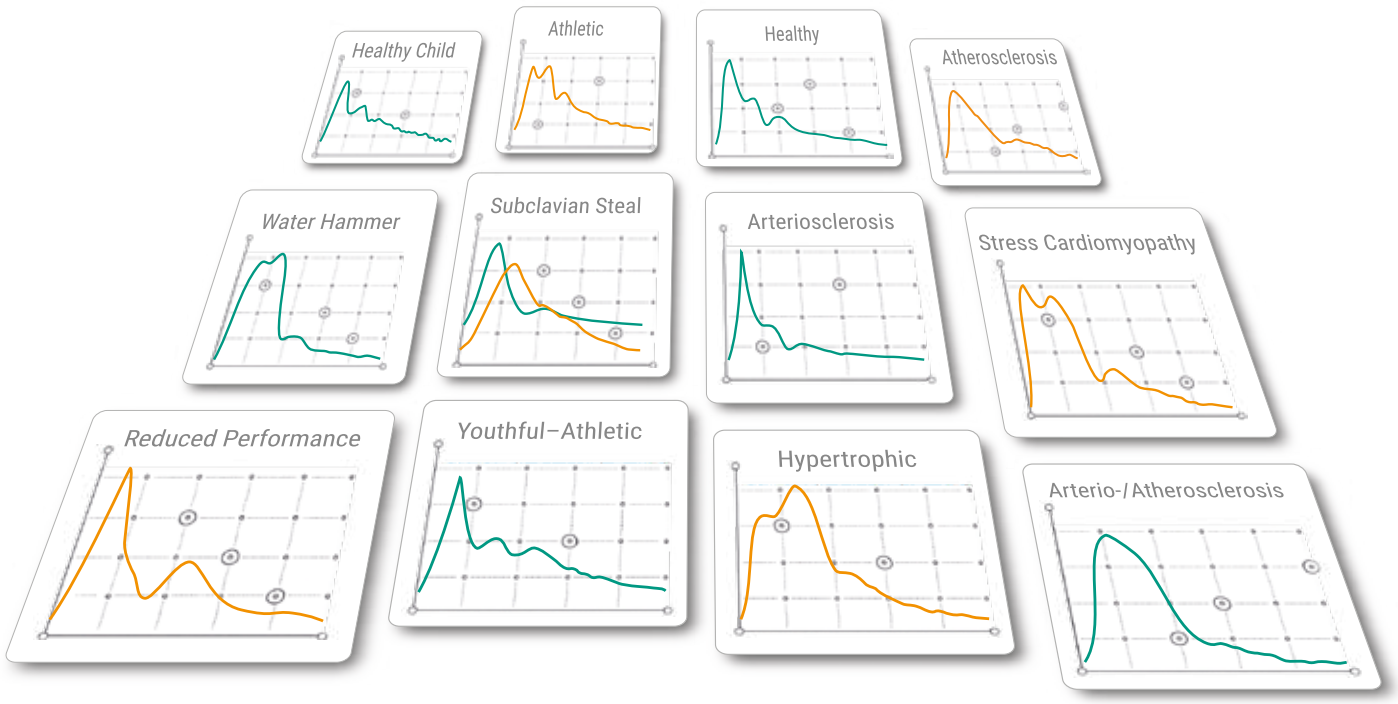
One heartbeat.
Characteristic patterns.
Specific functional insights.



VasioCore® *health*

Discover the Wisdom of the Pulse Wave

inmedIQ

The Wisdom of the Pulse Wave—Decoded.

From measurement to Cardiovascular Twin to functional insights into the heart and arteries.

What Shapes the Pulse Wave?

Every pulse wave originates in the heart—and changes as it travels through the arterial system. Along the way, it is shaped by several factors:

Cardiac Performance

The force, dynamics, volume, and timing of cardiac contraction shape the pulse wave.

Arterial Properties

Vessel elasticity, flow resistance, and blood mass inertia modify the pulse wave as it travels through the arteries.

Measurement Technology

High-quality sensor technology is essential for reproducible pulse wave recordings and precise analysis.



High-Fidelity Signals for Precise Analysis

VasioCorder® records high-resolution pulse waveforms across six channels—with a level of quality otherwise found only in invasive measurements.



The measurement is noninvasive, painless, and easy to delegate. The optimized workflow keeps staffing requirements low.

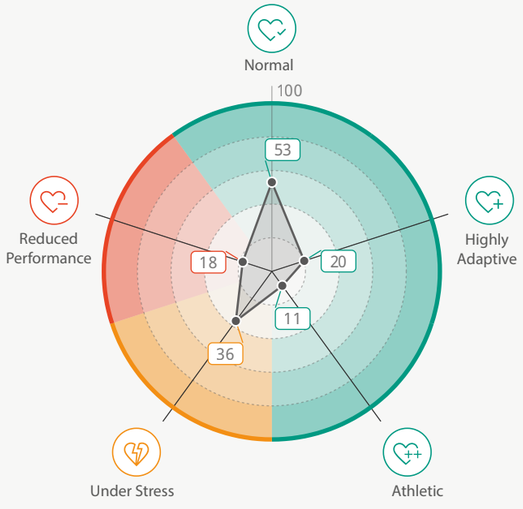
Cardiac Performance—A Multidimensional View

Cardiac performance is not black and white.

A powerful heartbeat may indicate a healthy, high-performing heart—but it may also reflect a heart that is continuously working against increased vascular load.

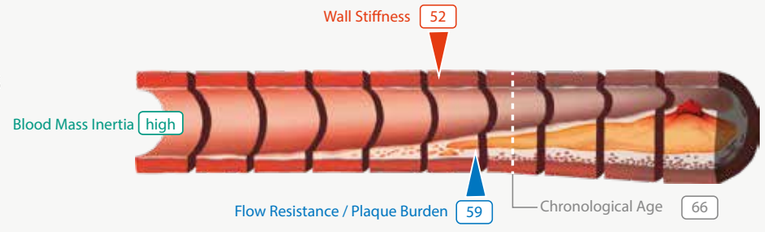
A less powerful heartbeat may indicate reduced performance—or a highly adaptive heart that operates particularly efficiently at rest.

The diagram presents cardiac function multidimensionally rather than reducing it to a single metric.



Arterial Properties—Critical for Organ Perfusion

Three physical variables determine the load on the heart and arteries.



Wall Stiffness

Shows how elastically or rigidly the arterial wall responds to the pressure pulse. Increased stiffness reduces its cushioning function and places greater strain on the vessels.

Blood Mass Inertia

Captures how readily or sluggishly blood moves through the arteries. Elevated values may result, for example, from dehydration or altered blood properties.

Flow Resistance

Describes the resistance blood must overcome in the vascular system—for example from plaque, stenoses, or altered vascular regulation. The heart compensates by raising pressure.

Changes Begin Long Before Symptoms Appear.

With VasioCore®, subtle changes in the heart and arteries no longer go unnoticed.



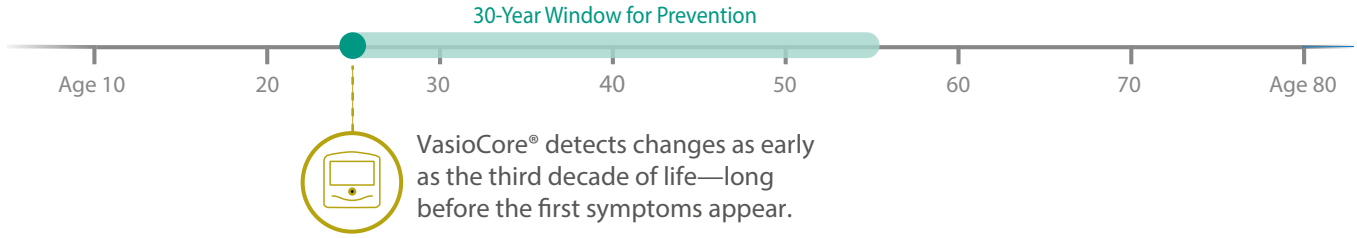
Age 14
Healthy

Age 31
Measurable Changes

Age 47
Undetected Progression

Age 59
First Noticeable Symptoms

Age 72
Heart Attack / Stroke



VasioCore® detects changes as early as the third decade of life—long before the first symptoms appear.

"Too Much, Too Late"

Heart Attacks and Strokes Are Preventable.

US physician Kevin Jon Williams calls for a fundamental shift in cardiovascular medicine: rather than merely treating the consequences of advanced atherosclerosis, we should identify and address its early signs much sooner.

His provocative argument: an atherosclerosis-related heart attack is not an unavoidable, sudden event, but the preventable end stage of vascular disease that has progressed unnoticed for many years. Instead of devoting ever greater effort to treating its consequences, medicine must intervene earlier—at a stage when the disease can still be influenced.[1]

VasioCore® follows this principle.

It reveals functional changes in the heart and arteries long before typical symptoms occur—up to 30 years before the first symptoms. This creates an opportunity to identify risks earlier, target preventive measures more precisely, and monitor changes over time.

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[1] *Williams KJ. Eradicating atherosclerotic events by targeting early subclinical disease: It is time to retire the therapeutic paradigm of "too much, too late." Arterioscler Thromb Vasc Biol. 2024; 44:48–64. doi:10.1161/ATVBAHA.123.320065.*

Non-Medical. Scientifically Grounded.

Why VasioCore® is based on robust models and traceable data.

Developed on a Scientific Foundation

For 15 years, we have translated published findings from physics, physiology, and clinical research into models and algorithms, tested them against real-world measurements, and continuously refined them across a wide range of cases. In practice, we compare our results with established methods.

VasioCore® has therefore evolved through an iterative, hypothesis-driven, and practice-tested process. All calculations and analyses are based on scientific publications—not on unsupported assumptions or speculative conclusions.

Three Examples from Our Development

The physical modeling of the human arterial tree has a long scientific tradition. As early as 1969, Nicolaas Westerhof and Abraham Noordergraaf described an electrical analog model of the human arterial system.[1]

inmediQ has substantially refined, expanded, and adapted this model. Using our patented method, the Cardiovascular Twin is calculated from measured pulse waves: a patient-specific representation of arterial hemodynamics, as reflected in these waveforms.

As early as 1969, Ewy, Rios, and Marcus reported that a pronounced dicrotic pulse, combined with low cardiac output, low stroke volume, and markedly reduced myocardial contractility, may indicate impaired cardiac function.[2] VasioCore® uses the dicrotic wave to estimate cardiac performance.

Radial dP/dt has also been investigated as a noninvasive marker of systolic performance and as a prognostic parameter in heart failure and has been incorporated into VasioCore®.[3]

Plausibility Through Age Correlation

In our analyses, the parameters wall stiffness and flow resistance/plaque burden show a very strong, sex-adjusted correlation with age. Because only a small number of cardiovascular parameters correlate with age to a similar extent, we consider this a strong indication of physiological plausibility and construct validity.

Why Non-Medical?

VasioCore® is currently not a medical device. It is a system for health optimization and longevity. This is not due to a lack of scientific foundation, but to our policy of making medical claims only when they are sufficiently supported by clinical evidence and secured through the appropriate regulatory process.

At the same time, we clearly distinguish ourselves from devices and methods whose claims are based on unsupported assumptions, nontransparent mechanisms of action, or pseudoscientific concepts.

For a system as complex as VasioCore®, classification as a medical device requires extensive clinical validation and a multi-year MDR conformity assessment process. For a highly innovative start-up such as inmediQ, this route requires substantial personnel and time resources.

Until clinical validation has been completed, we therefore deliberately refrain from making diagnostic or therapeutic claims. The extent to which findings from the Cardiovascular Twin can be applied to study participants or patients must be assessed by users in accordance with our intended purpose and under their own professional responsibility.

VasioCore® was developed with expert input from the German Heart Center Munich, Heidelberg-Mannheim University Medicine,[4] and the Department of Cardiac Surgery at University Hospital Erlangen.

References

[1] *Westerhof N et al. Analog studies of the human systemic arterial tree. J Biomech. 1969;2:121–143.*

[2] *Ewy GA, Rios JC, Marcus FI. The dicrotic arterial pulse. Circulation. 1969;39:655–661.*

[3] *Tartière JM et al. Noninvasively determined radial dP/dt is a predictor of mortality ... Am Heart J. 2008;155:758–763.*

[4] *Schumacher G, Kaden JJ, Trinkmann F. Multiple coupled resonances in the human vascular tree: refining the Westerhof model ... Journal of Applied Physiology. 2018;124(1):131–139. doi:10.1152/japplphysiol.00405.2017.*

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