British Heart Foundation

UNIVERSITY OF LEEDS

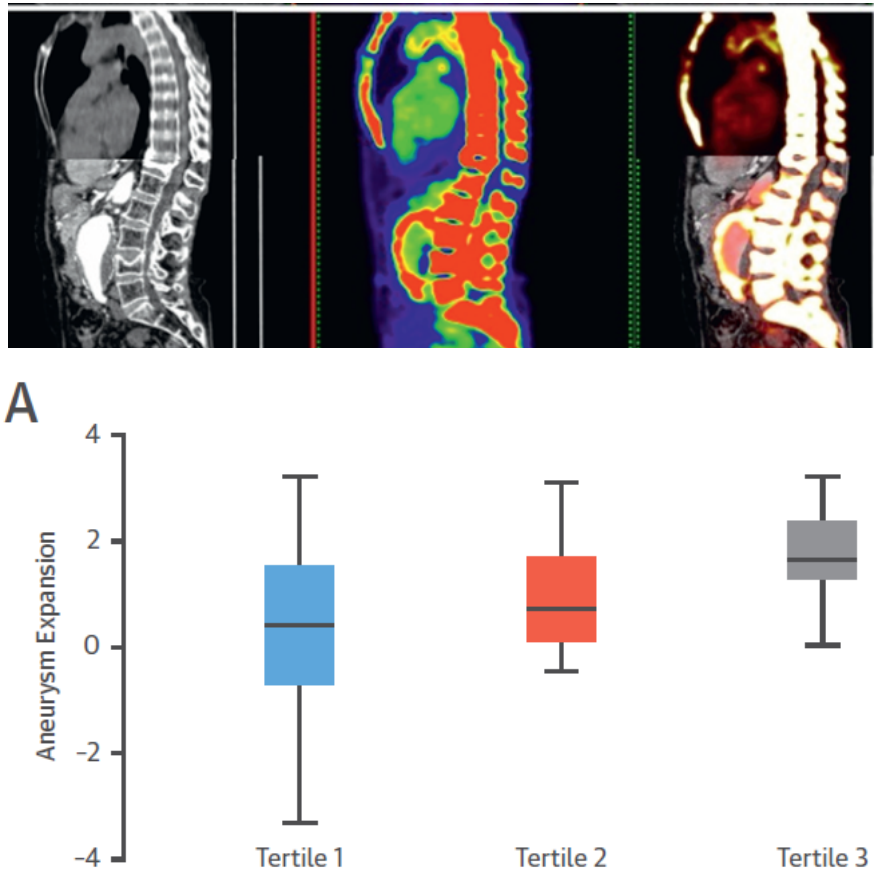
Tracing microcalcification development in the porcine pancreatic elastase murine model of abdominal aortic aneurysm using Na[^{18}F]F

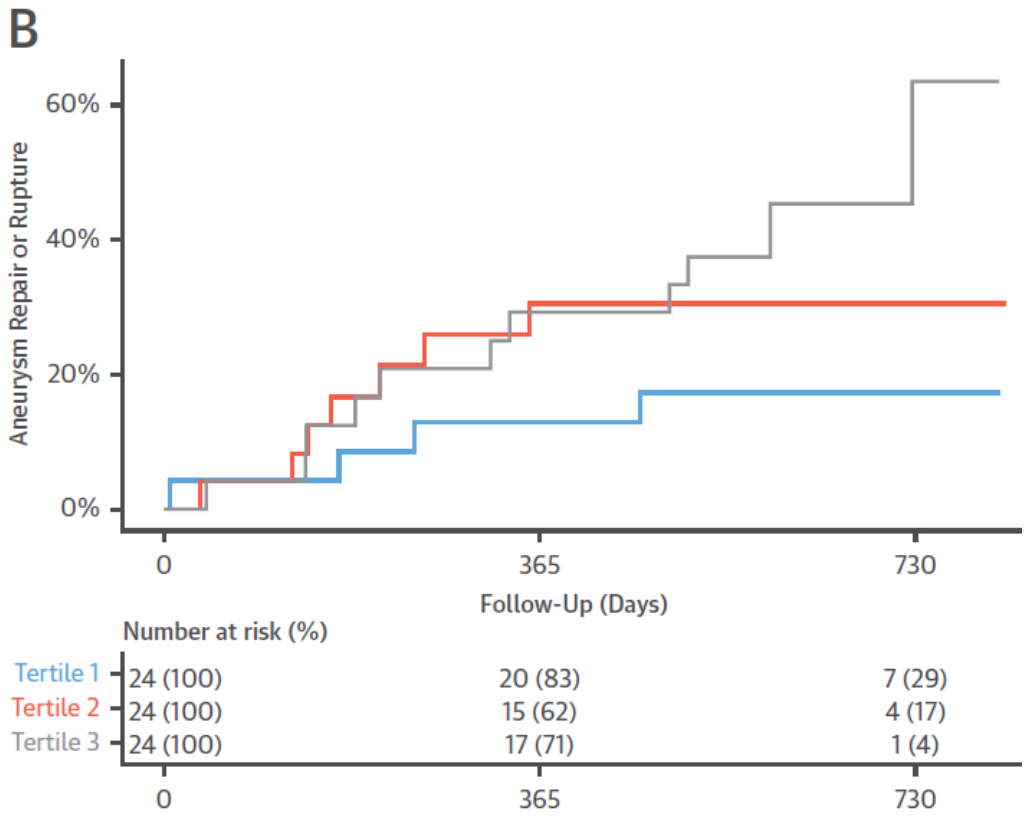
7th International Meeting on Aortic Diseases

Michael Bell MSc
Email: ummbe@leeds.ac.uk

Sodium Fluoride (Na[^{18}F]F) imaging of AAA

- Detection of **microcalcifications** predicted aneurysm **growth** and risk of **rupture** (SoFIA^3 trial)



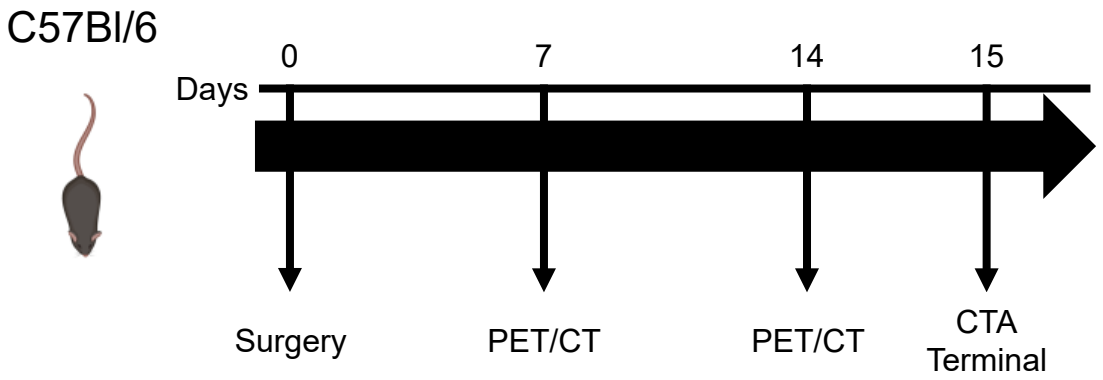


Forsythe RO, et al. J Am Coll Cardiol. 2018;71(5):513–23.

Methodology

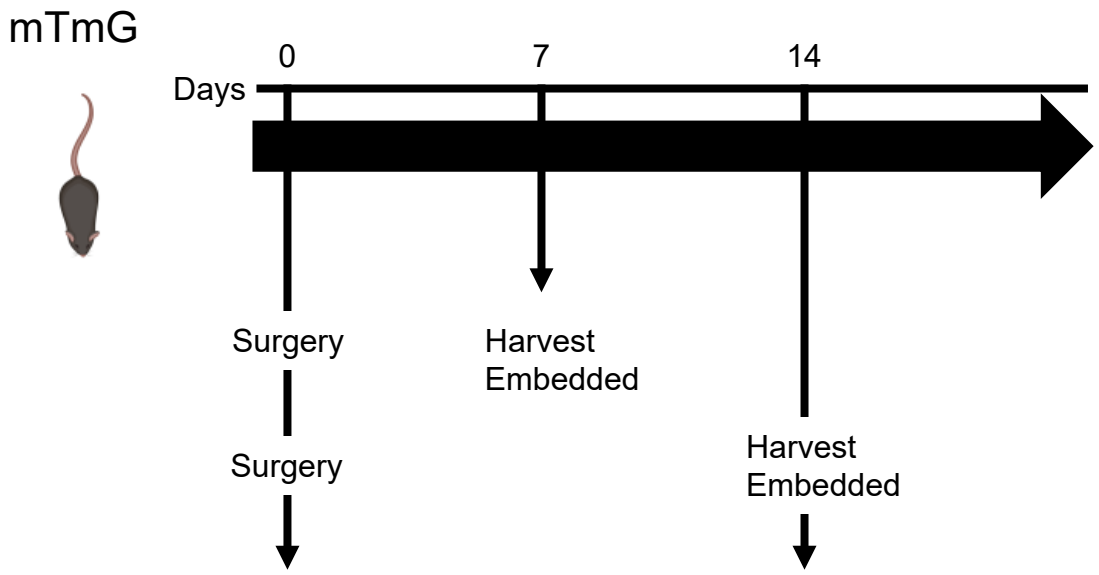
Aim: Does Na[^{18}F]F **longitudinally trace** microcalcification formation in a model of AAA?
Detect **cell type** contributing to microcalcification development in a model of AAA

Molecular Imaging



- Complementary biodistribution study of Na[^{18}F]F in abdominal aortic tissue
- Von kossa stain on abdominal aortic tissue

Biological investigation



All cells = tomato
mGFP = vascular smooth muscle cells

Results – Molecular Imaging

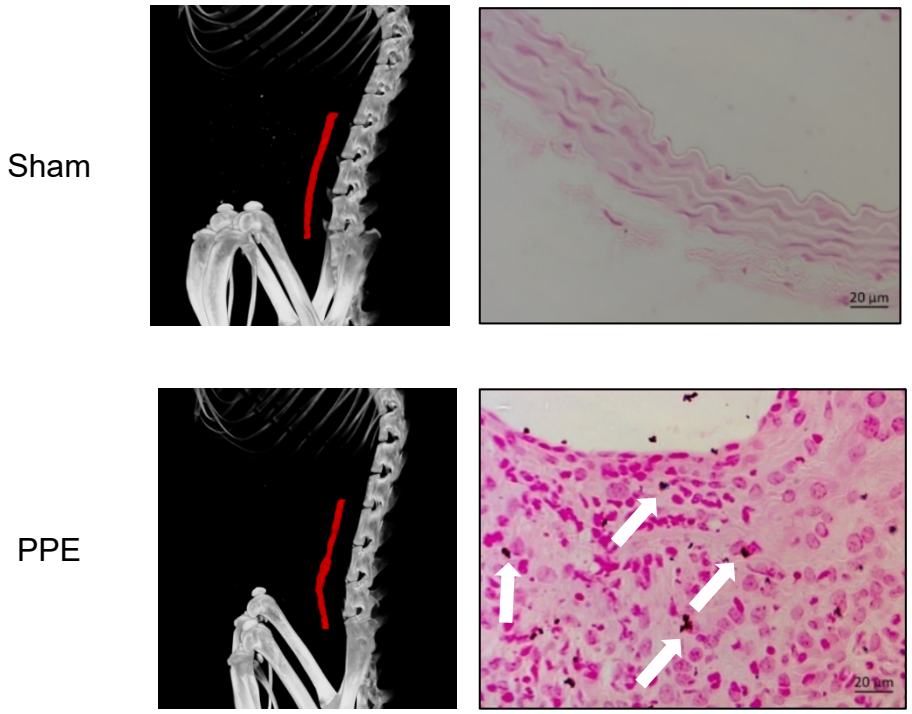
British Heart Foundation

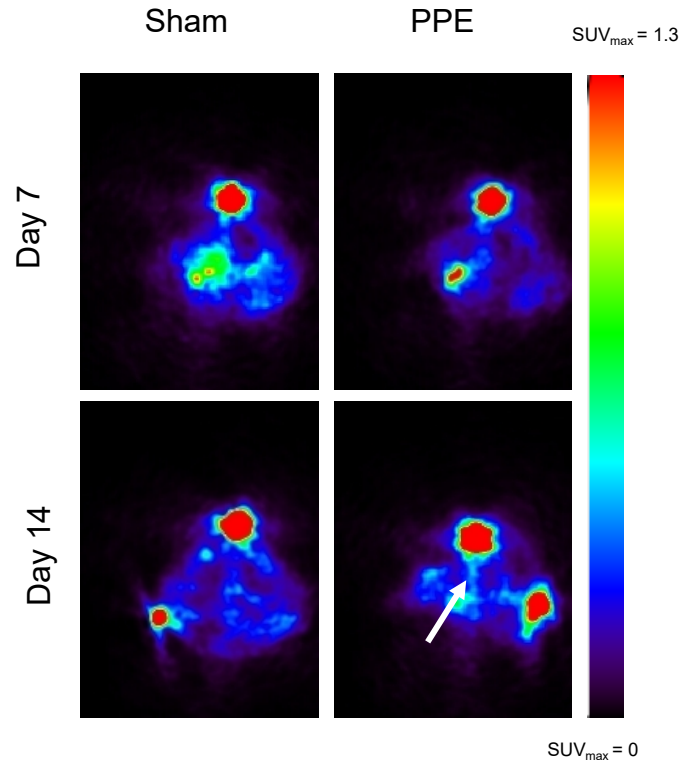
UNIVERSITY OF LEEDS

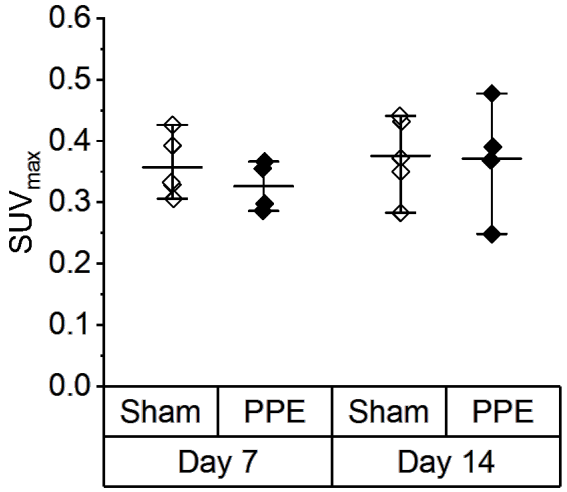
CT angiography

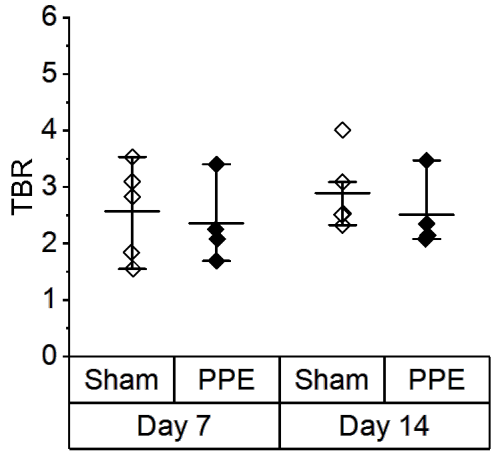
Histology

PET/CT









Results – Molecular Imaging

British Heart Foundation

UNIVERSITY OF LEEDS

Biodistribution

Current work

Improved identification of abdominal aortic aneurysm using the Kernelized Expectation Maximization algorithm

Daniel Deidda[1], Mercy I. Akerele[2,6], Robert G. Aykroyd[3], Marc Kelley Ferreira[1], Rachael C

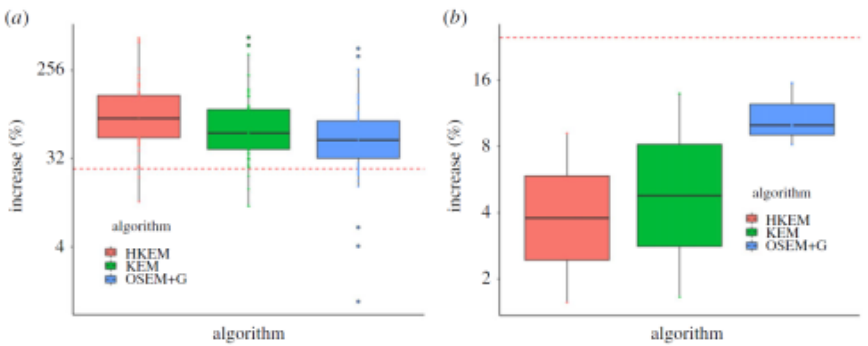
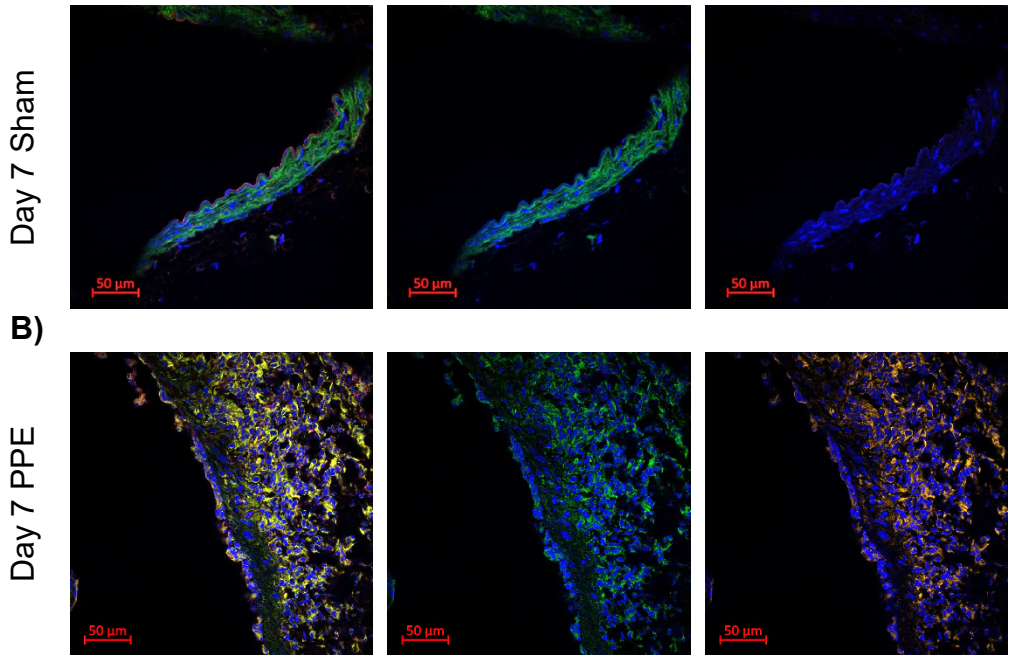


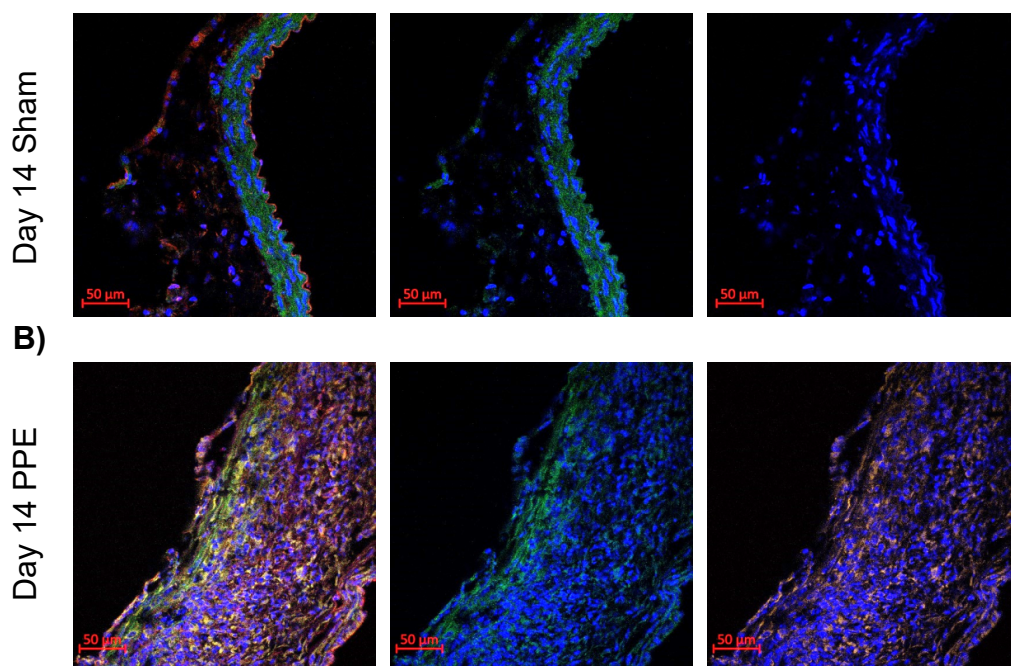
Figure 6. Increase of uptake between the ROI T and A: (*a*) for the AAA patient data, (*b*) for the control group. The dashed line represents the 25% increase that defines AAA positivity. (Online version in colour.)

Results – Biological investigation

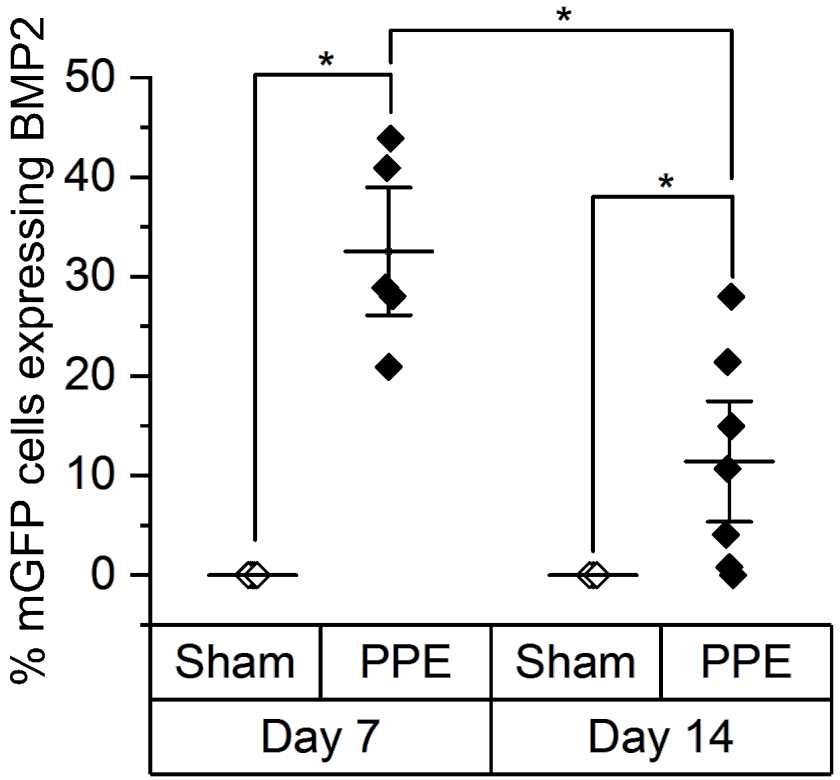
a)

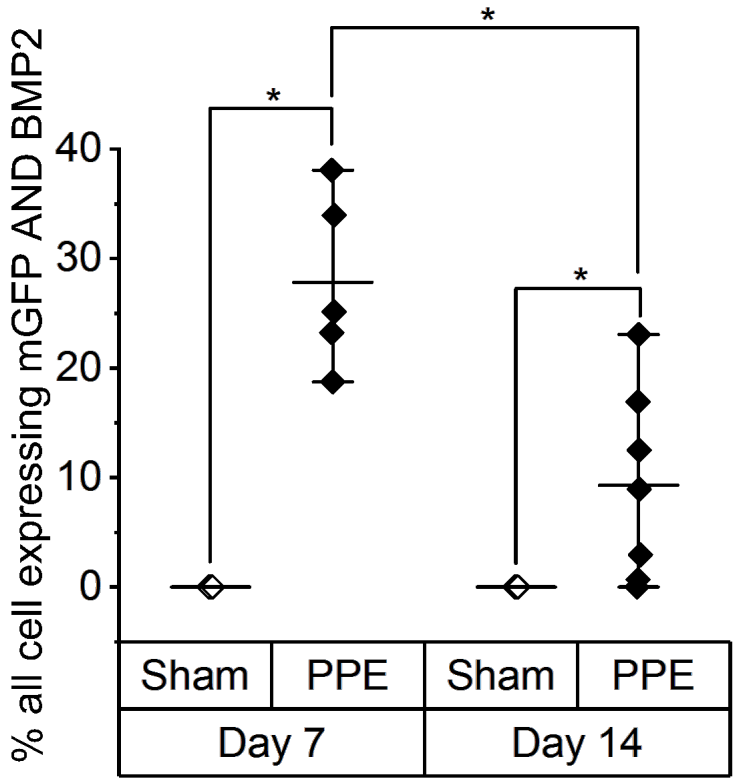


b)



Results – Biological investigation





Outlook

Biodistribution studies indicated an **increase** in Na[^{18}F]F uptake **day 14 post surgery** in PPE model. Difficult to detect using PET/CT

Von kossa staining detected **microcalcification** in PPE aortic tissue

Increase in BMP2 expression seen in VSMCs day 7 post surgery

Therapeutic studies in the PPE model to study [^{18}F]NaF **signal attenuation** to **prevent VSMC driven remodelling** of the aortic wall and microcalcification formation.

Autoradiography studies warranted to confirm **Na[^{18}F]F uptake** in PPE aortic tissue

Other papers:

Bell M, et al. Arterioscler Thromb Vasc Biol. 2021;41(5):1596–606.

Gandhi R, et al. J Nucl Cardiol [Internet]. 2021; Available from: https://doi.org/10.1007/s12350-021-02616-8