

# Macroscopic study of the mouse's pancreatic vascular system

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## Introduction

The mouse is the most widely used animal model for biomedical research. The 99% of its functional genes are identical to human genes, is easy to manage and today there are also a wide range of genetic tools available. Genetically modified mice are crucial to research and treatments for a number of human diseases caused by genetic abnormalities. However, there is a lack of a phenotypic database for reference in this rodent.

The aim of this study is to phenotype macroscopically the pancreatic vascular system of the mouse. Furthermore, the results obtained will be compared to canine and human anatomy.

The vascular corrosion technique has been used in order to obtain casts which enable different vessels of the pancreas to be identified.

## Material & Methods

One mice of the C57BL/6 strain was chosen to obtain the vascular corrosion cast. The mouse was first administered with 0.1 ml of heparin and then was sacrificed. It was dissected in order to achieve the thoracic aorta. The vessel was immobilized and punctured to inject caudally the casting resin (MERCOX®, Jap. Vilene Co.). Afterwards, the specimen was placed in soapy water at 60°C for 24h, corroded in 3% KOH for 3 days and finally rinsed in distilled water. The cast was analysed in a binocular loupe, using the vascular anatomy of the dog as a reference.

The comparison of the results obtained to human and dog anatomy was based on various anatomical atlases.

## Results

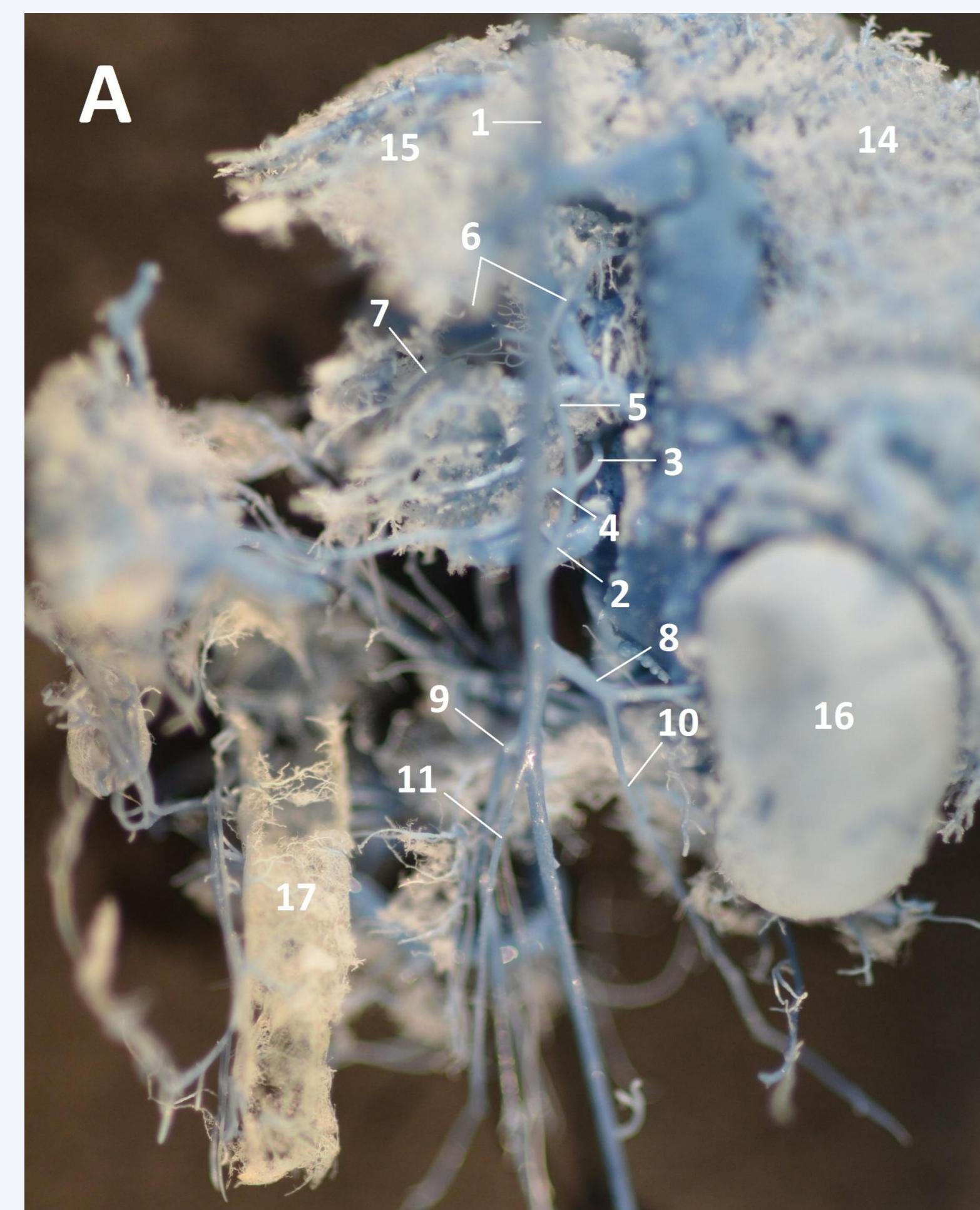


Figure 1. Abdominal vascularisation of the mouse. Vascular corrosion cast (Mercox®). A) Dorsal view. B) Lateral oblique view.

1: Abdominal aorta; 2: Celiac artery; 3: Right gastric artery; 4: Caudal splenic artery; 5: Hepatic artery; 6: Hepatic branches; 7: Cranial pancreaticoduodenal artery; 8: Right renal artery; 9: Left renal artery (sectioned); 10: Right deep circumflex iliac artery; 11: Left deep circumflex iliac artery; 12: Cranial mesenteric artery; 13: Caudal pancreaticoduodenal artery; 14: Right lateral lobe of the liver; 15: Left lateral lobe of the liver; 16: Right kidney; 17: Descending colon.

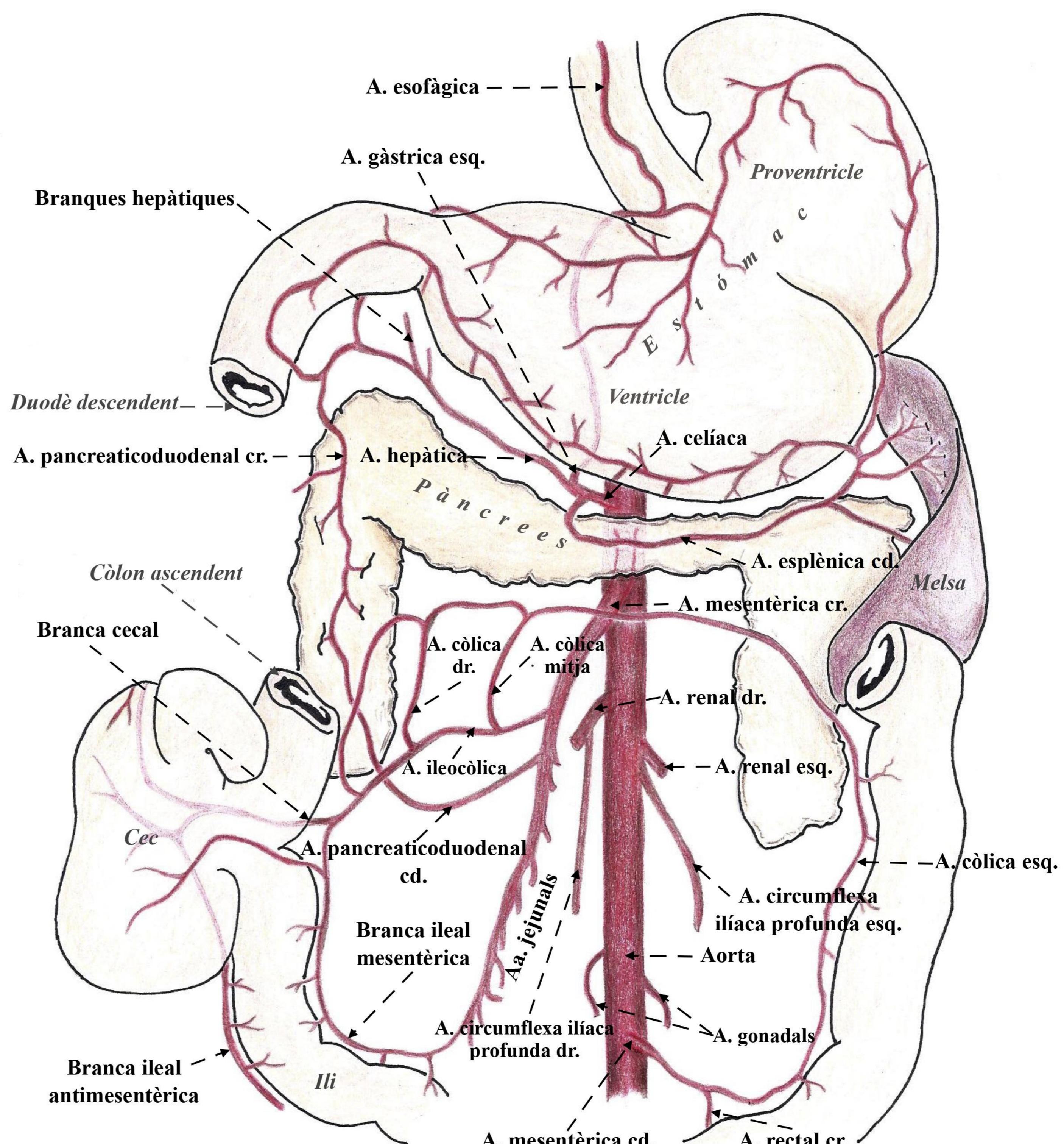
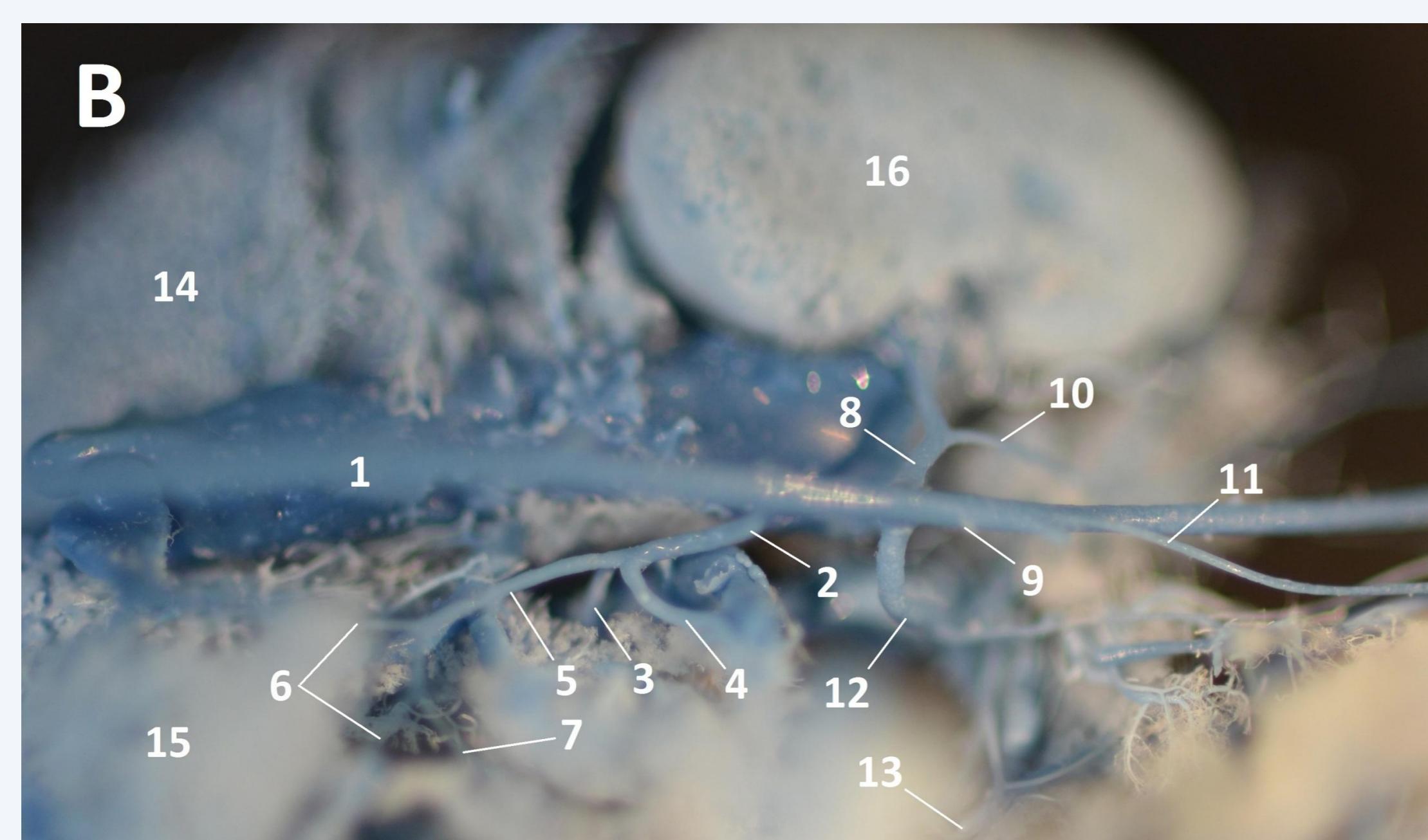


Figure 2. Scheme of the different branches of the celiac trunk and the cranial mesenteric artery in the mouse anatomy (adaptation of the image from Evans and de Lahunta, 1991).

## Comparing to the canine and human anatomy

| Features  | Mouse   | Dog   | Human   | Comments   |
|---|---|---|---|--|
| Shape of the pancreas   | Elongated   | Elongated   | Elongated and flattened   |  |
| Most developed lobe   | Left  | Right   | Right   |  |
| Structure of the celiac trunk                                 | ◦ Left gastric artery<br>◦ Caudal splenic artery<br>◦ Hepatic artery                            | ◦ Left gastric artery<br>◦ Splenic artery<br>◦ Hepatic artery                                   | ◦ Left gastric artery<br>◦ Splenic artery<br>◦ Common hepatic artery  | Mouse has two splenic arteries, cranial (left gastric artery) and caudal. There is a change on the hepatic artery nomenclature in humans. There are reported variations in humans. |
| Pancreatic vascularisation from the celiac trunk              | ◦ Pancreatic branches (splenic artery)<br>◦ Cranial pancreaticoduodenal artery (hepatic artery) | ◦ Pancreatic branches (splenic artery)<br>◦ Cranial pancreaticoduodenal artery (hepatic artery) | ◦ Dorsal pancreatic artery, major pancreatic artery and pancreatic branches (splenic artery)<br>◦ Superior pancreaticoduodenal artery (common hepatic artery) | Pancreaticoduodenal arteries are doubled in humans (anterior and posterior). Its nomenclature also changes (superior and inferior instead of cranial and caudal).                  |
| Structure of the cranial mesenteric artery                    | Similar between the three species.  |   |   | There are reported variations in humans.   |
| Pancreatic vascularisation from the cranial mesenteric artery | ◦ Caudal pancreaticoduodenal artery   | ◦ Caudal pancreaticoduodenal artery   | ◦ Inferior pancreaticoduodenal artery   |  |
| Abdominal distribution of the pancreaticoduodenal arteries    | Left  | Right   | Right   | Cranial and caudal pancreaticoduodenal arteries (superior and inferior) anastomose in dog and human.   |
| Origin of the deep circumflex iliac arteries                  | Renal arteries  | Aorta   | Aorta   |  |

Table 1. Comparison between mouse, dog and human pancreatic anatomy.

## Conclusions

Related to the pancreatic vascularisation of the mouse, it has been concluded that:

- It keeps the basic structure of the celiac trunk, with its three main branches.
- Cranial and caudal pancreaticoduodenal arteries remain.
- Pancreatic vascularisation leads off to the left of the abdomen, probably due to the major development of the left pancreatic lobe instead the right one.
- Its pancreatic vascular anatomy is similar to the dog.

➤ Mice and humans have the same main abdominal vessels, but there are some changes related to the branch and distribution of them.

It would be interesting the realization of more research studies in this field in the future, including a major number of specimens. In this way, the results obtained in this study could be confirmed.

## REFERENCES

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