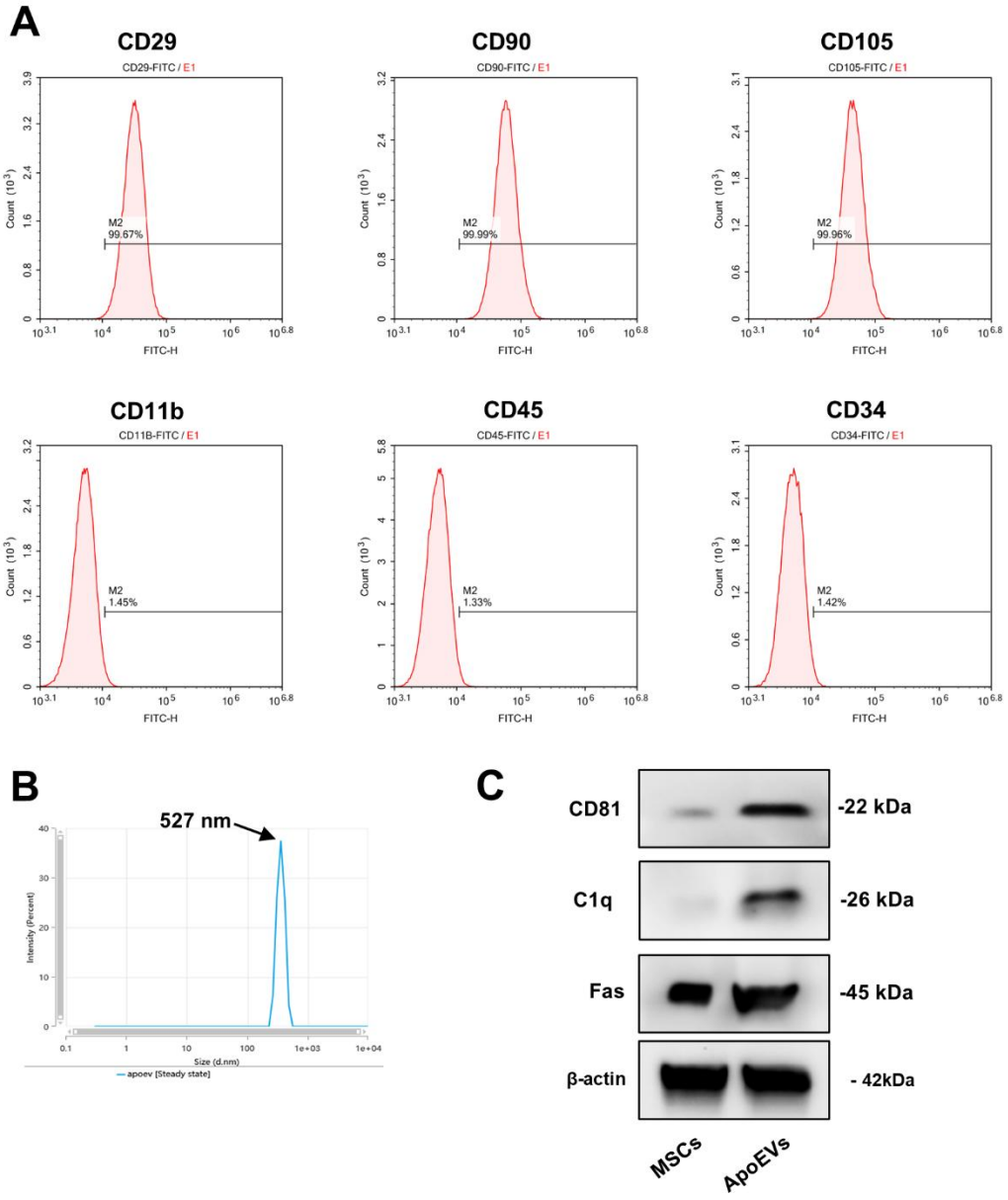
Supplementary Materials

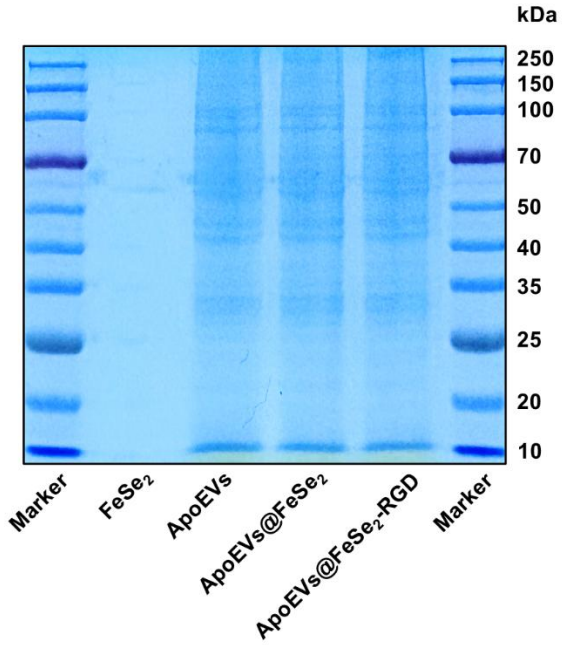
Supplementary Fig.1



Supplementary Figure 1. Identification and characterization of mesenchymal stem cells (MSCs) from bone marrow and apoptotic extracellular vesicles (ApoEVs) from MSCs. (A) Flow cytometric analysis of surface markers on MSCs. The cells showed positive expression for mesenchymal markers (CD29, CD90 and CD105) and negative expression for hematopoietic

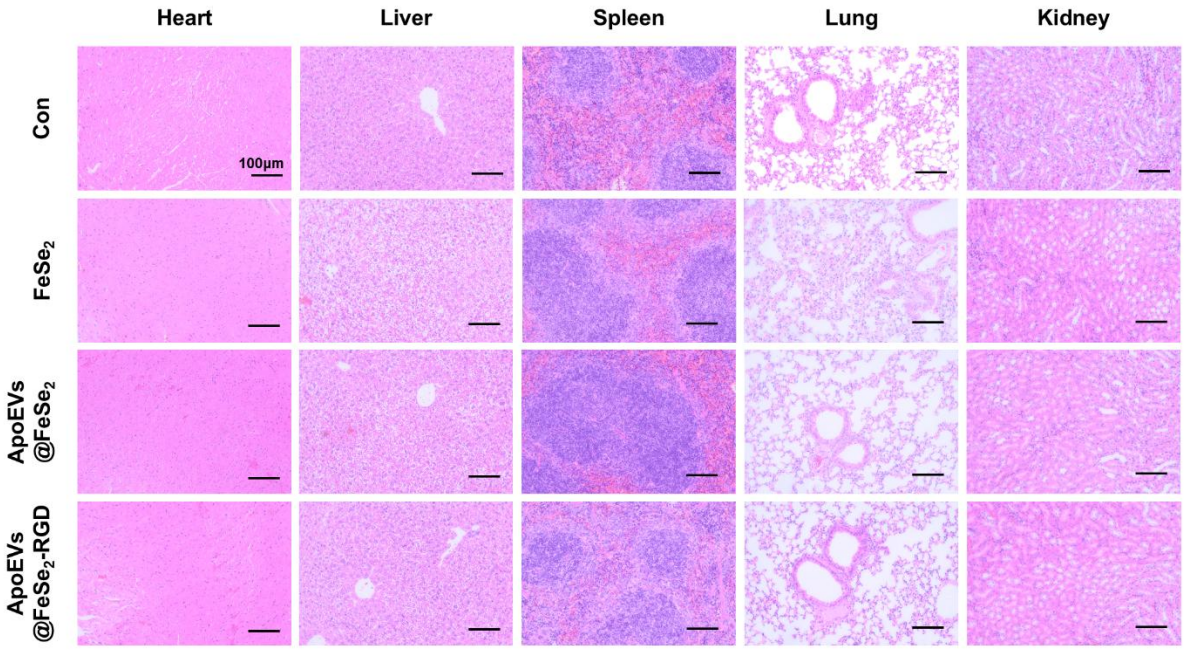
markers (CD11b, CD34 and CD45), which confirm their stem cell identity. (B) Particle size distribution of ApoEVs determined by nanoparticle tracking analysis (NTA), which shows the representative peak diameter around 527 nm. (C) Western blot analysis of specific protein markers in MSCs and ApoEVs.

Supplementary Fig.2

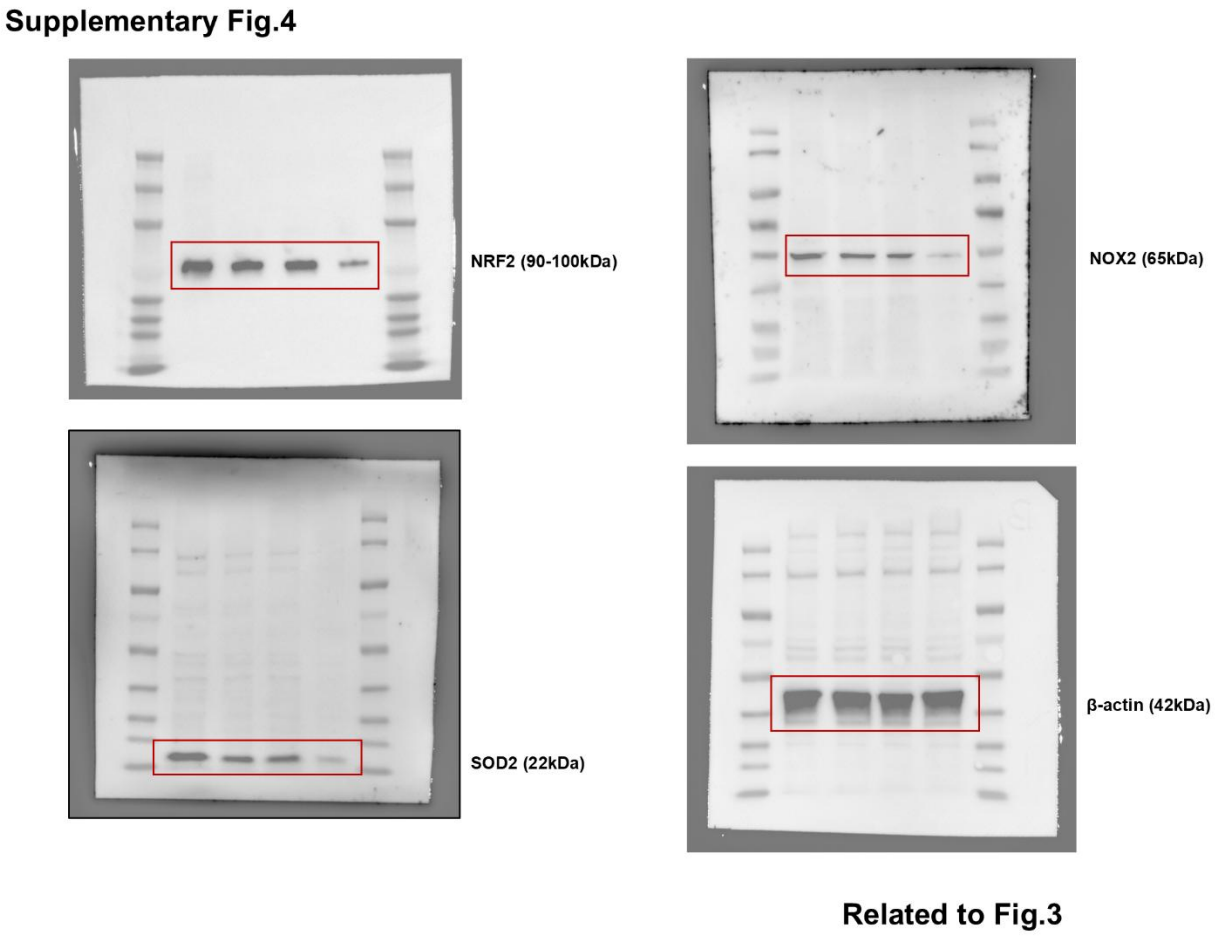


Supplementary Figure.2 SDS–PAGE analysis of ApoEVs membrane protein integrity after $FeSe_2$ decoration and RGD conjugation. SDS–PAGE analysis showed no detectable protein bands for pristine $FeSe_2$. ApoEVs exhibited multiple protein bands mainly between 20 and 100 kDa. ApoEVs@$FeSe_2$ and ApoEVs@$FeSe_2$-RGD displayed protein patterns comparable to native ApoEVs, indicating that vesicular membrane proteins were preserved during $FeSe_2$ decoration and RGD conjugation.

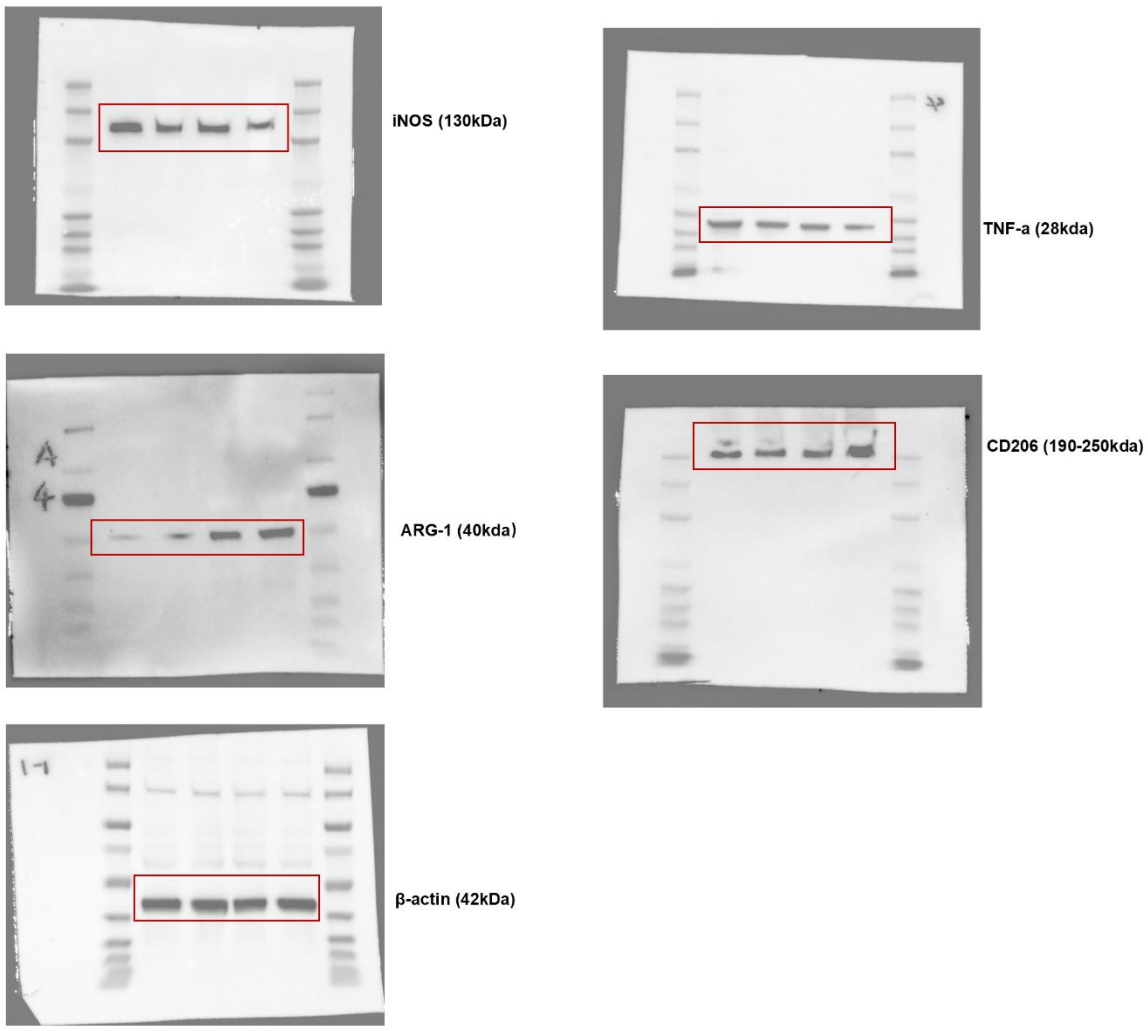
Supplementary Fig.3



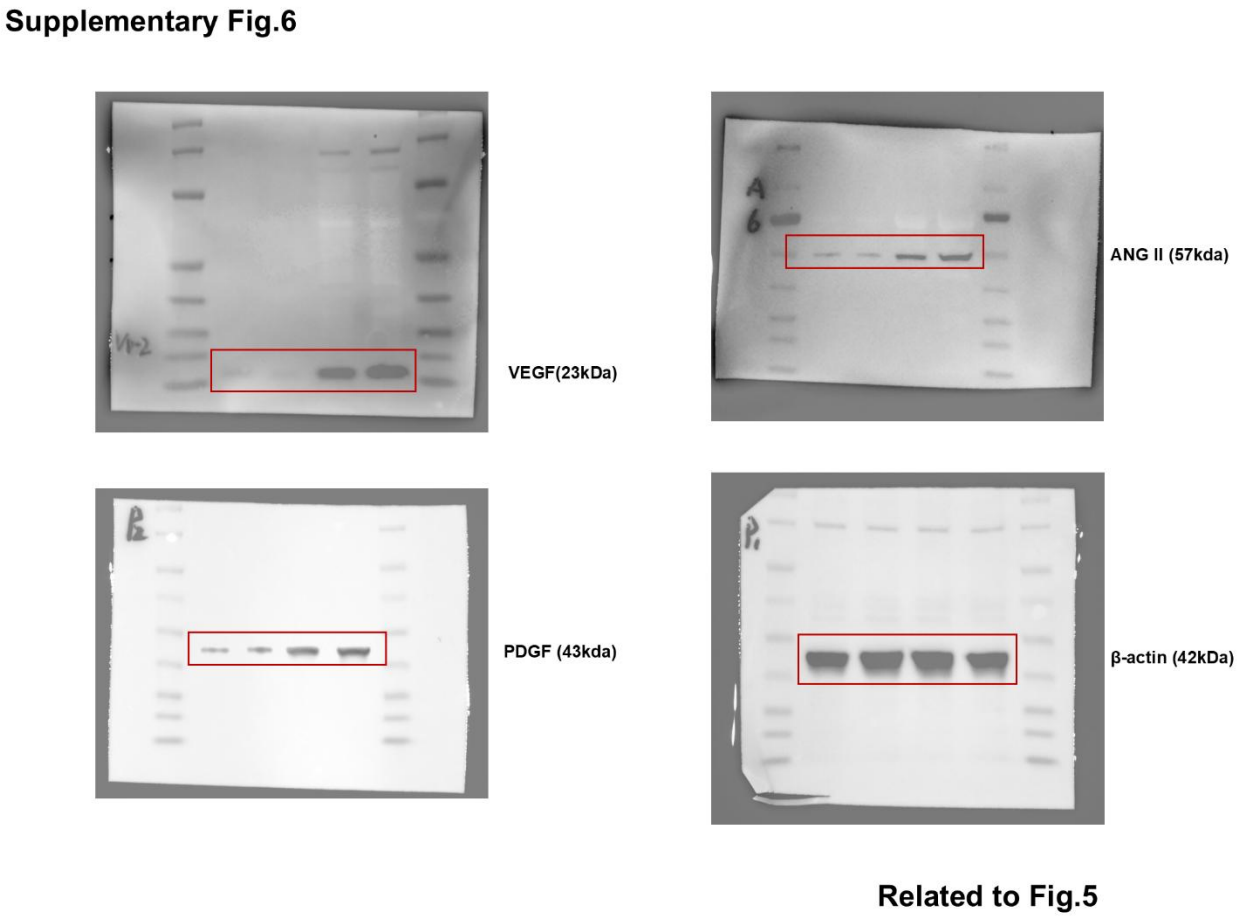
Supplementary Figure 3. Histopathological assessment of major organs for biosafety evaluation. Representative hematoxylin and eosin (H&E) staining images of major organs (heart, liver, spleen, lung, and kidney) harvested from mice after treatment with PBS (Control), $FeSe_2$, ApoEVs@$FeSe_2$ and ApoEVs@$FeSe_2$-RGD. No significant inflammatory cell infiltration, tissue necrosis, or structural abnormalities were observed, indicating the good biocompatibility and low systemic toxicity of the platform. Scale bar = 100 μm.



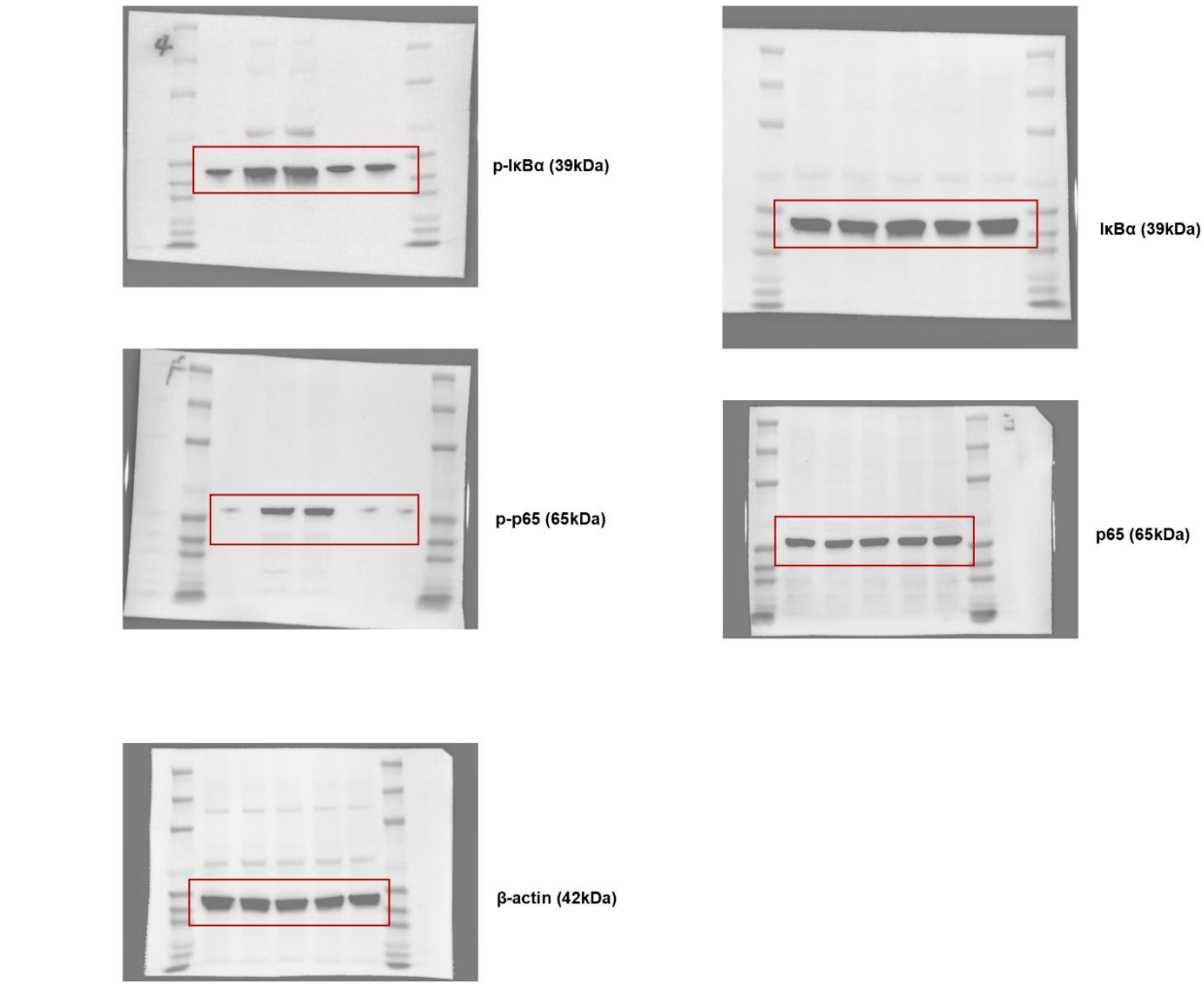
Supplementary Figure 4. Uncropped western blot membranes related to Figure 3.



Supplementary Figure 5. Uncropped western blot membranes related to Figure 4.

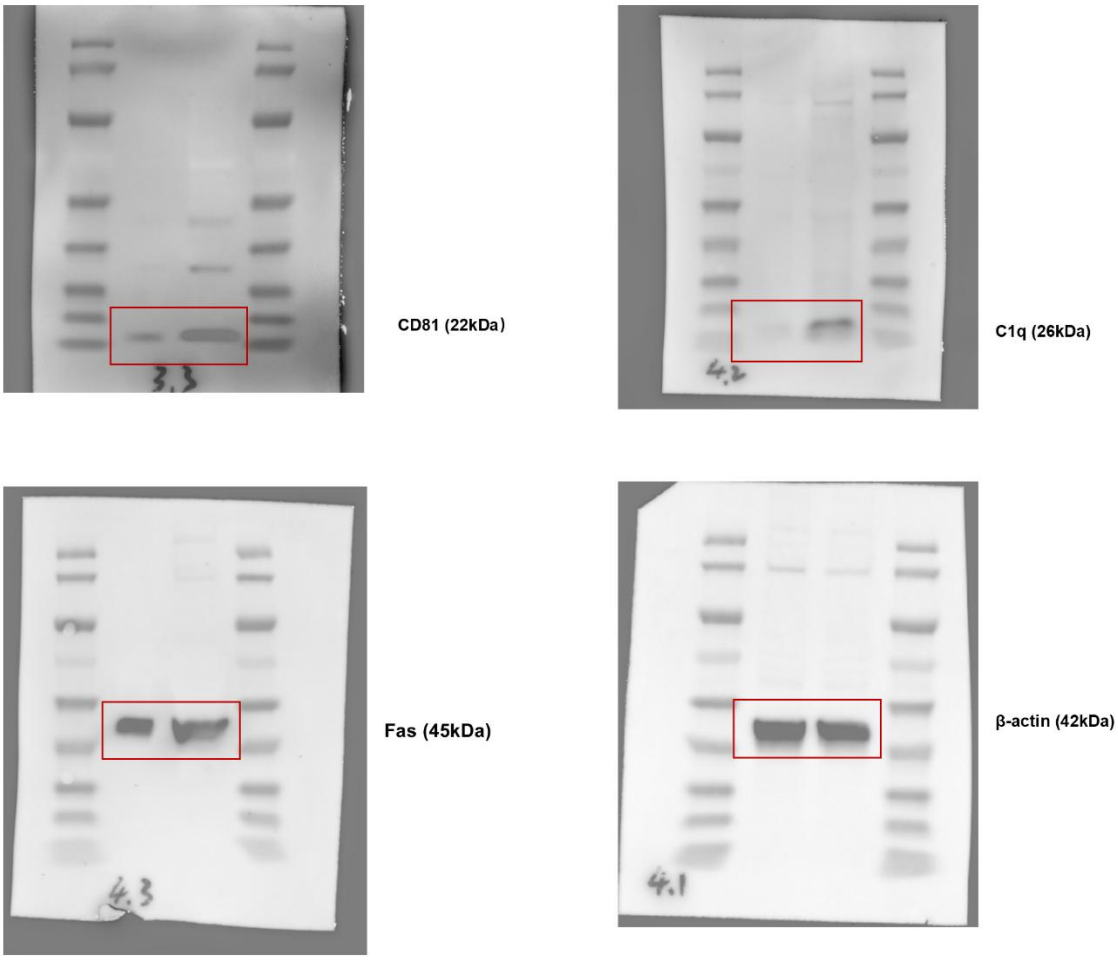


Supplementary Figure 6. Uncropped western blot membranes related to Figure 5.



Supplementary Figure 7. Uncropped western blot membranes related to Figure 6.

Supplementary Fig.8



Related to Supplementary Fig.1

Supplementary Figure 8. Uncropped western blot membranes related to Supplementary Figure 1.