Determining Ejection Fraction Volumes on a Continuous Basis

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Technology description

Introduction

People with progressive heart failure need ejection fraction (EF) measurements as critical information in diagnosis and treatment. EF is the percentage of the total volume in a ventricular chamber of the heart that is ejected per beat, a key measure of overall heart function. A technology allowing continuous monitoring of EF would allow for much better patent care than current capabilities where waits of many hours are commonly required to obtain a single EF reading. In addition, a system allowing such data to be gathered at the home, rather than in a hospital, would be a major cost saver for the care of heart patients.

Description of Technology

Using blood pressure information derived from either invasive or non-invasive procedures, the resulting waveforms are used to calculate a personalized circulatory system for a given patient by fitting a general circulatory model to the waveforms to obtain a personalized circulatory model. From that model, predicted ejection fractions can be calculated. Commercially available medical diagnostic equipment is used to obtain the required input information on individual patients, namely systemic arterial pressure (SAP) and/or left ventricular pressure (LVP). This technology is essentially a mathematical analysis innovation, in software form, that can be run by commercially available PCs for hospital use, using the above SAP/LVP waveforms as inputs to predict EFs. A major feature of this technology is that the software-predicted total volume of blood in a ventricle, and the predicted total volume ejected per beat from the ventricle have the same proportionality constants which cancel out when determining the EF fraction, allowing for a very accurate prediction of the EF on a continuous basis. There is no current technology available which can do this.

Application area

Minimally invasive:The Ejection Fraction technology can be minimally invasive (it can use a clip on the wrist to get blood pressure waveforms).

Continuous monitoring of EFs in ICUs, and home monitoring of EFs for heart patients.

Advantages

Increased prediction accuracy:Made possible by the superior mathematical analysis tool.
Cost reductions:Major cost reductions can be achieved through gaining input data for EF predictions from heart patients in their homes.
Minimally invasive:EF predictions can be made using patient-derived data obtained from minimally invasive means.
Personalized circulatory systems:Ability to construct personalized circulatory systems for individual patients, with improved prediction accuracy and usefulness as a diagnostic and treatment tool.
Real time predictions:Ability to generate predicted EF values in real time, on a continuous basis, and automatically.
Lack of competing technologies:No other technology is able to generate EF predictions, so this technology has no real competitors at the present time.

Institution

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