

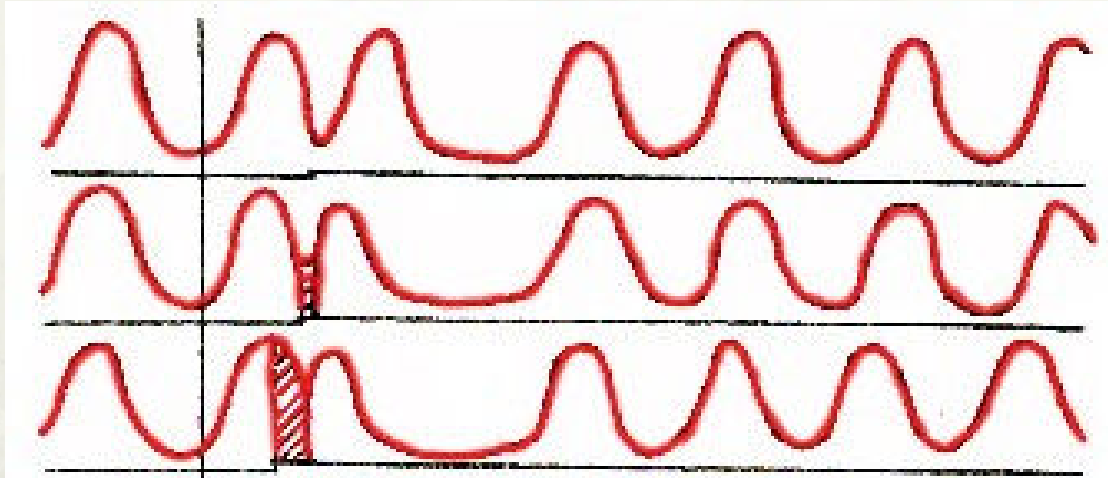
# *Extrasystole and compensatory pause of toad heart*

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Teaching Center for Experimental Medicine

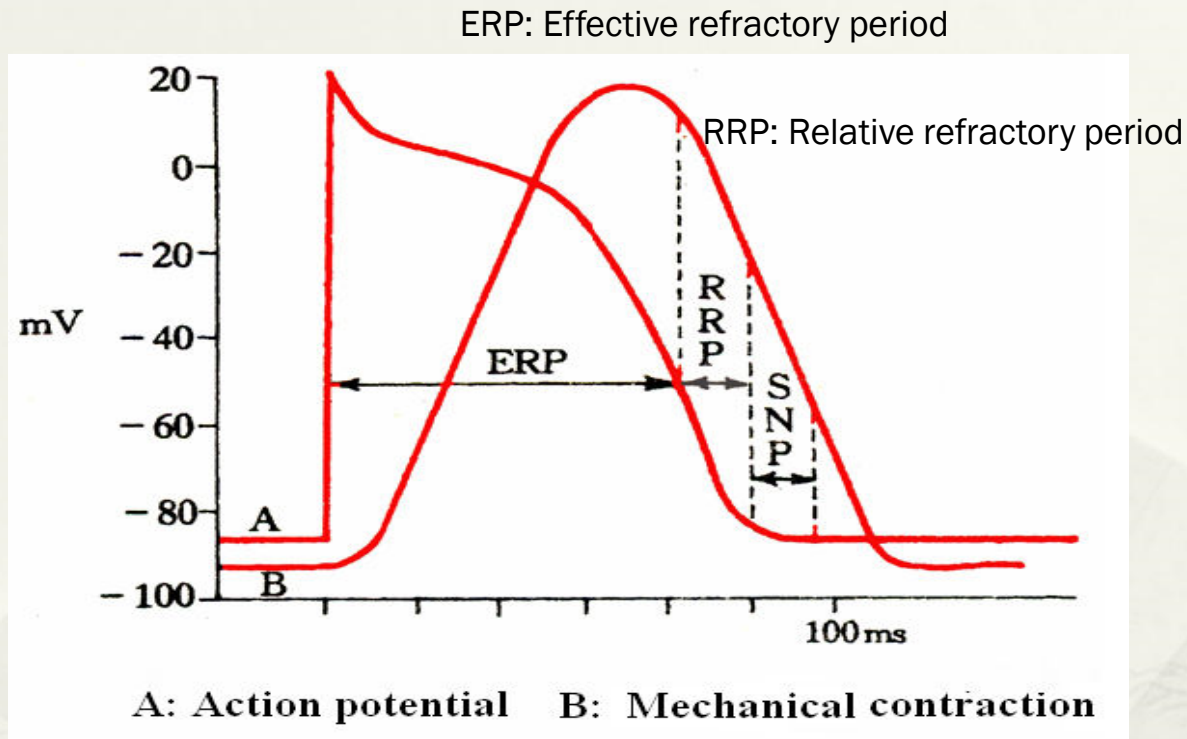
## Extrasystole

- \* a premature cardiac contraction that is independent of the normal rhythm and arises in response to an impulse outside the sinoatrial node.



## Compensatory pause

- \* The pause following an extrasystole, when the pause is long enough to compensate for the prematurity of the extrasystole;
- \* the short cycle ending with the extrasystole plus the pause following the extrasystole together equal two of the regular cycles.



## Significance:

1. The cardiac muscle is refractory to any stimulus during the contraction phase and thus tetanus cannot be produced in cardiac muscle.
2. The cardiac muscle can relax and get filled up with blood and then contract to pump out the blood.

## **Aim :**

- 1. To investigate the changes of excitability in a cardiac cycle.**
- 2. To understand the significance of long effective refractory period of heart.**

# Experimental Procedure

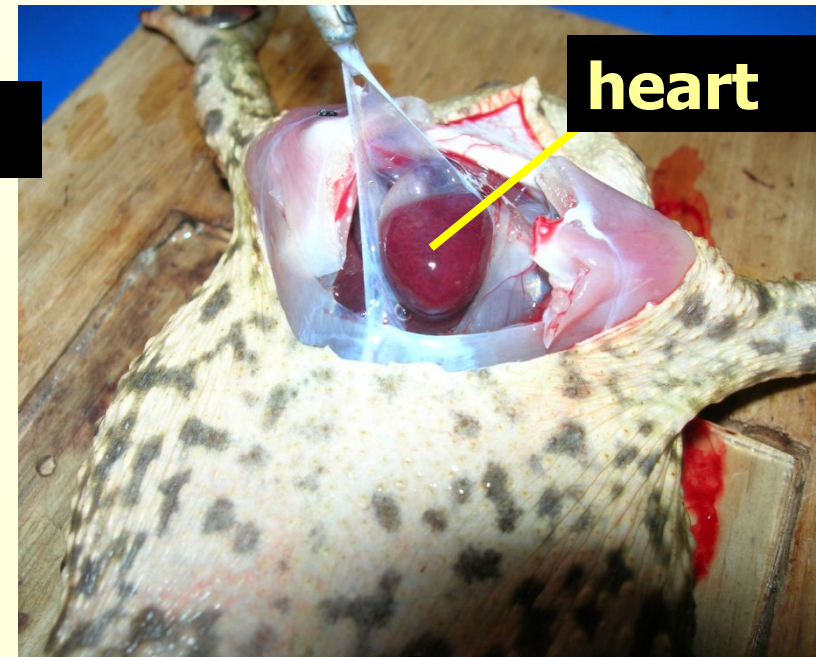


## 1. Dissection Procedures :

- Destroy the brain and spinal cord of a toad and fasten it to a board, **ventral** side up;
- Use scissors to make a **longitudinal** incision on chest wall to expose the heart ;





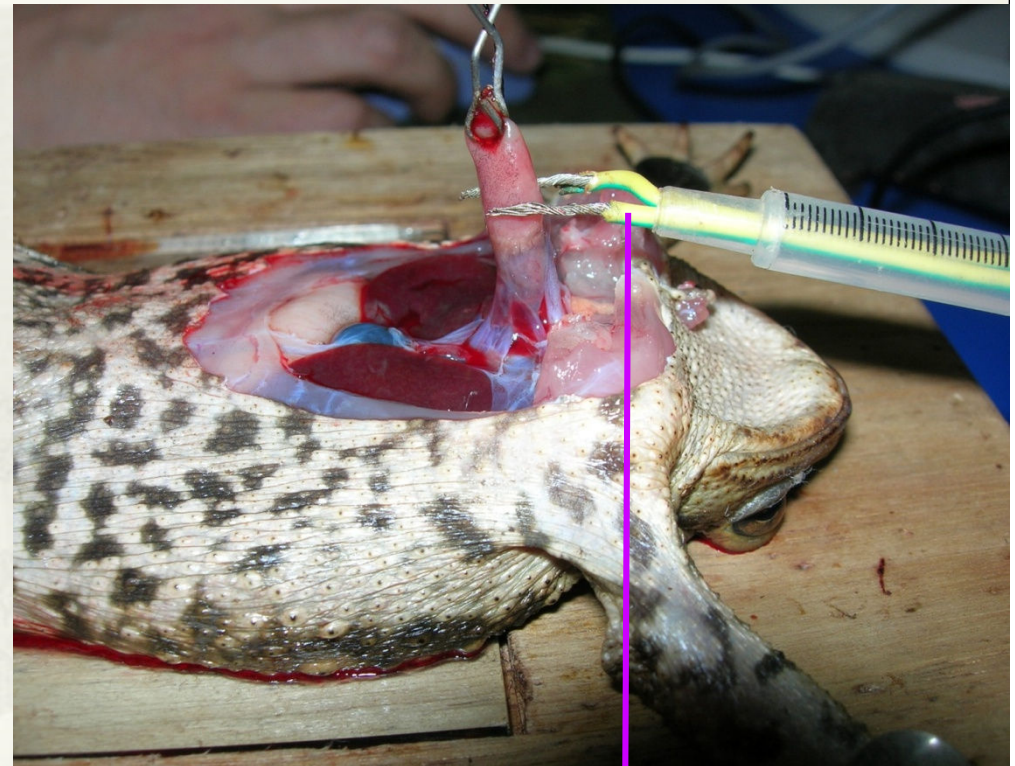


## 2.Exposing the heart

- \* Hold the cardiac pericardium with forceps and carefully remove the membrane from the heart with scissors.
- \* The heart is then periodically moistened with Ringer's solution.

### 3. Connecting the ventricle to the transducer

- \* Clamp the apex of the ventricle with a clip during ventricle diastole. Be careful and don't hurt the ventricle.
- \* Connect the clip to the transducer with a thin thread and adjust the tension of the ventricle.



**Stimulation  
electrode**



# 4. Choose protocol, Setup the stimulus parameters, observe and record the result.

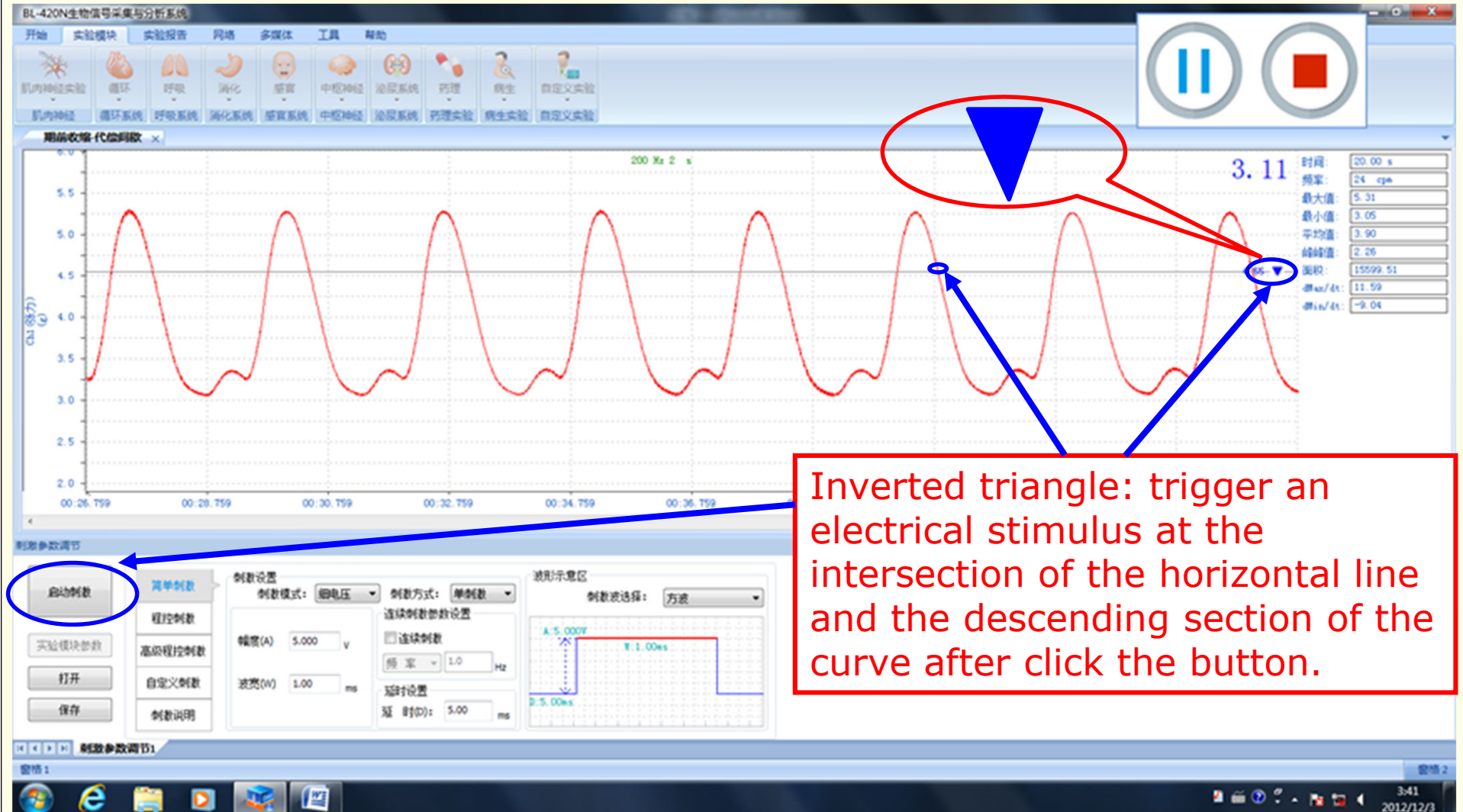
The screenshot displays the BL-420N software interface. At the top, there is a menu bar with options like '开始', '实验模块', '实验报告', '网络', '多媒体', '工具', and '帮助'. Below this is a toolbar with various icons representing different experimental modules. A dropdown menu is open, showing a list of protocols. A red arrow points to the protocol '期前收缩-代偿间歇' (Premature contraction-compensatory pause). The main area of the software is a data recording window with a grid background. On the right side, there are several parameter input fields for each channel, including '时间', '频率', '最大值', '最小值', '平均值', '峰峰值', and '面积'. The bottom of the window shows the system tray with the date and time '2012/12/3 3:40'.

Protocol: Circulation - Extrasystole and compensatory pause

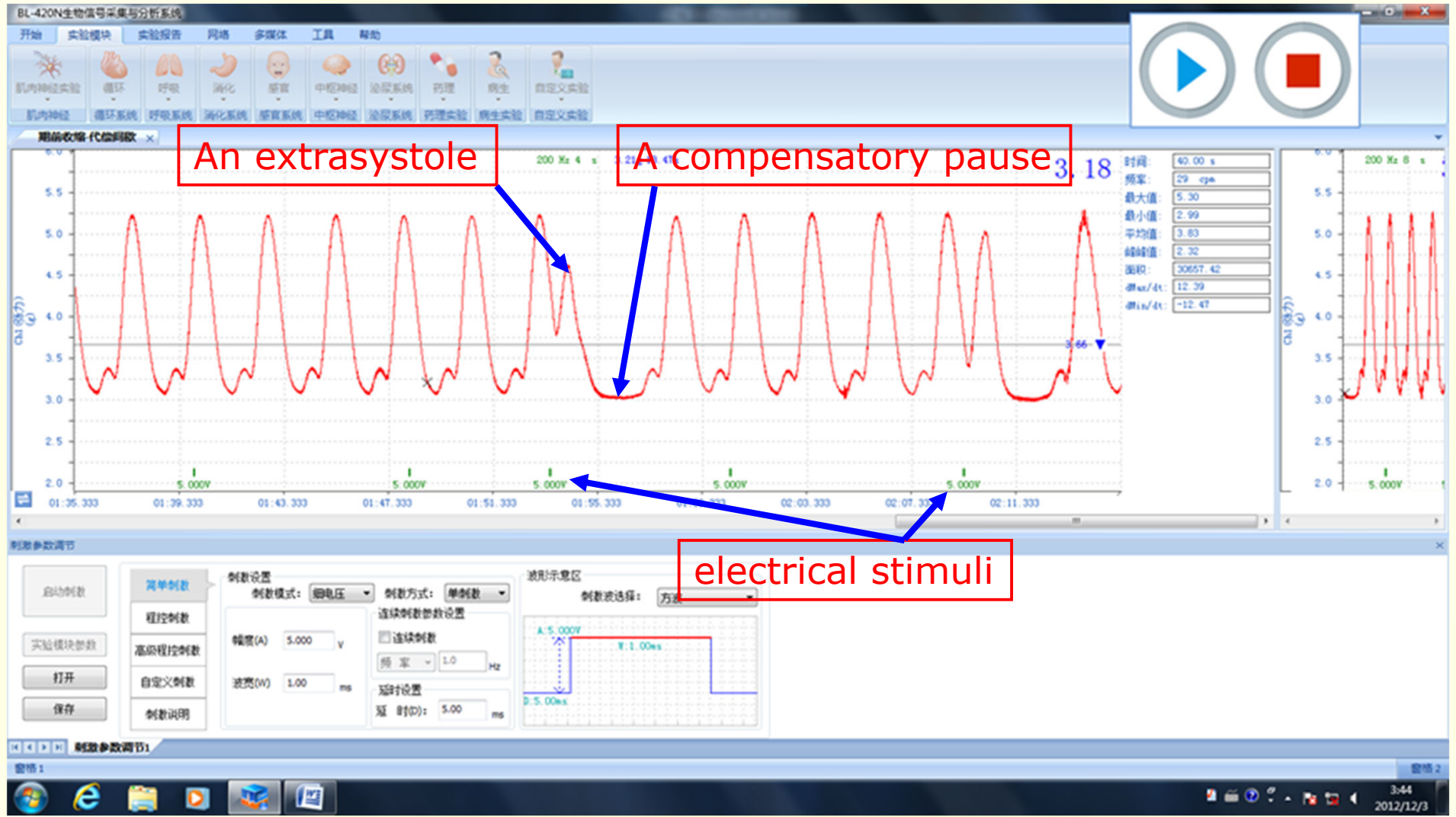


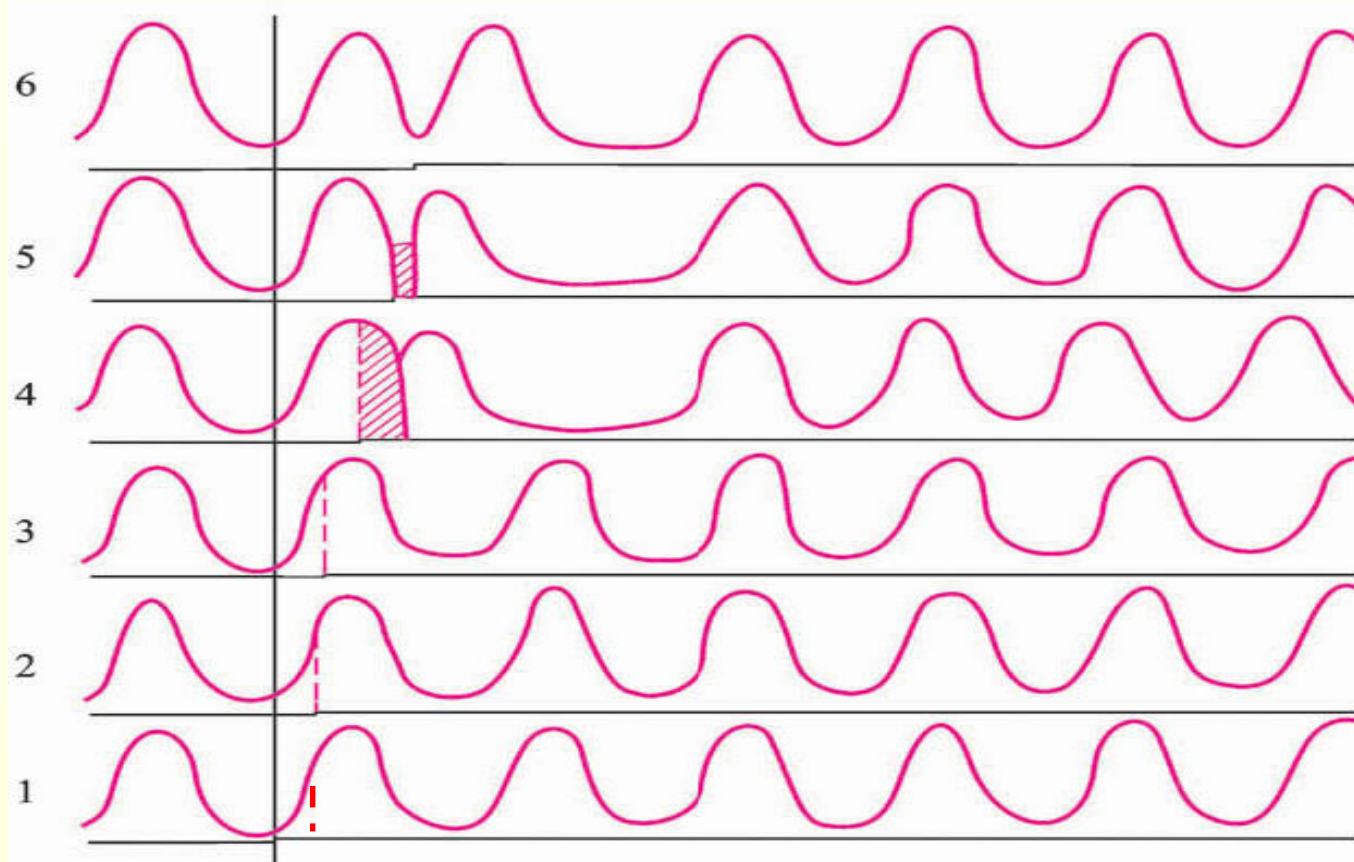
Simple Stimulate: Amplitude: 5.0 Voltage, Wavelength: 1.0ms

Click button “Start Stimulate”



Inverted triangle: trigger an electrical stimulus at the intersection of the horizontal line and the descending section of the curve after click the button.





Curve 1-3 stand for stimulus fall within effective refractory period

Curve 4-6 stand for stimulus fall within relative refractory period

# Discussion

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1. **What is the cause of compensatory pause after an extrasystole?**
2. **What is the cause of the long refractory period of the heart muscle and what is its advantage?**





**Start ...**

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