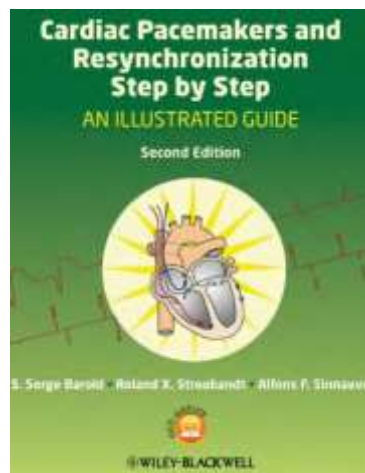
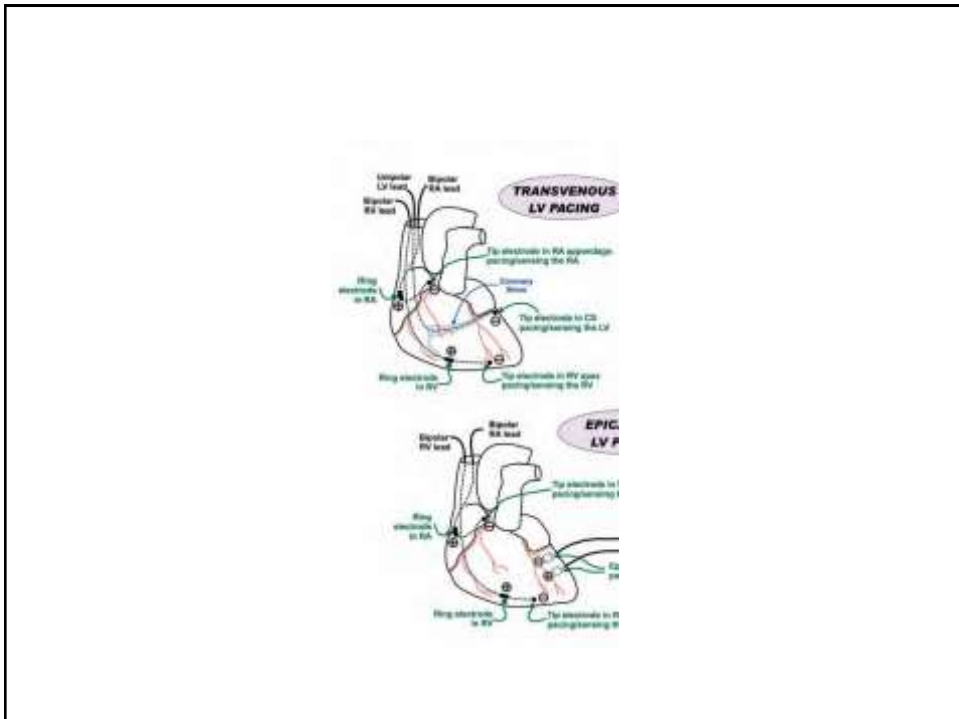
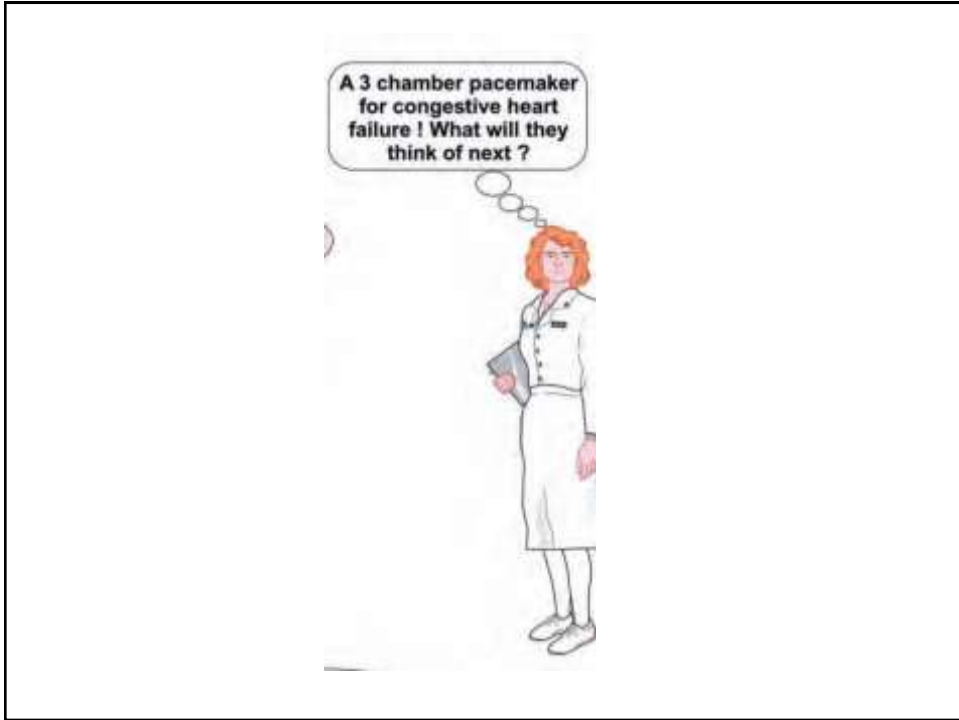


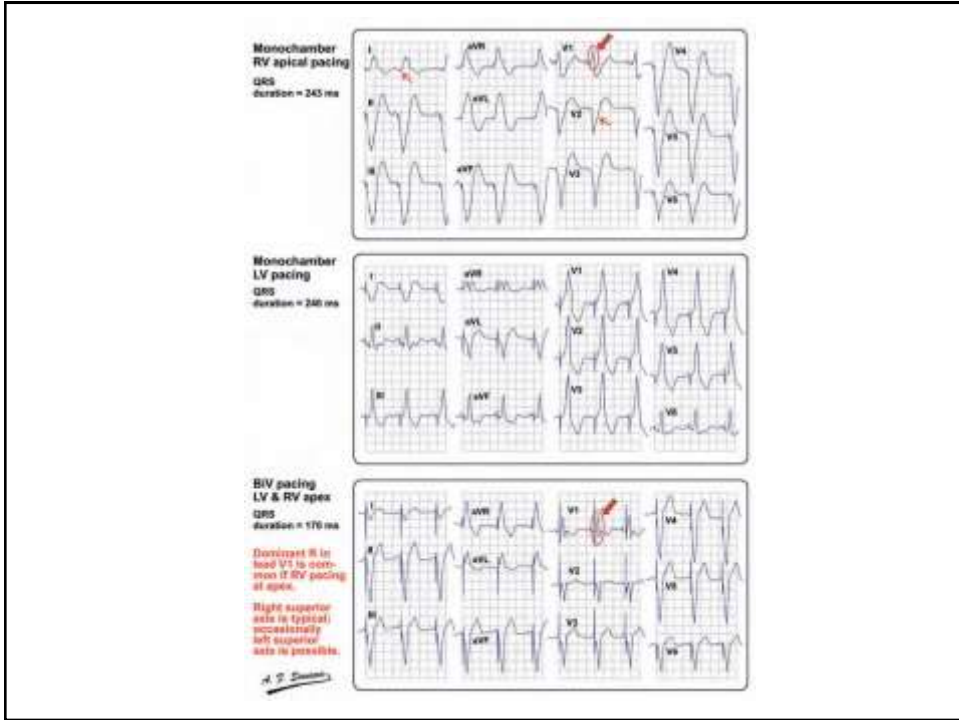
CRT PROGRAMMING

Mohamed Bayoumi
Tanta University

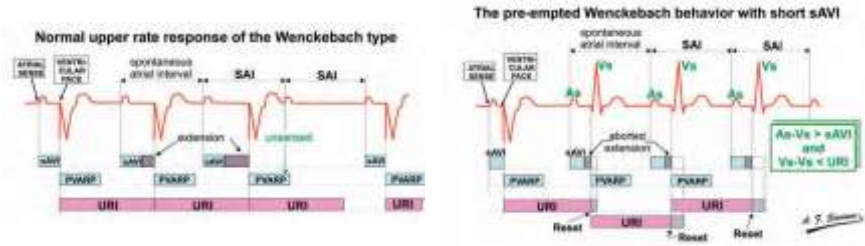
2010







CRT DILEMMA

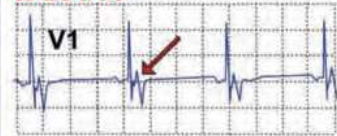


Basic programming

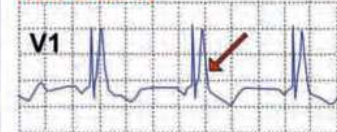
- Allow AS, with high tracking rate
- Short PVARP
- Target high Biv percentage, treat AF, PVCs
- LV repositioning (programmable)
- 12 lead ECG evaluation during programming
- AV and VV delay

FUSION

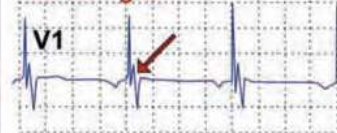
BiV pacing with Fusion
Initial ECG ; As-Vp = 100ms
QRS narrowing too good to be true

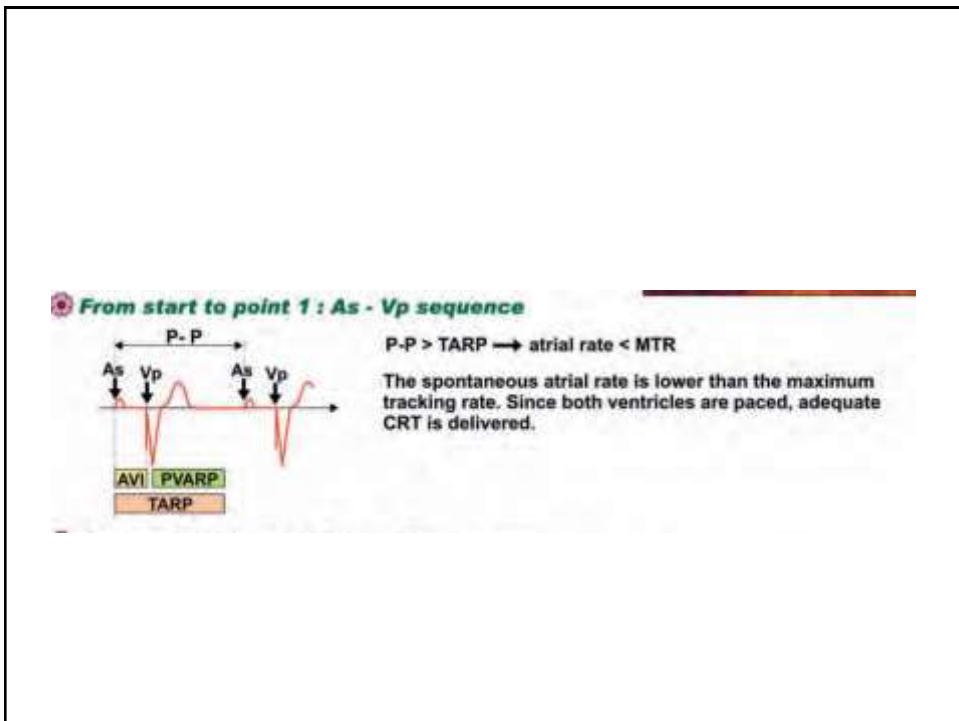
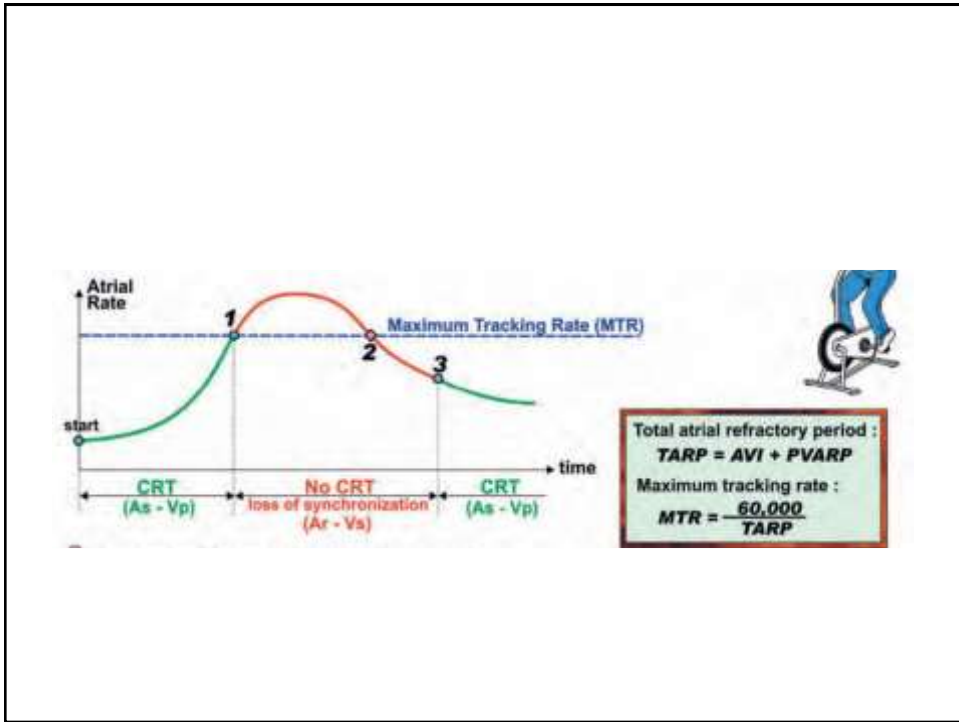


BiV pacing ; As-Vp = 100ms
Recorded some time later
Now a tall R

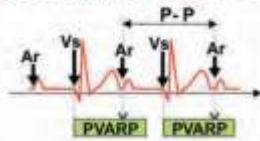


BiV pacing ; As-Vp = 130ms
Fusion again !





④ From point 1 to point 2 : Ar - Vs sequence

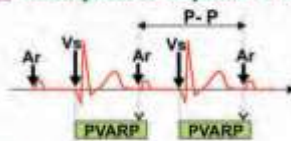


$P-P < TARP \rightarrow$ atrial rate $>$ MTR

As soon as the atrial rate exceeds the MTR, the P wave falls within the PVARP and ventricular resynchronization is lost.

Note : $(Ar - Vs) > AVI (= As - Vp)$

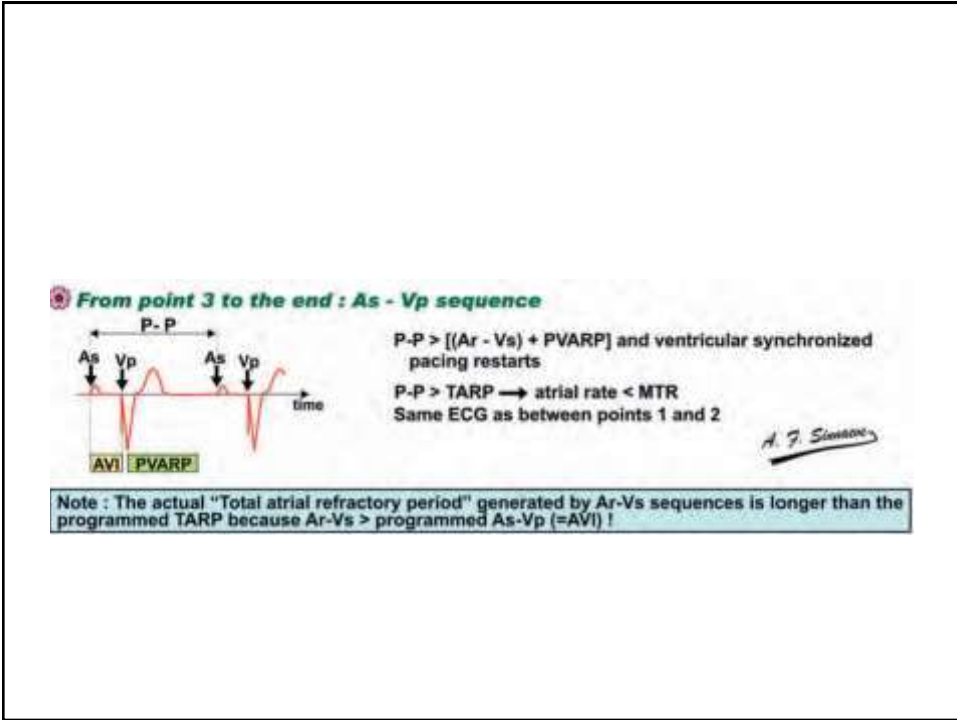
⑤ From point 2 to point 3 : Ar - Vs sequence



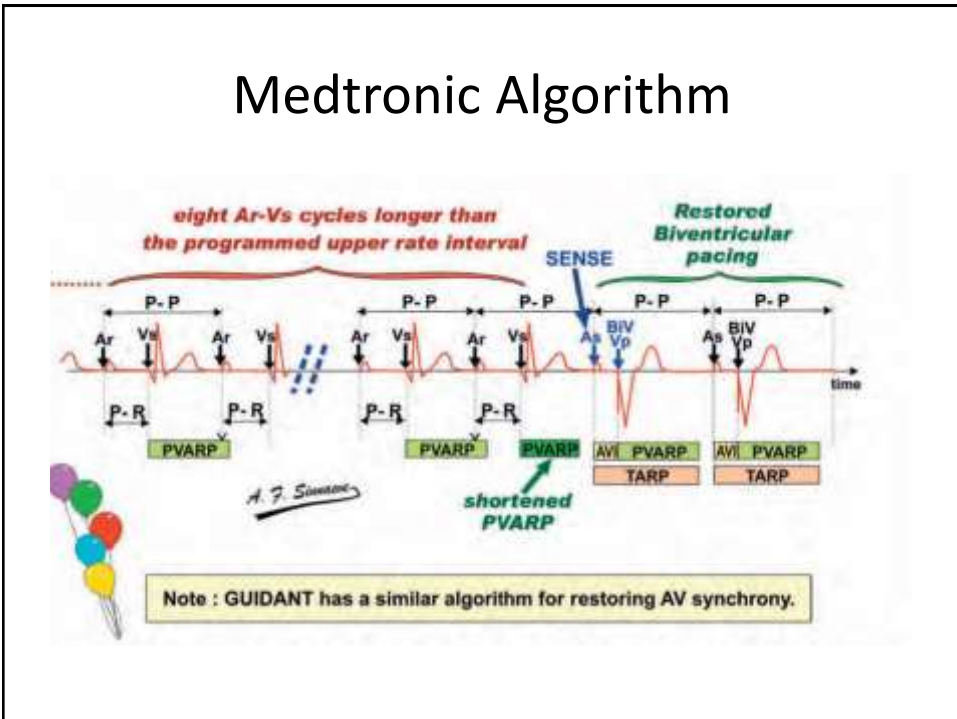
$P-P > TARP \rightarrow$ atrial rate $<$ MTR

The timing cycles of the device force the continuation of the Ar - Vs sequences as long as $P-P < [(Ar - Vs) + PVARP]$

At point 3 the atrial rate is decreased far enough as to make $P-P = [(Ar - Vs) + PVARP]$



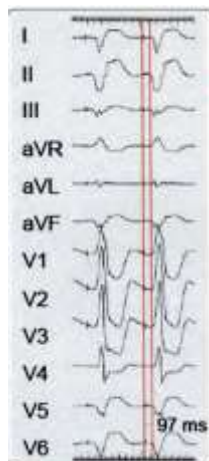
Medtronic Algorithm



The answer to our problems

- AVN ABLATION

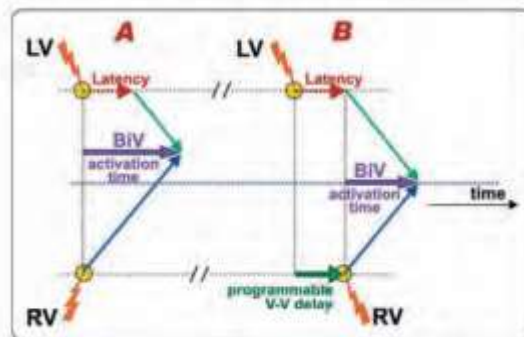
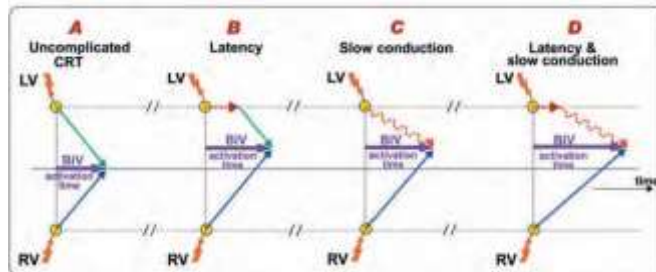
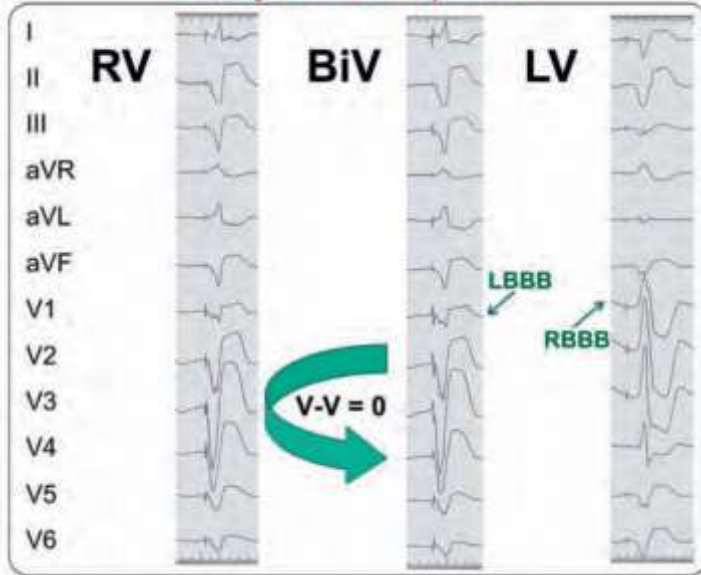
Latency



An isoelectric onset of the QRS complex in one or only a few leads can mimic latency. Consequently the demonstration of latency requires a 12-lead ECG taken at fast speed for diagnosis



Marked increase in LV latency. RV and BiV pacing produce virtually identical ECG patterns.



Phrenic nerve stimulation

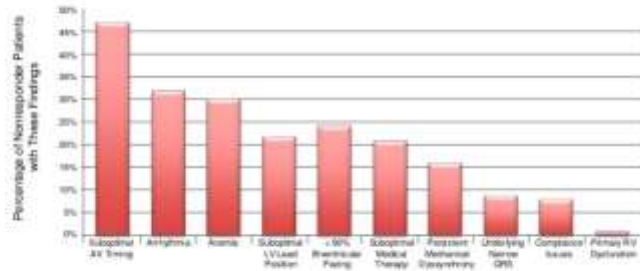
- During implantation
- Electrical repositioning

Still

- NO RESPONSE!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

Before you come to me for help.....

There Are Multiple Causes of Non-Response to CRT



 Duke Heart Center

Mullens W, et al. J Am Coll Cardiol. 2009;53:765-773.

And now.....

- Echo guided optimization