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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**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**

<table>
<thead>
<tr>
<th>Label</th>
<th>A tool to provide highly accurate continuous functional monitoring of new cardiovascular parameters, from signals obtained from current monitoring devices.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>Higher than current methods.</td>
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</table>

**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.

**Clinical Value**

- Better control of his current health situation and better-directed treatment.
- Survival increase, complications reduction

**Economic Value**

- 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.

**Monitoring devices companies**

- Competitive value for offering new clinical values to final customers.

**Health Care (“HC”)**

- Reductions of 18-46% mortality in ICU.
- Reduction of very long hospitalizations.
- Better Control of vascular or respiratory treatments.

**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.

**Licensing Opportunity**

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).

**Clinical Value**

- 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.

**Economic Value**

- 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 customers.

**Health Care (“HC”)**

- Reductions of 18-46% mortality in ICU.
- Reduction of very long hospitalizations.
- Better Control of vascular or respiratory treatments.

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