

Overview SphygmoCor (PWA & PWV)

SphygmoCor PX Pulse Wave Analysis system is a new diagnostic system. The system is FDA approved and imported from Australia. It can be used in the Preventive Cardiology program to set up VASCULAR_LAB_(measure the stiffness of the arteries) and Hypertensive clinic. The system non-invasively measures the Central aortic blood pressure and stiffness of the central arteries, which are so far possible only through invasive procedures.

Central Blood pressure:

The system can derive the central aortic blood pressure and waveform from analyzing the Radial pulse waveform using a generalized mathematical transfer function. The central systolic and pulse pressure are now shown as a better predictor of cardiovascular events and outcome than peripheral systolic and pulse pressure. It is now clearly shown by the recent Conduit Artery Function Evaluation (CAFÉ) Trial that different blood pressure lowering drugs has different effect in central blood pressure despite having similar reduction in peripheral blood pressure. The study concludes it's the central blood pressure reduction, which determines the superior outcome in cardiovascular events.

Central artery stiffness:

The central artery stiffness is now recognized as a major risk factor for cardiovascular disease. Independent studies have shown central artery stiffness increase in patients with Diabetes Mellitus, Hypercholesterolemia, hypertension, stroke, myocardial infarction, end stage renal disease and stiffness is closely related to age.

Now SphygmoCor device can quantify the arterial stiffness in discrete value by measuring the velocity of the forward traveling wave generated by Left ventricular ejection and reflected wave from the periphery along with the time of arrival of the reflected wave during the cardiac cycle.

Increase central aortic stiffness will lead to increase myocardial oxygen demand and myocardial mass.

Measuring aortic stiffness is emerging as a new indicator to predict future cardiovascular events. This system will enable cardiologist to establish the specific medical treatment on the patient and assess the improvement in cardiac status in response to the treatment. This system will also be used in Anti-Hypertensive clinic to adjust the medication for maximum benefit to the patients.

The system can screen the patients with diabetes, hypertension, hypercholesterolemia and other cardiac risk factors for arterial stiffness and predict future cardiac events. This will give the option for the cardiologist to start treatment at earlier stage and recommend necessary preventive steps like life style modification, diet and exercise.

The system can calculate wide range of arterial stiffness indices such as: Aortic Systolic pressure (sp), which differs markedly from brachial Sp, Aortic Augmentation Index (Aix), a measure of systemic arterial stiffness, Ejection Duration(ED) and Subendocardial Viability Ratio: A Key parameters for distinguishing systolic Vs diastolic dysfunction, and for managing efficacy of CHF therapy.



BENEFITS:

- Improves characterization and stratification of CV risk
- Provides a clinical tool to diagnose and manage arterial stiffening due to aging and disease
- Provides a powerful clinical tool for managing CHF patients with diastolic dysfunction
- Improves ability to optimize drug therapy by allowing direct management of the central CV parameters

UTILITY OF SPHYGMOCOR.

Master Health Check up Screening Device.

The system can be able to assess the systemic arterial stiffness and central aortic stiffness. The system will give the report whether his arterial stiffness for age is normal for his chronological age or premature stiffening has set in. Premature vascular ageing is one of the main factor influencing the cardiac morbidity and mortality.

This can be incorporated in the master check up package.

CV Risk Factors, such as:	Cause:	Which is a key mechanism driving development of all 3 CV outcomes:
High cholesterol High BP Diabetes Sleep Apnea Aging Inflammation	Stiffening of the Arterial System, and Changes in Wave Reflection	Heart Failure Stroke Heart Attack

Hypertensive Clinic:

Pulse wave analysis with the SphygmoCor system provides a non-invasive means of and evaluating the ascending aortic blood pressure waveform.

- This information is of value in improving hypertension management, as the central pressure data provided by the SphygmoCor system are critical parameters in managing these patients.
- Use of the SphygmoCor system can facilitate more effective management of isolated systolic hypertension, as well as determination of the necessity of therapy in spurious systolic hypertension of youth, “white coat hypertension”, and pseudo hypertension.

Heart Failure Clinic.

The system can measure the Ejection duration and based on this can diagnosis Systolic dysfunction and Diastolic dysfunction. Diastolic dysfunction in elderly are under diagnosed because of poor exercise tolerance in elderly are frequently confused with normal aging. The system can help the physician to reduce the heart after load and arterial stiffness by looking at central homodynamic parameter.

Diabetic Clinic.

Arterial stiffness is increased in diabetes mellitus type I and type II. Systemic arterial stiffness and central aortic stiffness are the major factors, which determine the cardiac outcome in Diabetes. Hypertension often precedes development of diabetes. SphygmoCor

can able to monitor the benefit of blood glucose level in arterial stiffness and central hemodynamic parameters.

Renal Failure.

Patient with End stage-renal failure rarely die from renal failure, but rather die from Cardiovascular disease. They show the accelerated development of arterial stiffness and drastically increased after load which can be monitor by SphygmoCor and treated effectively.

Therefore, arterial stiffness measurements are an important tool in identifying renal failure patients at risk of cardiovascular disease. The ability to identify these patients may lead to better risk stratification with earlier and more effective preventative therapy

Stroke.

Increases in central aortic systolic pressure and pulse pressure are better predictor of stroke than the peripheral systolic and pulse pressure.

Cholesterol Management.

High cholesterol levels are associated high central pulse pressures and systemic arterial and aortic stiffness, despite comparatively low peripheral blood pressures. Reduction of cholesterol causes a reduction in large artery stiffness and blood pressure¹⁴. Hence, cholesterol lowering reduces both cardiovascular and total mortality¹⁵. SphygmoCor device can able to monitor the reduction of central blood pressure and arterial stiffness.

SPHYGMOCOR MESUREMENTS.

SphygmoCor can measure the Central Aortic, Systolic pressure, Diastolic pressure, Mean pressure and pulse pressure. The system can calculate the after load and myocardial oxygen demand more accurately.

Augmentation Index: A Measure of systemic arterial stiffness and to assess the arterial ageing due to various risk factors like, Diabetes Mellitus, Hypercholesterolemia, Hypertension, End stage renal failure and ageing.

Aortic Augmentation pressure: A measure of aortic stiffness.

Ejection Duration: Gives the time the heart spends in systole and diastole. Important to diagnose the systolic heart failure from the diastolic heart failure. In Diastolic heart failure the heart Ejection duration is prolonged compromising the diastolic period and coronary perfusion pressure and blood flow to myocardium.

Sub Endocardial viability ration.

Is the measurement of cardiac reserve. Lower the ration less tolerant the patient to physical activity and more prone to develop sub Endocardial ischemia.