Introduction

Congenital heart defects (CHD) are most common malformation in fetal life. Cardiac functional development is continuous process during fetal life. Although to understand and evaluate the normal and abnormal developmental process of heart is pivotal in fetal medicine area, in vivo studies of human embryonic heart is few. Especially functional studies using pulsed-Doppler wave on developing human embryonic heart are limited, due to safety concerns about concentrated focusing of Doppler waves. Therefore, we aimed to assess cardiac function of developing rat embryos by using a high-frequency ultrasound system.

Methods

• A timed breeding program was initiated with a rat line. High frequency Transabdominal ultrasonography (30–70 MHz) was used and recorded using cine–function on isoflurane sedated pregnant rats. Thirty–two rat embryos 10, 11, 12, 13 days after conception were included and evaluated.

• Results: Along with developmental stages, the heart rate decreased from $362 \pm 5$ to $323 \pm 4$ beats per minute. Atrial size was bigger than ventricle size. Isovolumetric Contraction Time (ICT) does not change. Ejection time (ET) increased until day 12 then decreased. Tei index (IRT+ICT)/ET decreased during late embryonic stage of the rat heart.

Conclusion

Functional study of rat embryonic heart was feasible using high frequency ultrasonography. In late embryonic stage rat heart, atrium was dominant (chamber size, blood flow velocity) than ventricle.