

## Continuous monitoring of finger blood pressure by Finometer device

The arterial blood pressure changes can be caused by changes in heart action (contractility and heart rate), vessels action (vascular resistance) and extravascular pressure (e.g. intrathoracic pressure). The changes of the order of several tens of mmHg can be observed during various manoeuvres but spontaneous oscillations in resting conditions are also present. The systolic and diastolic blood pressures are defined for each heart beat and therefore they can be assessed on a beat-to-beat basis.

Direct intraarterial measurement of blood pressure is the most precise method for its continuous monitoring. However, the usage of this method is markedly limited by its invasiveness. At present, the volume-clamp method (Finometer device) is the only alternative for non-invasive beat-to-beat blood pressure monitoring. Although absolute values of the blood pressure obtained using this method can be distorted (overestimated systolic and underestimated diastolic blood pressures), volume-clamp method is able to reliably follow blood pressure oscillations.

The volume-clamp method was first introduced by Czech physiologist Prof. J Peňáz in 1967. With this method, finger arterial pressure is measured using a finger cuff and an inflatable bladder in combination with an infrared plethysmograph.

Plethysmograph (a volume measuring device) consists of an infrared light source and detector. The infrared light is absorbed by the blood, and the pulsation of arterial diameter during a heart beat causes a pulsation in the light detector signal.

The first step in this method is determining the proper unloaded diameter of the finger arteries, the point at which finger cuff pressure and intra-arterial pressure are equal and at which the transmural pressure across the finger arterial walls is zero. Then the arteries are clamped (kept at this unloaded diameter) by varying the pressure of the finger cuff inflatable bladder using the fast cuff pressure control system. The cuff pressure provides an indirect measure of intra-arterial pressure. The cuff is usually applied around the middle phalanx of the 3<sup>rd</sup> finger and the finger should be supported at the heart level during measurement.

### Tasks:

Draw a finger arterial pressure changes during several heart cycles.

Assess the changes of finger arterial pressure during various manoeuvres.

