The 5-HT₄ receptor represents a subtype of the phylogenetically old family of 5-HT receptors. It can couple to and stimulate adenylyl cyclase activity. Interestingly, we at first noted that serotonin had no effects on beating rate or force of contraction in isolated cardiac preparations from wild type mice (WT). Therefore, we generated transgenic mice (TG) which express the human 5-HT₄ receptor in the heart. In isolated right atrial preparations of these animals, 5-HT and its derivatives cisapride and prucalopride exerted positive chronotropic effects. In anaesthetized TG (isoflurane or ketamine), all three agonists increased the beating rate, \textit{in vivo}, using ECG or echocardiography. Likewise, these agonists led to positive inotropic effects in paced left atrial preparations, in the ventricle of isolated spontaneously beating hearts (Langendorff heart) and increased the ejection fraction in anaesthetized (isoflurane) intact TG using echocardiography. Interestingly, the time course of the inotropic effects of these agonists was significantly slower than that of the β-adrenoceptor agonist isoprenaline. Moreover, we noted enhanced basal rates and agonist induced rates of arrhythmias in isolated (left and right) atrial preparations and in a similar way \textit{in vivo} (echocardiography). Inotropic and chronotropic effects were absent in isolated preparations from WT and in intact WT. In summary, we conclude that our new TG offers the possibility to assess the physiology and biochemistry of the human 5-HT₄ receptor in a model system. (Supported by the DFG)