our non-invasive diagnostic methods. It is up to us to use these improvements to ask important questions and to use the answers to improve our patients' health. Observation without action is not enough.

## References

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