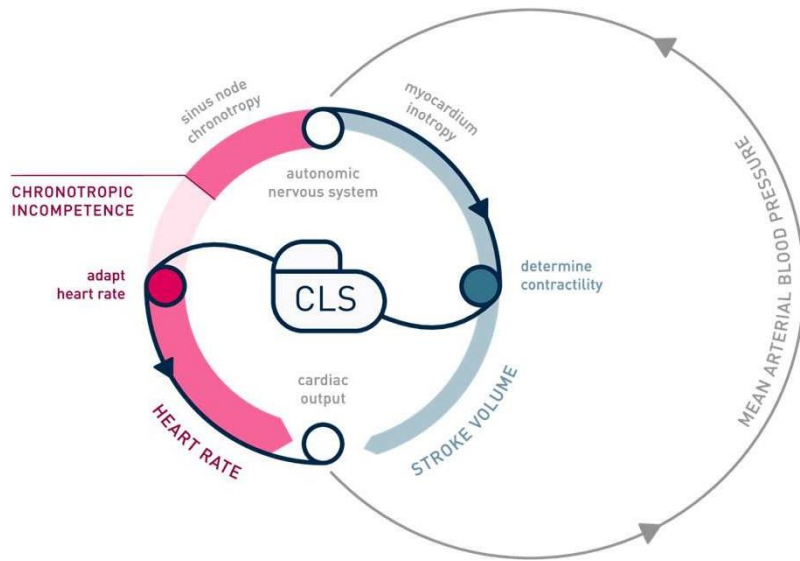


CLS and Heart Failure Therapy folder



Closed Loop Stimulation & Heart Failure Therapy folder

- 1 Jorde UP et al.; European Journal of Heart Failure; 10 (2008) 96–101.
- 2 Garcia LI et al.; Chronotropic incompetence is an independent predictor of mortality in patients with advanced CHF; J Am Coll Cardiol 2009; 53: A194.
- 3 Peter H. Brubaker, et al.; Chronotropic Incompetence – Causes, Consequences, and Management; Circulation; 2011; 123: 1010–1020.
- 4 Tse HF et al.; The incremental benefit of rate-adaptive pacing on exercise performance during cardiac resynchronization therapy; J Am Coll Cardiol 2005; 46: 2292–7.
- 5 Maass AH; Importance of heart rate during exercise for response to cardiac resynchronization therapy. J Cardiovasc Electrophysiol 2009; 20: 773–80
- 6 Sims D. B. et al.; Rate responsive pacing using cardiac resynchronisation therapy in patients with chronotropic incompetence and chronic heart failure. Europace 2011
- 7 Beliaev O.V. et al.; Heart Rate Variability over 24 Hours – Closed Loop Stimulation and Motion-Sensor Pacemakers Compared with Healthy Control Group; Prog. Biomedical Res. 1999; Vol. 4; 146–148
- 8 Wojciechowski D et al.; Clinical Results of Contractility-Based Closed Loop Stimulation in Patients Treated with Beta-Blockers; Prog Biomed Res 2001; Vol. 6: 303–307.

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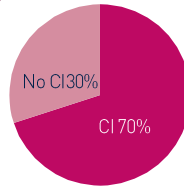
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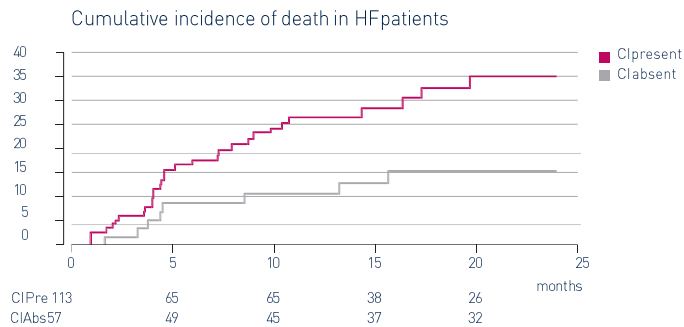
70% of CHF patients have chronotropic incompetence (CI)

CI occurs in over 70% of advanced systolic CHF patients irrespective of beta-blocker use¹

- CI is an independent predictor of mortality.²
- HF patients need an appropriate increase in HR to compensate for their inadequate stroke volume during physical exertion.^{3,4}



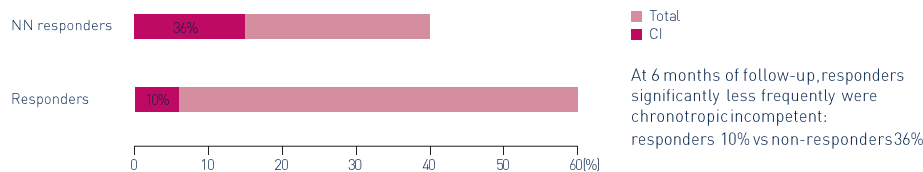
CI increases the risk of death



CI is associated with CRT non-response

CI is a predictor for non-response to CRT in patients in sinus rhythm.⁵

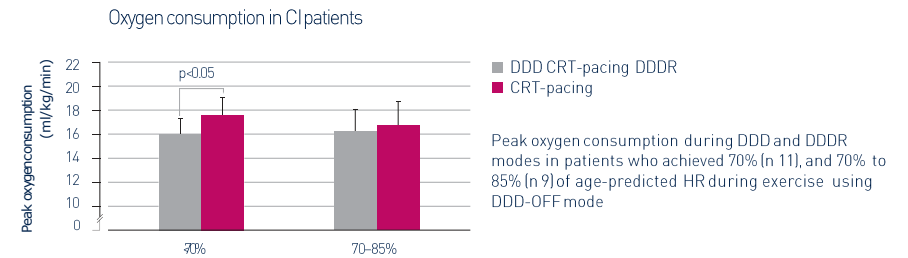
Chronotropic Incompetence in non-responders HF patients



Physiological rate with CLS

Appropriate rate is the key

20% increase in Vmax can be achieved using an appropriate rate adaptive pacing in HF patients with severe CI (< 70% HR)⁶



CLS makes the difference

- CLS is not based on movement of the patient, which might be very limited in patients with severe CHF.¹
- CLS is the only rate-adapting algorithm reacting both on physical and mental stress.
- CLS is not influenced by the patients' drug therapy.⁷

