# Development of the heart and vessels in the caudal part of the human body

# Valorisation

# Valorisation

The impact of the current dissertation is described in this chapter. The scientific highlights of the investigation were:

- The inferior caval vein develops according to a basic body plan in mammals, with no influence of the size of the mesonephric organ (Chapters 2 and 3).
- The branching pattern of the portal and hepatic veins in the liver is similar in mammals with or without separate liver lobes (Chapter 4).
- Couinaud's segmental model of the liver does not match the distribution of the portal and hepatic veins in the liver (Chapter 5).
- Cardiac development involves a series of successive 'renovation' projects and can be made accessible with 3D models (Chapter 6).

These findings are part of a larger program to provide a new and novel pictorial textbook of human embryology. The reason for the construction of a new textbook is that embryology has become a nearly forgotten topic in the medical curriculum with teachers who base their knowledge on colorful pictures, plagiarized models or redrawn schemes of developmental events. Clearly, a new and accessible approach with original illustrations and as little text as possible is necessary. For this reason, we aim for an end product of our program that provides an interactive three-dimensional guide through the development of adult human anatomy. These series of 3D-models between 3.5 and 10 weeks of development, for now in the form of interactive 3D-PDFs, are a pictorial abstract of our findings and can be queried on any personal computer. This allows the teacher, student, researcher or medical staff to inspect this updated topographic embryology from viewing points of his or her own choice at any place. Additionally, these models provide a template for 3D-printing to create realistic and physical, yet stylized and up-to-date educational material. In our view, such an approach to human embryology facilitates learning and understanding adult human anatomy. Likewise, a better embryological knowledge of the origin and final position of structures/organs and their adjacent structures is valuable for the clinic, as malformations are often poorly described.



The choice of the animal model to study abnormal development or disease is important. This thesis often referred to animal models when describing human development for at least two reasons. Firstly, some aspects of development proceed in a more pronounced fashion in animals than in humans. Examples are the development of the caudal cardinal, umbilical and vitelline veins in mouse embryos, because of the virtual absence

of a mesonephros and a lobated liver in this species. Secondly, animal models can be based on experimental approaches, which are off limits in research on humans. Such information can be used to explain differences in morphology between human embryos of different age.

Obviously, the next steps in this program should not only be to expand and improve on our rendering of human development, but also to “spread the word”. To make this latter aspect effective, we need better and in particular more interactive presentation programs, further simplification of our presentations, very brief yet lucid descriptions of those developmental features that fit in teaching blocks, and focus groups to avoid the introduction of personal hobbies. These aspects will receive due attention in my career as a teacher.