



For Physicians.
For Patients.

Achieving Rate Adaption.
Supporting Physiological Pacing.

What is CLS?

BIOTRONIK Closed Loop Stimulation (CLS) technology is based on relative changes in heart contractility provided by the ANS. The CLS algorithm uses changes in impedance measurements taken from the lead tip. CLS achieves physiological rate response modulation that reacts to the patient's physical activity, mental stress and haemodynamic changes.



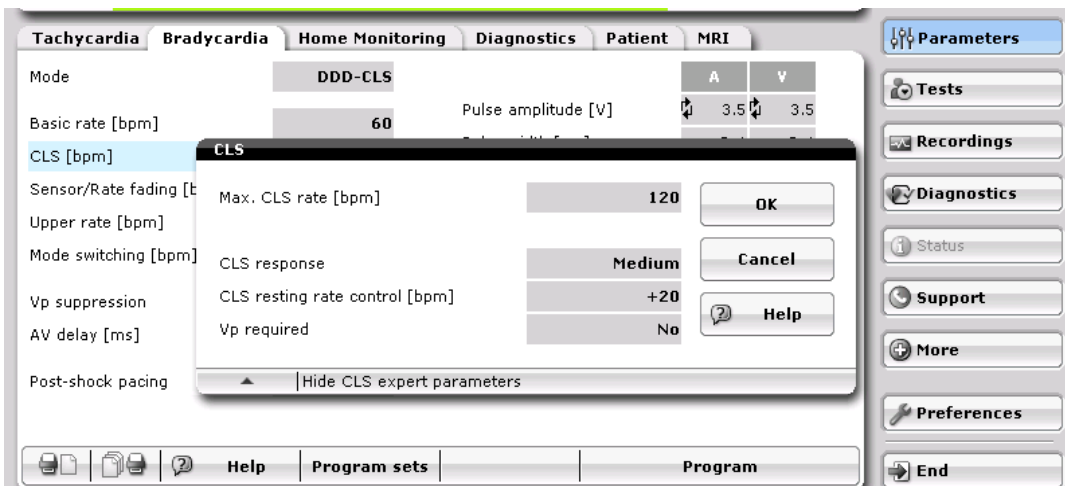
Pre-ejection
Smaller fraction of myocardium = low Ω



Ejection
Larger fraction of myocardium = high Ω

Click on this link to listen to these UK Cardiac specialists on our BIOTRONIK YouTube channel ([click link](#)).

The World's Only Rate Adaptation System that Reacts to Physical and Mental Stress!



Simple to find on the Renamic programmer. Bradycardia parameters, under **CLS**.



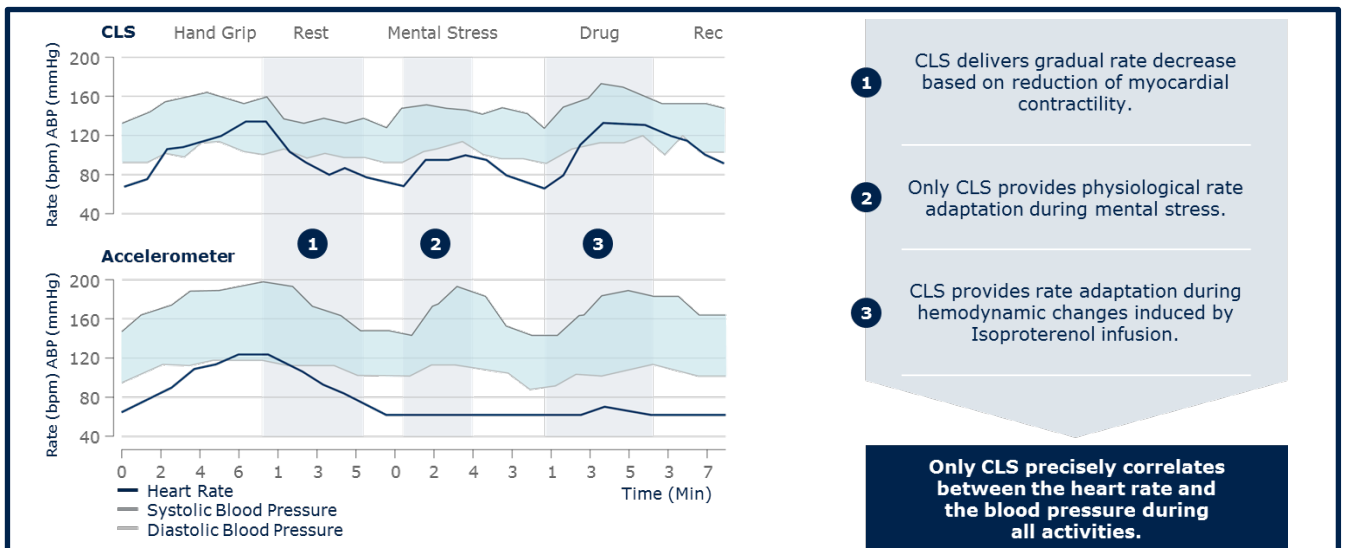
For Physicians.
For Patients.

Unique Rate Response.
In All Situations. **For All Needs.**

Which patients is CLS suitable for?

CLS functionality is **not** limited to brady-related syncope patients... It's a fantastic rate response on its own! Give your patients the response **they need** – not only when exercising but during emotional stress too! What does **your** heart rate do when you sit an exam, get busy at work or when you're watching your favourite sport!

What about **CLS in HF device** patients? Bailey presented data collected over 18 months, which showed NYHA class & EF significantly improved for those patients with EF <40% & signs of CHF – [read an older article from Coronary Heart here.](#)



What evidence supports CLS?

In 2014, Sumiyoshi summarised the pacing was helpful for VVS and that “DDD pacing with CLS seems to be a promising algorithm”

The INVASY study saw 82% of VSS patients had NO MORE SYNCOPE when programmed with CLS. More recently, the SPAIN trial (March 2017 ACC) demonstrated impressive clinical results. Baron-Esquivias et al recruited 54 patients with a history of syncope, aged ≥40yrs from 12 centers, and randomly assigned them to DDD-CLS or DDI. After 12 months, patients were crossed over. 72% had a reduction of >50% in syncope episodes within the first year, **but syncope recurred after they crossed over to the DDI**

group. Baron-Esquivias currently uses DDD-CLS pacing to treat patients with recurrent syncope in his own practice and is looking forward to the results of the ongoing BioSync CLS trial, after which, he expects that international guidelines will be changed to recommend DDD-CLS pacing in these patients.

