# *CARDISIOGRAPHY*

***THE NEW STANDARD*** FOR CARDIAC SCREENING

STATISTICALLY SPEAKING,
***33% OF MEN'S HEARTS*** AND
***20% OF WOMEN'S HEARTS***
DO NOT FUNCTION PROPERLY.

# *CARDISIOGRAPHY*
# THE NEW STANDARD FOR CARDIAC SCREENING

## Heart disease is more deadly than all forms of cancer combined.[1]

Heart disease is especially dangerous because many of those affected have little to no symptoms. Therefore, heart diseases will often progress undetected until they become life-threatening. The sooner heart problems are detected, the more easily they can be remedied with lifestyle changes, medication, or minor procedures.  With this in mind, early detection is the topic of the future of heart medicine. Modern methods of artificial intelligence can help us start protecting our heart health earlier. Cardisiography (CSG) detects pathological patterns in the heart earlier and more precisely than any comparable examination method. This allows for those affected to quickly seek treatment and be on their way towards a healthier heart.

## Do you still rely on technology that is a century old?

In 1924, Willem Einthoven received the Nobel Prize for Medicine after inventing the electrocardiogram. Almost 100 years later, science is finally making a great leap forward in the early detection of heart disease. Thanks to 3D vectorcardiography, a patented algorithm, and the use of artificial intelligence, heart problems can be detected and treated faster than ever before.

## The future of heart health

Over 90% of all cardiac deaths could be avoided with early detection. Cardisiography (CSG) opens the door to a completely new and effective kind of prevention. Doctors can now monitor their patients' heart health and take countermeasures at the first warning signs. CSG can be integrated within the existing framework of health check-ups. Signs of an emerging or already existing heart disease can be regularly monitored.

Structural, arterial or arrhythmic irregularities can now be detected early, easily, quickly, cost-effectively and precisely. This allows doctors to accurately initiate the correct treatment. The same applies to follow-up of patients with known diseases - the success of a treatment which has been carried out can finally be regularly and non-invasively checked without much effort!

We are continuing our endeavors to greater lengths! Soon, everyone will be able to monitor their heart health at home, in real time, and on demand.

**Learn more about tomorrow's heart health today!**

# ***ECO-SYSTEM:*** PREVENTION – NETWORK

The American Heart Association recommends women start monitoring their heart health as early as 20 years old.[1] However, heart health concerns all ages and genders. The earlier heart disease is detected, the sooner it can be treated.

In 10 years, heart attacks should be a rare disease in industrialized nations. This is only possible if early detection networks are continuously expanded, and awareness is promoted by medical professionals and media outlets.

Cardisiography (CSG) helps the general practitioner quickly, easily, and safely assess the cardiovascular condition of a patient. The current diagnostic gap in the early stages of heart health can thus be completely closed. For the cardiologist, a comprehensive, detailed analysis of the CSG is available, which enables further insights into the condition of the heart. In addition, Cardisio offers expanding knowledge around the topic of heart health on cardis.io and on other social media platforms.

One of Cardisio's goals is to form a lively ecosystem of innovative and prevention-conscious doctors and medical experts. In this system, the patient is the focus and receives the optimal follow-up diagnosis or most effective treatment.

## THE ***ADVANTAGES*** FOR

### *PATIENTS*

Fast, precise, cost-effective.

Stress and risk free.

Non-invasive.

Path to diagnosis is shortened.

Unnecessary visits to specialists are avoided.

If necessary, effective treatment can be initiated at an early stage.

### *DOCTORS*

Non-invasive, performed on the patient in a resting state.

Quick results (data acquisition and results in a few minutes).

Sensitivity > 90% [3] (compared to stress ECG 45-50% [2]).

Access to state-of-the-art technology and continuous development through cloud-based deployment.

### *THE HEALTH CARE SYSTEM*

Early detection of heart disease can prevent serious and costly illnesses.

Optimized diagnostic path as a result of early diagnosis at the GP.

Integration in telemedicine concept.

Effective and thus efficient use of the diagnostic pathways.

# ***WHAT IS DIFFERENT*** ABOUT CARDISIOGRAPHY

The experts at Cardisio use proven medical practices and state-of-the-art technical methods to create a unique and modern „early warning system" for heart disease.

Cardisiography (CSG) measures the electrical activities of the heart. By placing an additional electrode on the back, a vectorcardiogram (3D analysis of the heart's electrical activities) is generated in a very short time. With each heartbeat, 290 parameters including but not limited to the electrical potential, direction of excitation spread in space, angles, and areas are calculated and evaluated using artificial intelligence in the Cardisio-algorithm. The AI-algorithm is continuously trained with confirmed findings, improving its accuracy.

CSG is as easy to use as an ECG, but measures the heart muscle in three dimensions. The evaluation quickly provides clarity on whether the heart is diseased or if a heart attack could be imminent.

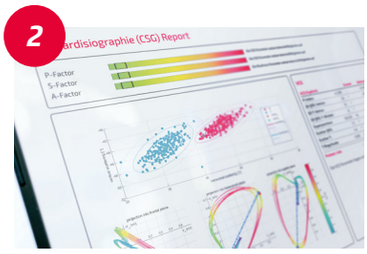
# ***THE PROCEDURE*** OF A CARDISIOGRAPHY

1

### ***SIGNAL ACQUISITION*** FOR 4 MINUTES

Five electrodes are attached to the body for signal acquisition. The patient sits/lies quietly and waits for four minutes. During this time, other examinations can be performed, such as measuring blood pressure.

2




### ***QUICK RESULTS***

The recorded parameters are immediately transmitted to the Cardisio server and processed into a report using an AI algorithm.

3

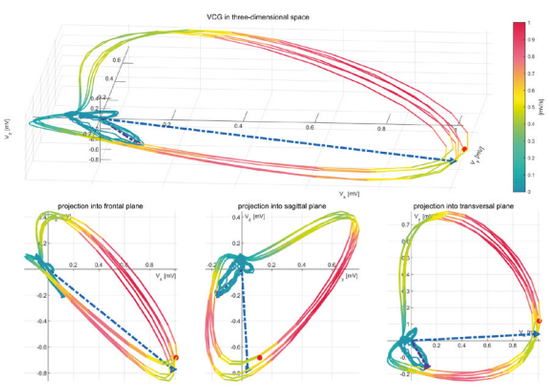
### ***FOLLOW-UP***

A medical professional discusses the results with the patient and initiates further steps if necessary. The patient receives a printout of the report. This is also stored in the patient's medical record.

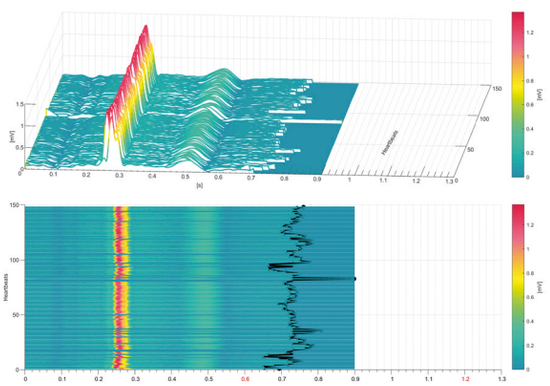
# ***VECTORCARDIOGRAPHY*** AS A BASIS OF CSG

The vectorcardiography was not historically used as a routine clinical method. It was only used in cardiology for clarifying specific questions because the vector information could only be interpreted by trained experts.

### VECTORCARDIOGRAM (VCG)



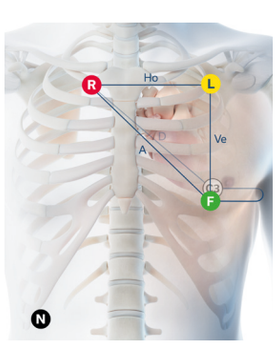

### TEMPORALE HEARTBEAT ANALYSIS (VCGM)




This is changing with the introduction of Cardisiography (CSG). Determining whether a heart is healthy or diseased is now also possible for non-experts with the help of artificial intelligence (AI).

With conventional diagnostics, it can take several months for patients to find out how their heart is doing. Now results can be evaluated and clarified within a few days and, if necessary, treatment can be initiated.

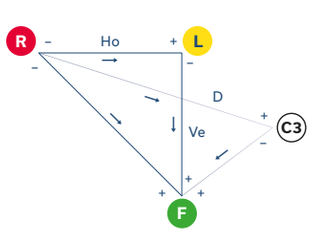
### LEAD PLACEMENT, DERIVATIONS, AND CALCULATIONS OF CARDISIOGRAPHY



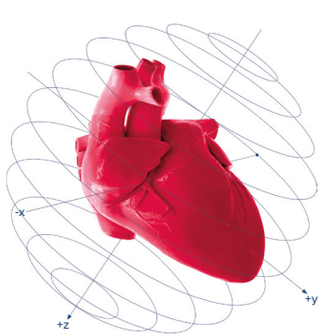

*Electrode placement*

**x** = D . cos 45° - I
**y** = D . sin 45° + A
**z** = sin 45° (Ve - Ho)

*Axis calculation formulas*




*Arrangement and polarization of derivations*




*Heart position in 3D space*

# UNDERSTANDING THE ***"DIAGNOSTIC GAP"***

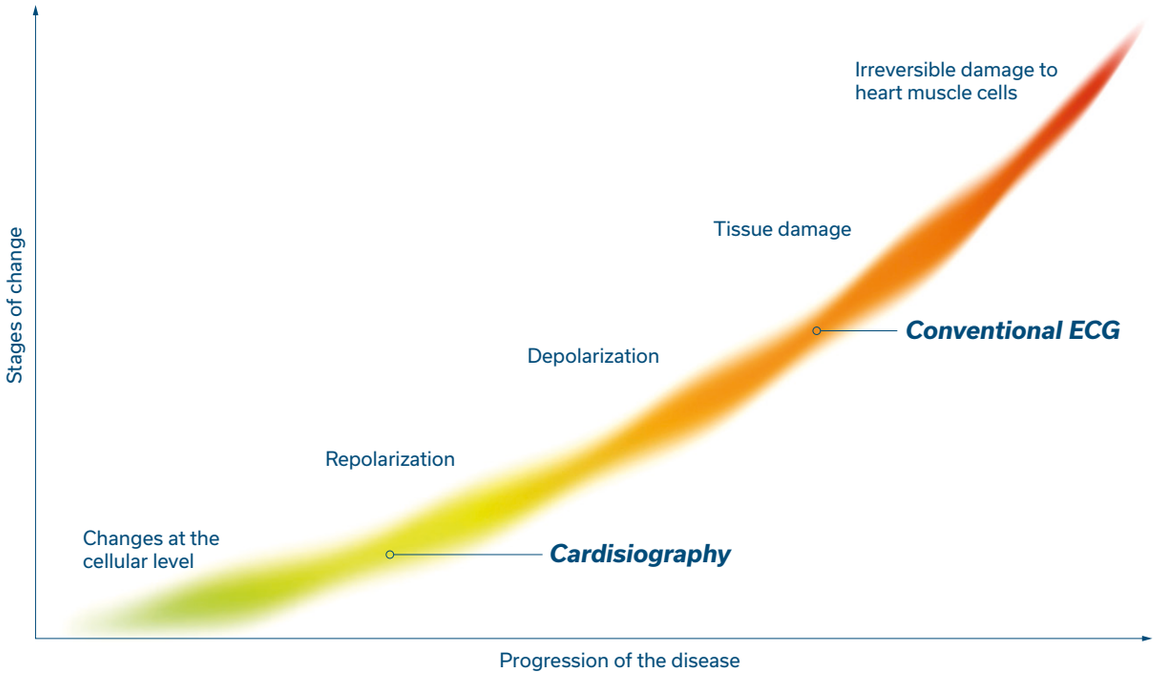
The vast majority of patients with heart disease have little to no symptoms at onset. Only once the disease has progressed significantly can life-threatening problems occur, such as a heart attack. This appears to occur suddenly, but the truth is that the affected heart is almost always sick, and the patient was unaware due to a lack of symptoms.

Until now, doctors have only had limited technical capabilities to detect structural or ischemic heart diseases in the asymptomatic stage. Old techniques, such as the ECG or the stress ECG, are only partially informative in predicting a relevant disturbance of blood flow.[2]

More helpful technologies in this area, such as CT or MRI, are complex and too expensive to use prophylactically. Cardisiography (CSG) changes this.

Designed as a decision-making aid for the early diagnostic phase, it was specifically developed for early detection of heart diseases that do not show up in conventional ECG exams.

## DETECTION OF DAMAGE TO HEART CELLS



# ***UNIQUE FEATURES*** OF CARDISIOGRAPHY (CSG)

1. Significantly more accurate and reliable than current screening procedures.
2. Risk-free and non-invasive.
3. Easy and quick, taking only a few minutes to perform.
4. Examiner-independent and can be performed by trained personnel after a brief orientation, so the presence of a doctor is not required.
5. Cost-effective.
6. Can be performed anytime and anywhere.

Under no circumstances is CSG a substitute for diagnosis, care, advice or treatment by a medically trained professional. The results are for informational purposes only and are intended to provide guidance to the physician.

CSG is not intended to be used for decision-making in acute conditions or for real-time monitoring of vital functions. Moreover, it never interferes with existing, guideline-compliant diagnostic paths or therapeutic measures.

# THE ***ADVANTAGES*** OF THE CARDISIOGRAPHY

- **Non-invasive** and performed on the patient in a **resting state.**
- Fast results, within 10 minutes.
- **Sensitivity > 90%** [3] (compared to stress ECG 45-50% [2]).
- CSG's accuracy is confirmed and backed by numerous scientific studies.[3]
- Developed in Germany.
- Billing secured through **GOÄ Number** 657 and A658 (93,59 € per application).

# ABOUT ***CARDISIO***

Cardisio GmbH, founded in 2016 and headquartered in Frankfurt am Main, is committed to the early detection of heart disease. Cardisiography (CSG) is a procedure that quickly, precisely and non-invasively detects pathological patterns that are indicative of heart disease. Cardisiography is now used in a multitude of practices and clinics, paving the way for simple and reliable early heart disease detection. In addition to its headquarters, Cardisio has a location in Berlin, as well as many internationally active sales partners in various countries.

## Vision

In Cardisio's future, everyone has access to a scientifically proven, highly accurate and non-invasive screening procedure for heart disease that is easy to use, exam-independent and affordable. We aim to reduce cardiac deaths, complications and healthcare costs by providing more effective heart exams globally.

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VISIT US ONLINE: ***CARDIS.IO***

# *SOURCES*


1 **American Heart Association:** Common Myths About Heart Disease,
Link: *goredforwomen.org/en/about-heart-disease-in-women/facts/common-myths-about-heart-disease*
Stand 11.8.2021.

2 **DGK-Leitlinien:** Management der stabilen koronaren Herzkrankheit (KHK), 2015, Seite 16.5.

3 **Braun T, Spiliopoulos S, Veltman C et al:** Detection of myocardial ischemia due to clinically asymptomatic coronary artery stenosis at rest using supervised artificial intelligence-enabled vectorcardiography – A five-fold cross validation of accuracy, Journal of Electrocardiology, Volume 59, 2020, Pages 100-105.

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