

Visualizing Cardio-Respiratory interactions by a new innovative continuous monitoring InterCaRe technology

Breathing affects the cardiovascular system and these interactions are used to evaluate clinical conditions.

Current monitoring and signals visualization have important limitations.

Current methods of monitoring do not fully explain the cyclic functional change on different aspects of right and left ventricle along the breath cycle. Moreover, current algorithms used for the integration of signals measurements in clinical monitoring devices are affected by the regularity and intensity of breathing.

Severe and acute patients at ICU are being continuously monitored. They have a high degree of complexity and monitoring analysis of several variables simultaneously is essential to have real time information about their situation for decision-making in order to avoid severe consequences.

Evaluation of patient's situation and best treatment to use is done in short time and relies on the physician criteria, knowledge and experience.

Improving the description of signals' respiratory-cardiac interaction and allowing intervention in response prediction



Our method builds a highly descriptive waveform of variation of hemodynamic variables along breathing. The application of analytic techniques on this waveform allows this tool to quantify and describe these respiratory and circulatory systems interactions with high accuracy in a clear way and to decide best treatment, or predict response to a particular intervention for a patient in a particular situation, without limitations of patient condition.

It offers continuous monitoring of new parameters from signals already monitored, providing a revolutionary concept in patient monitoring: evaluation of cardiovascular and respiratory systems as a unit and moving therefore functional monitoring to a new scenario in clinical practice and patient's management in and out of ICU (i.e. for hemodynamic signals analysis in respiratory or cardiovascular chronic pathologies).

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Clinical Value Proposition

A revolutionary technology, for continuous functional monitoring devices, that evaluates cardiovascular and respiratory systems as a unit. It provides doctors with a new high accurate tool of continuous functional management of patients (in and out of ICU) for treatment decision-making, and new parameters for pleural pressure and fluids response prediction without the use of any other invasive device.

The technology works also in patients with respiratory or cardiac arrhythmias.

Patients Value Proposition

Tool for "in situ" continuous evaluation of cardiovascular state of patients and an opportunity to accurately decide on their best-adjusted treatment for their current situation.

Product

InterCaRe tool. Implemented technology for translation, treatment and visualization of signals from current monitoring devices into new data for clinical use.

Market introduction

Estimated time to market 2- 3 years.

Scientific and Clinician Team

- Multidisciplinary team of ICU clinicians and researchers of several disciplines. Experts in cardiovascular and respiratory physiology, imaging and continuous signals waveforms analysis and its use in clinics.
- 100% owners of technology.
- Patent covering method, apparatus and use for signals analysis
- Technical validation of pleural pressure monitoring and fluids responsiveness performed with data from patients. Current validation in the most prevalent clinical scenarios.

InterCaRe tool for hemodynamic continuous monitoring

Licensing Opportunity

After preclinical validation of the tool, CIBER offers a License to Partners to use all IP and Know-How to adapt technology to their monitoring devices and commercialize InterCaRe.

The first target market is **Hospital Intensive Care Units**. A bigger market in cardiovascular and primary healthcare is expected in providing new parameters monitoring data for the use of most prevalent acute/chronic respiratory /cardiovascular diseases.

Target Product Profile

Label A tool to provide highly accurate continuous functional monitoring of new cardiovascular parameters, from signals obtained from current monitoring devices.

Accuracy Higher than current methods.

Pricing: Current monitoring devices have a current market of 708,8M€. This tool will be used together with current devices but offering new data to medical doctors from same signals and opening a new market for vascular function monitoring for acute/chronic, respiratory/cardiovascular diseases.

Key Economical Considerations

- Region. Same as current monitoring devices.
- Use per year. Only for ICU monitoring 42% of UCI admissions around **1.2M patients/year** (USA, Europe, Japan). Broader market for non-ICU patients.
- Reduction of hospitalization costs (1800€/day hospitalization/ patient).
- Reduction of 18-46% mortality.

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The InterCaRe tool for hemodynamic prediction monitoring

The tool consists in the automatic and continuous building of a highly descriptive waveform of variation of hemodynamic variables along breathing. It allows the **quantification of respiratory and circulatory systems interactions**. The continuous visualization and monitoring of **new parameters** brings doctors new simultaneous information to decide best treatment, or predict response of a patient. Patients with hemodynamic instability or respiratory or cardiac arrhythmia will surely benefit from this analysis.

In particular the tool can: **Estimate the pleural pressure** (important to adjust mechanical ventilation); **and fluid administration** (main therapy in hemodynamic instability); **Evaluate left and right ventricle function** (several diseases with dysfunction are life threatening); **and vascular function** (in acute/chronic respiratory/cardiovascular diseases); **Monitor vasoactive drugs and vascular function in dosage titration of patients** (such as the ones with cardiac insufficiency).

IP and Know How Patent under PCT application. Particular adaptations of the technology for to estimation needs are under *know how* protection.

Easy adoption The tool is easy to implement within existing monitoring devices used in clinics. No adoption hurdles are expected in its use by clinicians, due to its easy visualization.

	Clinical Value	Economic Value
Patient	Better control of his current health situation and better-directed treatment. Survival increase, complications reduction	Treatment and family hospitalization costs reduction.
Clinician	Best option for functional continuous monitoring. Faster and easier treatment decision-making. Reduction for complications and deaths. Higher accuracy of fluid response prediction. Higher accuracy of pleural pressure without any invasive technique. Data available even with arrhythmic cardiac or respiratory frequencies.	Reduced risk of complications and deaths and associated costs. Reduction in secondary effects, hospital or UCI stays and specialist controls. Increased chance of quicker and more correct treatment adoption.
Monitoring devices companies	Competitive value for offering new clinical values to final costumers.	Broader market volume due to non ICU patients
Health Care ("HC")	Reductions of 18-46% mortality in ICU. Reduction of very long hospitalizations. Better Control of vascular or respiratory treatments.	Hospitalization costs reduction. Quicker and more directed treatment decision.