Introduction Automatic evaluation of spontaneous breathing recovery for patients during artificial ventilation is one of the central problems in the early postoperative period. The basic criteria for adequate breathing recovery are rhythmic movements and respiration muscle tone. The current paper presents the possibilities of using video processing technology to determine spontaneous breathing recovery in patients during high frequency jet ventilation (HFJV). We refer to this technology as remote body plethysmography (rBPG).

Materials and Methods The 16 subjects (male and female) involved in the experiment, aged between 24 and 76, had undergone operation of the thoracic cavity. Each patient provided written informed voluntary consent prior to study procedures. Immediately after operation, patients enter the intensive care unit, and have HFJV administered for a time between 30 min up to 2 hours or until the full recovery of muscle tone, consciousness and adequate spontaneous breathing is made. The HFJV was performed by the ZsLine JV100A device (Triton Electronics Systems Ltd., Russia, registration No 2010/08739). The reference respiration rate signal was measured by impedance pneumography with an MP 6–03 monitor (Triton Electronics Systems Ltd., Russia, registration N2007/00597). The patient body video recording was performed at a distance of 80 cm using two Logitech C920 webcams with 640 × 480 pixel resolution and 30 Hz sampling frequency. The original video processing software was used to process recordings and respiration muscle tone recovery and for measuring total respiration to be quantified. Thus, rBPG can be used for assessing respiration muscle tone recovery and for measuring respiration parameters.

Results The Results of rBPG measurement showed that in most cases the process of restoring spontaneous breathing begins with diaphragmatic breathing. The thoracic breathing recovery can be quantified through the measurement of chest movement amplitude. The example of breathing recovery presented in figure 1. The amplitude is raised alongside muscle tone recovery.

Conclusion rBPG provides readings of measurements of diaphragmatic and thoracic breathing from epigastric and chest regions. It allows the relative contribution of each region in total respiration to be quantified. Thus, rBPG can be used for assessing respiration muscle tone recovery and for measuring respiration parameters. It can be used to accurately select the appropriate time for turning off the ventilator and for extubation.