Large animal cardiovascular models on different swine genotypes using 3D imaging modalities

Abstract

The commercial meat-type pigs are long time used model animals in cardiovascular experiments. Their heart and circulatory system show a lot of similarity to the human organ system, many research results have already been obtained from experiments with this animal species. However, their use is severely limited by their extremely rapid, genetically defined growth and fattening potential, which makes these animals inappropriate for projects with long term follow-up period. A useful alternative is the application of the so-called fat-type pig breeds with slower growth potential. However, these varieties are often incompatible with the breeding and keeping technology of the meat-type pigs, which challenges the researchers. The other option is the use of minipigs that are not larger than 50-70 kg in their adult state. With the smaller animals performing the interventional and imaging procedures are easy, and they can be used also in long-term follow-up experiments. Another advantage is that unlike conventional varieties, the experiments can be performed on adult individuals, so the researchers are not forced to do the so-called "juvenile" model, which may have an adverse effect on their experimental results. Based on literature data and our own experiments, it can be concluded that the heart function and the morphological properties of the minipigs are not analogous to that of the conventional breeds, therefore further research is needed to obtain data on the parameters of the mini individuals used in long-term experiments.

Image

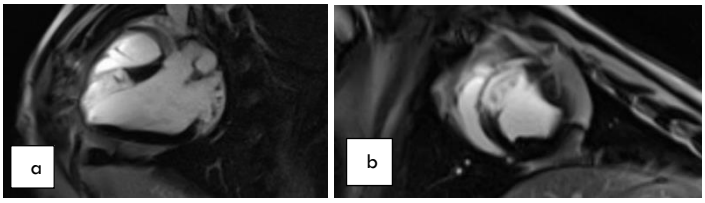


Figure 1. Long (a) and short (b) axis late gadolinium enhancement cine MRI images of a minipig heart on the 3rd follow-up day, after a closed chest myocardial infarction procedure using LAD coronary occlusion for 90 minutes.

Recent Publications

1. Lukovic, Dominika ; Gugerell, Alfred ; Zlabinger, Katrin ; Winkler, Johannes ; Pavo, Noemi ; Baranyai, Tamás ; Giricz, Zoltán ; V. Varga, Zoltán ; Riesenhuber, Martin ; Spannbauer, Andreas et al.: Transcriptional Alterations by Ischaemic Postconditioning in a Pig Infarction Model: Impact on Microvascular Protection. INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES 20 : 2 p. 344 , 19 p. (2019)

2. Petneházy, Ö ; Czeibert, K ; Donkó, T ; Csóka, Á ; Petrási, Zs ; Lassó, A ; Garamvölgyi, R: Cardiac CT examinations and reconstructions in different domestic animals and genotypes. ANATOMIA HISTOLOGIA EMBRYOLOGIA 47 : Suppl 1 pp. 60-60. , 1 p. (2018)

3. Baranyai, T* ; Giricz, Z* ; Varga, ZV ; Koncsos, G ; Lukovic, D ; Makkos, A ; Sarkozy, M ; Pavo, N ; Jakab, A ; Czimbalmos, C et al.: In vivo MRI and ex vivo histological assessment of the cardioprotection induced by ischemic preconditioning, postconditioning and remote conditioning in a closed-chest porcine model of reperfused acute myocardial infarction: importance of microvasculature. JOURNAL OF TRANSLATIONAL MEDICINE 15 : 1 Paper: 67 , 13 p. (2017)

4. Pavo, N ; Lukovic, D ; Zlabinger, K ; Zimba, A ; Lorant, D ; Goliasch, G ; Winkler, J ; Pils, D ; Auer, K ; Jan, Ankersmit H et al.: Sequential activation of different pathway networks in ischemia-affected and non-affected myocardium, inducing intrinsic remote conditioning to prevent left ventricular remodeling. SCIENTIFIC REPORTS 7 Paper: 43958 , 14 p. (2017)

5. Mariann Gyöngyösi, , Noemi Pavo, Dominika Lukovic, Katrin Zlabinger et al.:: Porcine model of progressive cardiac hypertrophy and fibrosis with secondary postcapillary pulmonary hypertension. J Transl Med (2017) 15:202



Biography

After her graduation Dr. Garamvölgyi worked as a clinician vet. Since 2002 she has been working as a scientific veterinarian at the Department of Diagnostic Imaging and Radiation Oncology of Kaposvár University. In 2007 she obtained her doctoral thesis on the „3D imaging techniques for the examination of canine mammary tumours" at Kaposvár University (Doctoral School of Animal Science). Since 2014 she is the leader of the Multidisciplinary Research Department of the Institute of Diagnostic Imaging and Radiation Oncology, and the legal successor Medicopus Nonprofit Ltd.

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Notes/Comments: