Pacemaker: Electrodes

Functionality:

no

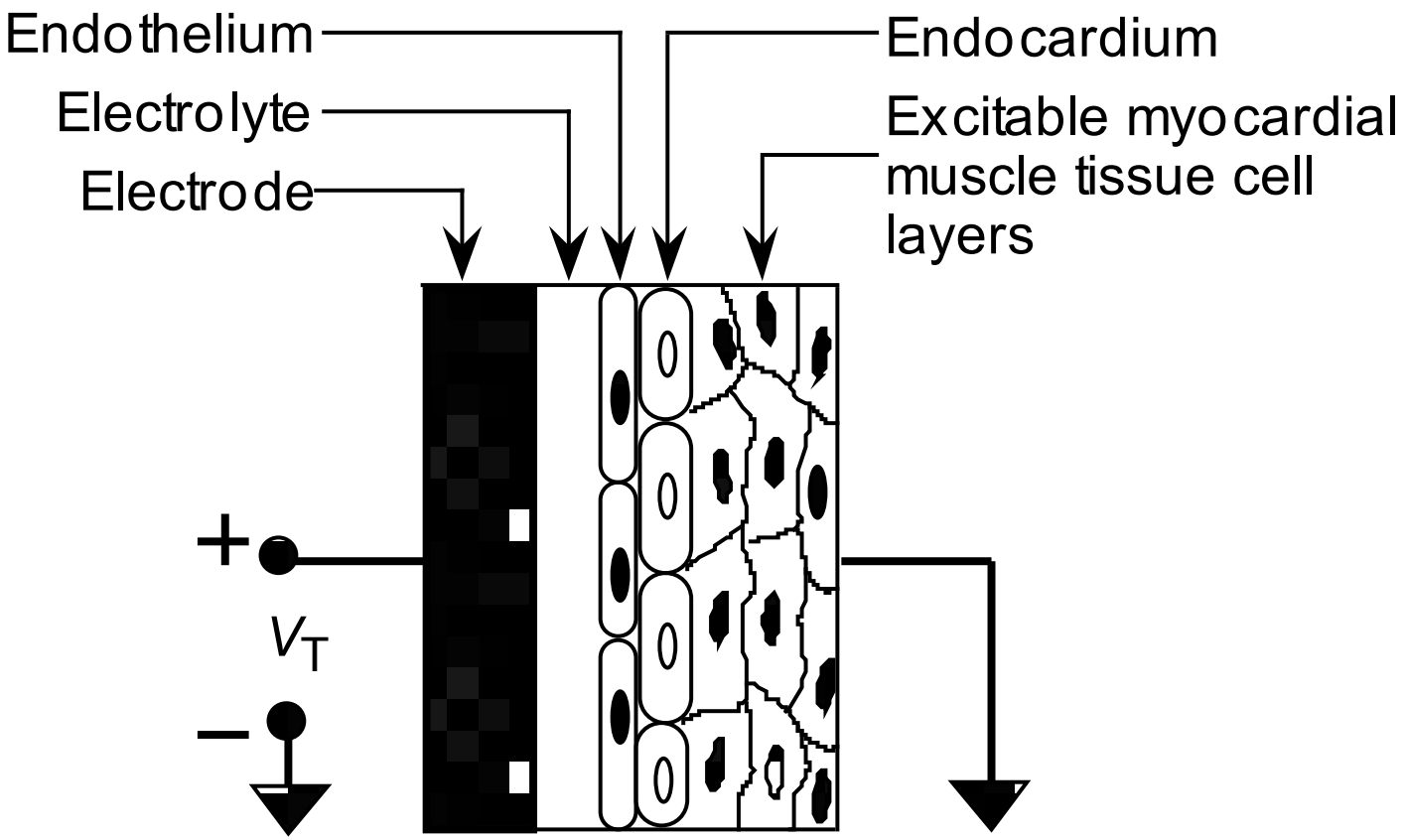
- application of electrical stimulus, supplied by the pulse generator, to the cardiac tissue (myocardium)
- sensor of the electrical potential of the tissue, to be transferred to the central unit

Figures of merit:

- safety in the cardiac stimulation of the patient
- minimization of the energy lost in the stimulation
- biocompatibility
- dimensions, ease of implantation and management

Interface electrode-myocardium

fast, equivalent to what already seen. ofc also biocompatilibty issues.



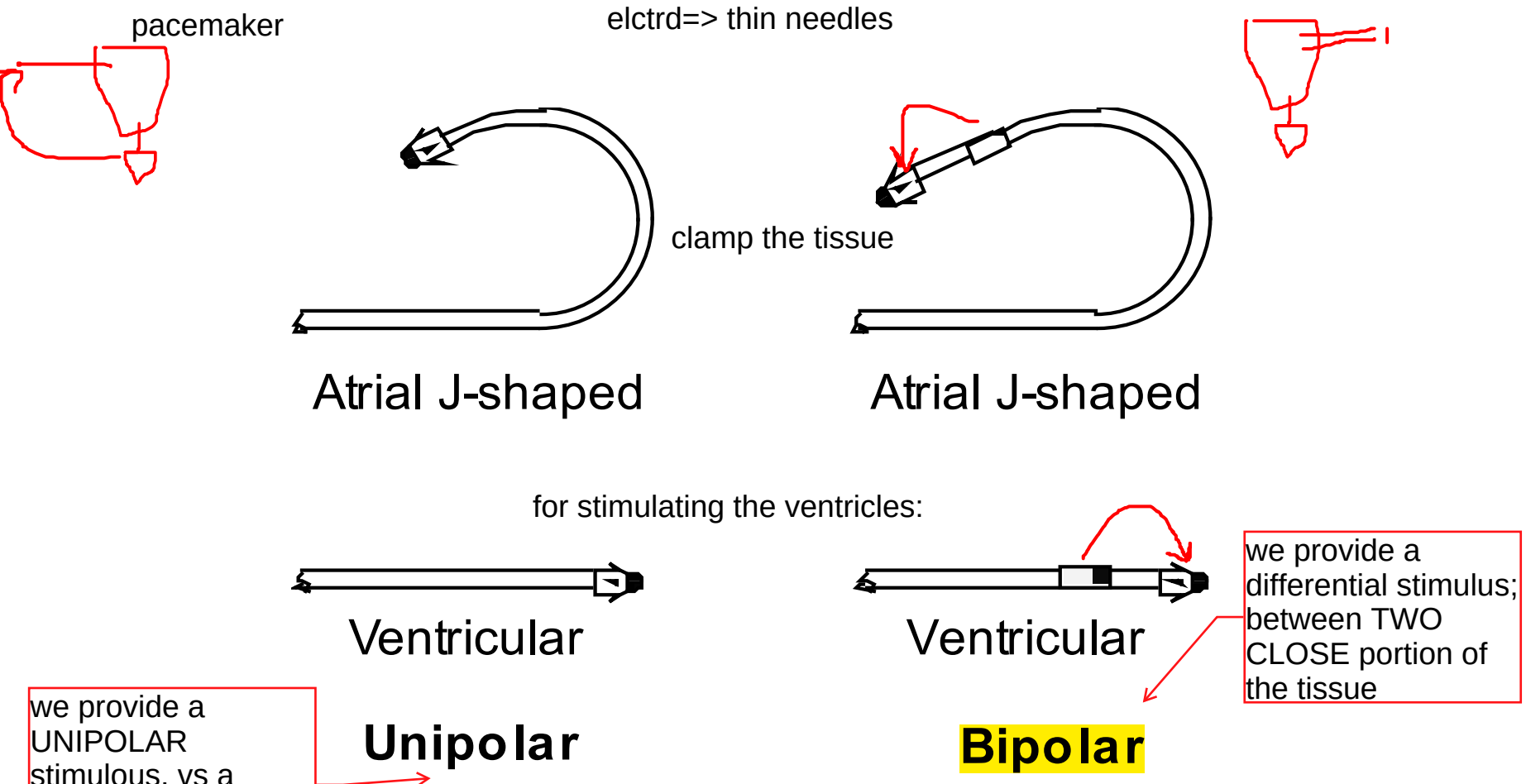
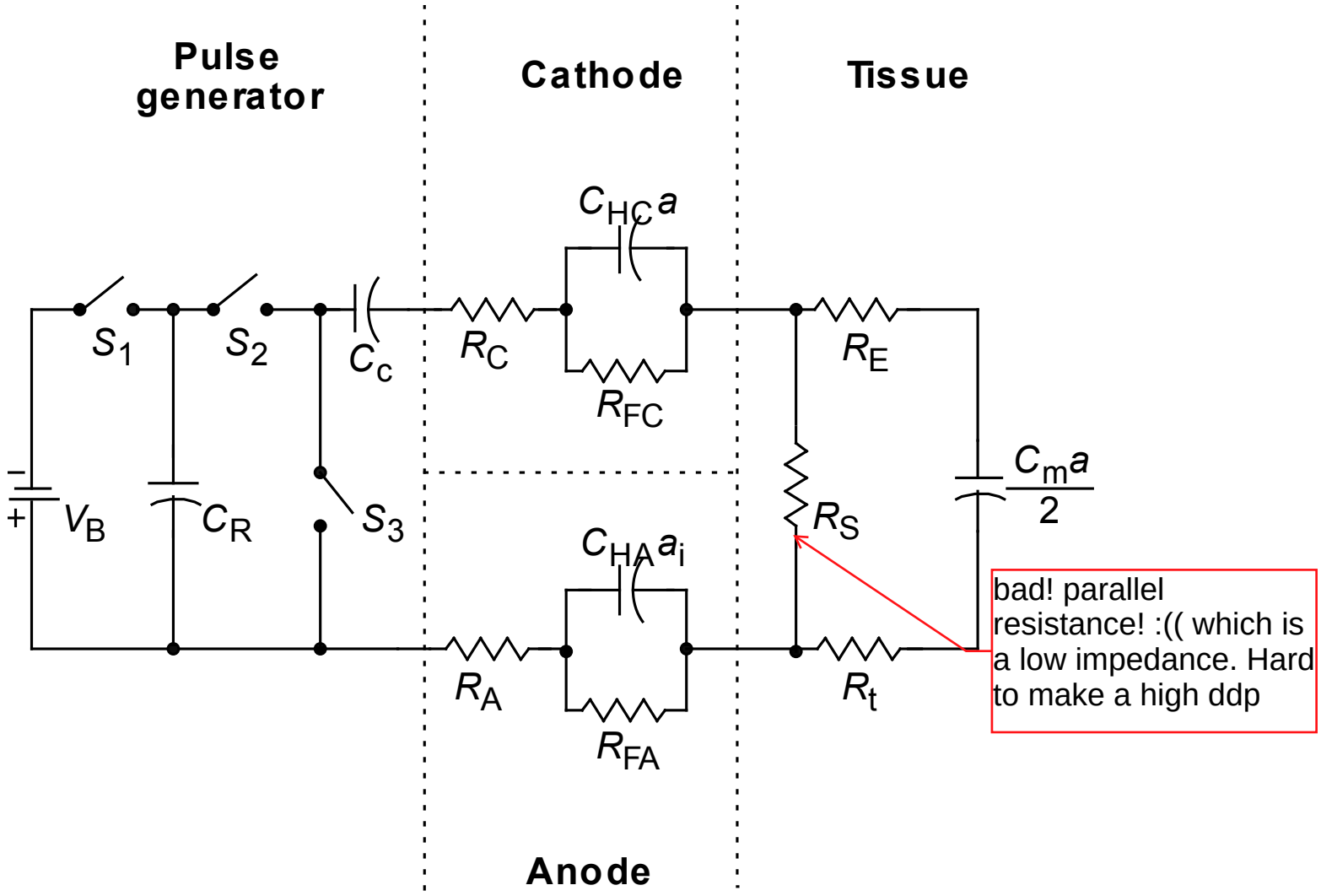


Figure 6.13 Unipolar and bipolar implementations of both J-shaped and nonpreshaped leads. All models have distal cathode. Bipolar designs typically have a ring anode proximal 10–15 mm on the lead.

The pacemaker is "insulated" come il satellite. Però ha il suo common. E possiamo vederlo come la terra. E possiamo considerare il cuore come la terra [cit necessaria]. Unipolar pulse=> diamo lo stimolo (negative) tra il tip/common del pacemaker. Se il common è un po' lontano dove vogliamo stimolare è meglio il bipolar.

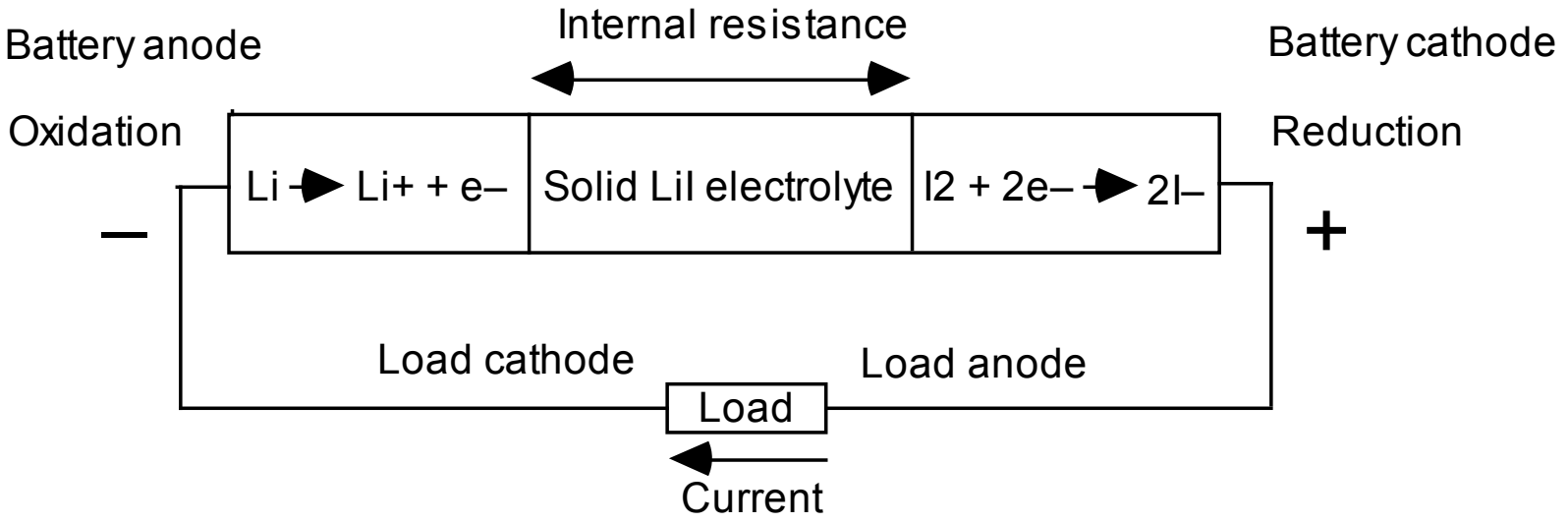
circuit, bipolar, ultrafast



Battery used in pacemaker=> **SOLID BATTERY**. Electrode/electrolyte are both solid material

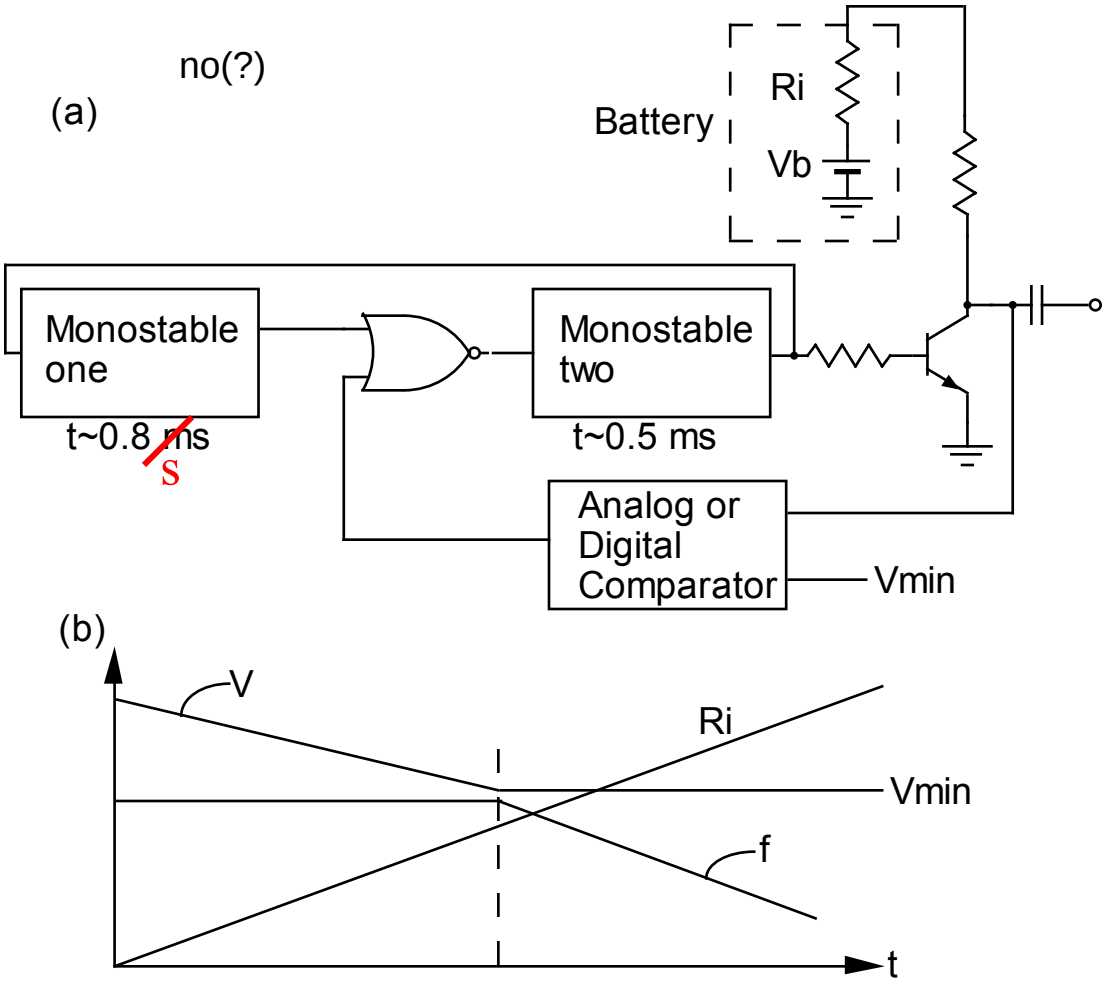
Battery

quaderno



- V = 2.8V
- increase of internal resistance (typ. 30kΩ after 1800mAh)

Lithium Iodine battery. Can have a long duration. Figure of merit of a battery is its **capacity.** "charge available to be delivered". C ~=2000mah (is a charge, but it has more meaningful, mA that can be delivered in hours. Coulomb does not give the feeling of how much current we have). **Duration:** 10years. 2 constrain: best capacity and wished duration between 2 surgeries. What's the average current we can draw? Iavg=C/D => we get **23uA**!!!! AVERAGE CONSUMPTION OF ALL THE ELECTRONICS INSIDE THE PACEMAKER. Relative budget.. different parts. **Stimulation unit=> we need to provide 10mA for 10mV, for 1mSec. => 17uA avg. Most of the battery is used for the stimulation only.**



circuit to grant pulses at least equal to Vmin event in case of reduction of power supply voltage