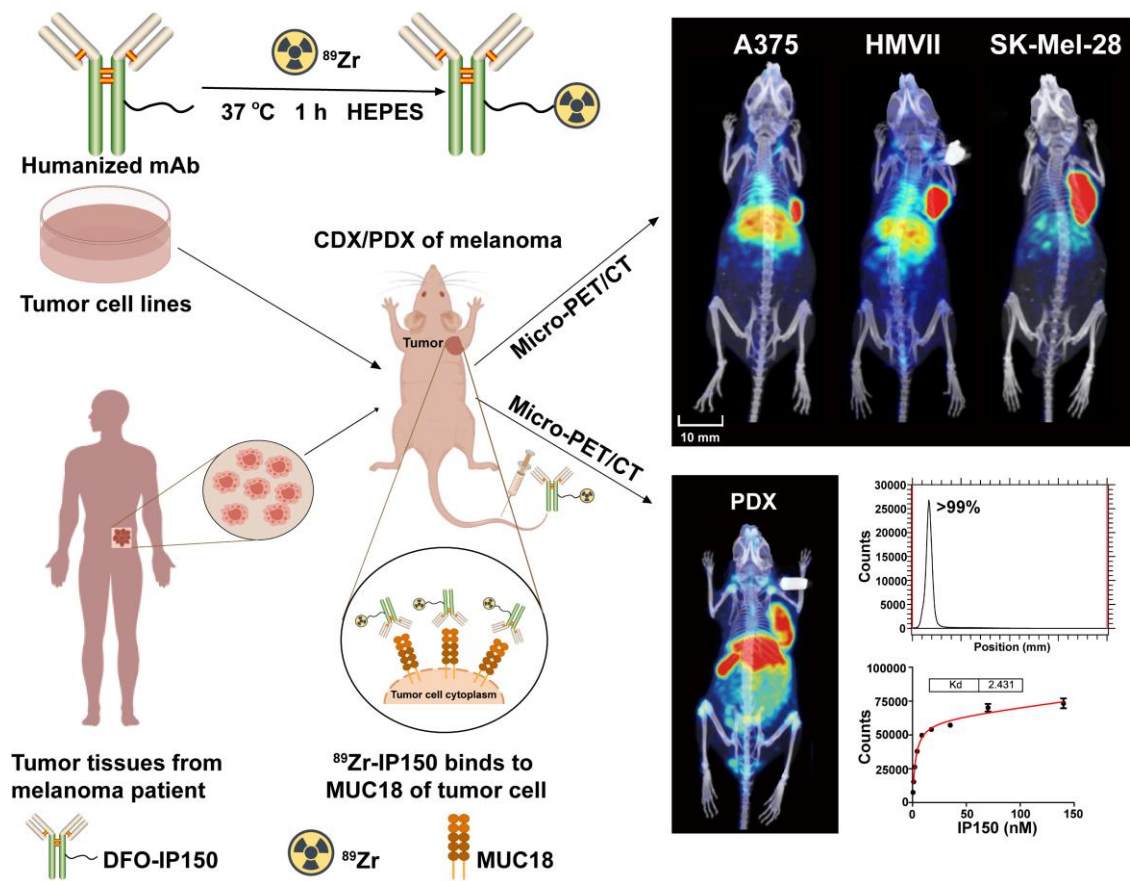


Graphical Abstract



^{89}Zr -IP150 can be used to image various CDXs of humanized melanoma, and for the first time, the clinical conversion potential of ^{89}Zr -IP150 was explored using a more clinically representative melanoma PDX model.

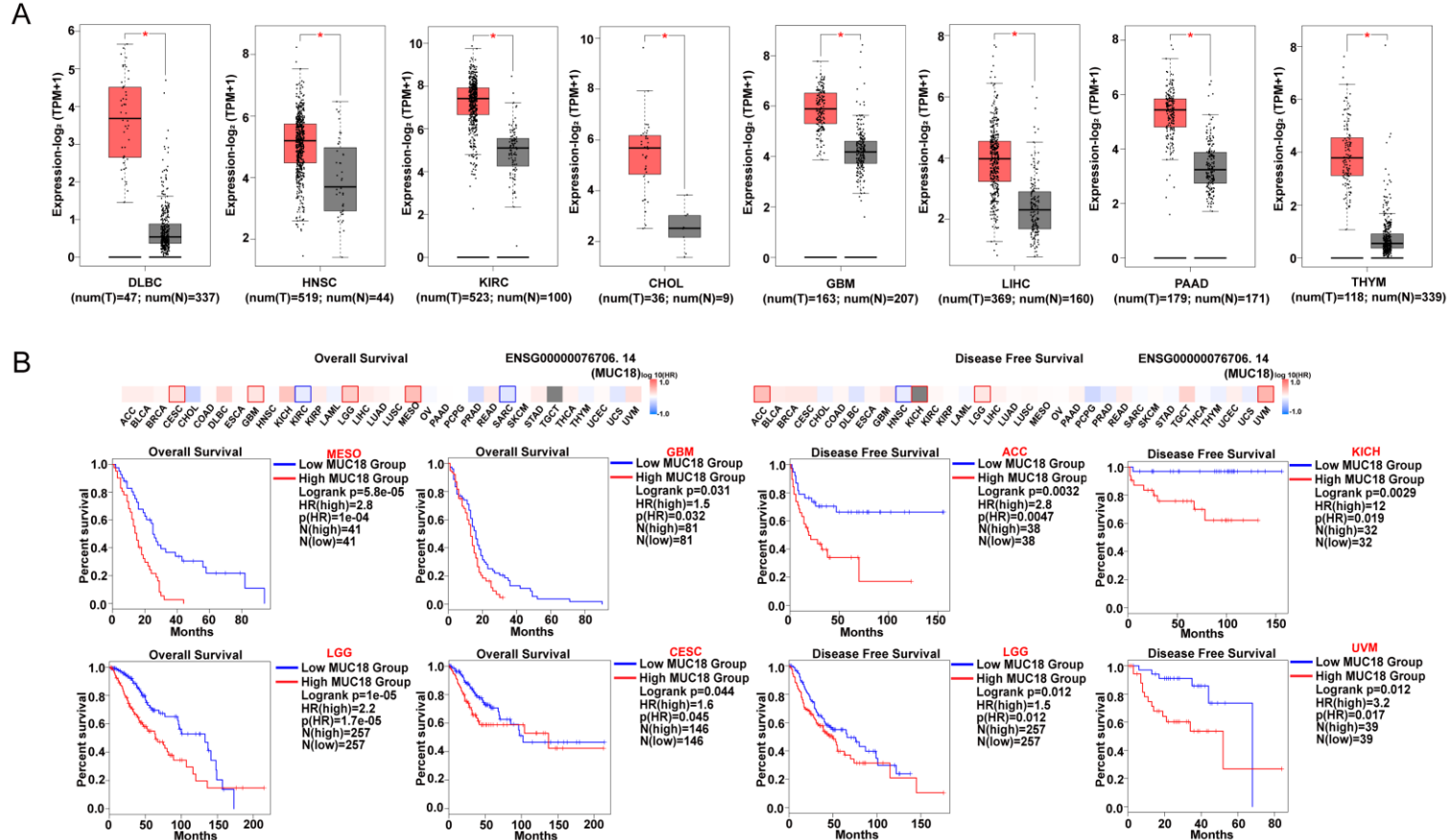


Figure 1. Analysis of GEPIA2 outputs. **(A)** Comparisons of MUC18 expression levels between tumor and non-tumor control tissues (The expression levels showed significant difference between tumor and normal); red, expression levels of tumor, black, expression levels of non-tumor; *, $p < 0.05$. **(B)** The prognostic impacts of MUC18 expression level based on the survival heat map. The heat map shows the hazard ratios in logarithmic scale (\log_{10}) for MUC18. The red and blue blocks denote higher and lower risks, respectively. The rectangles with red frames mean the significant unfavorable results in prognostic analyses.

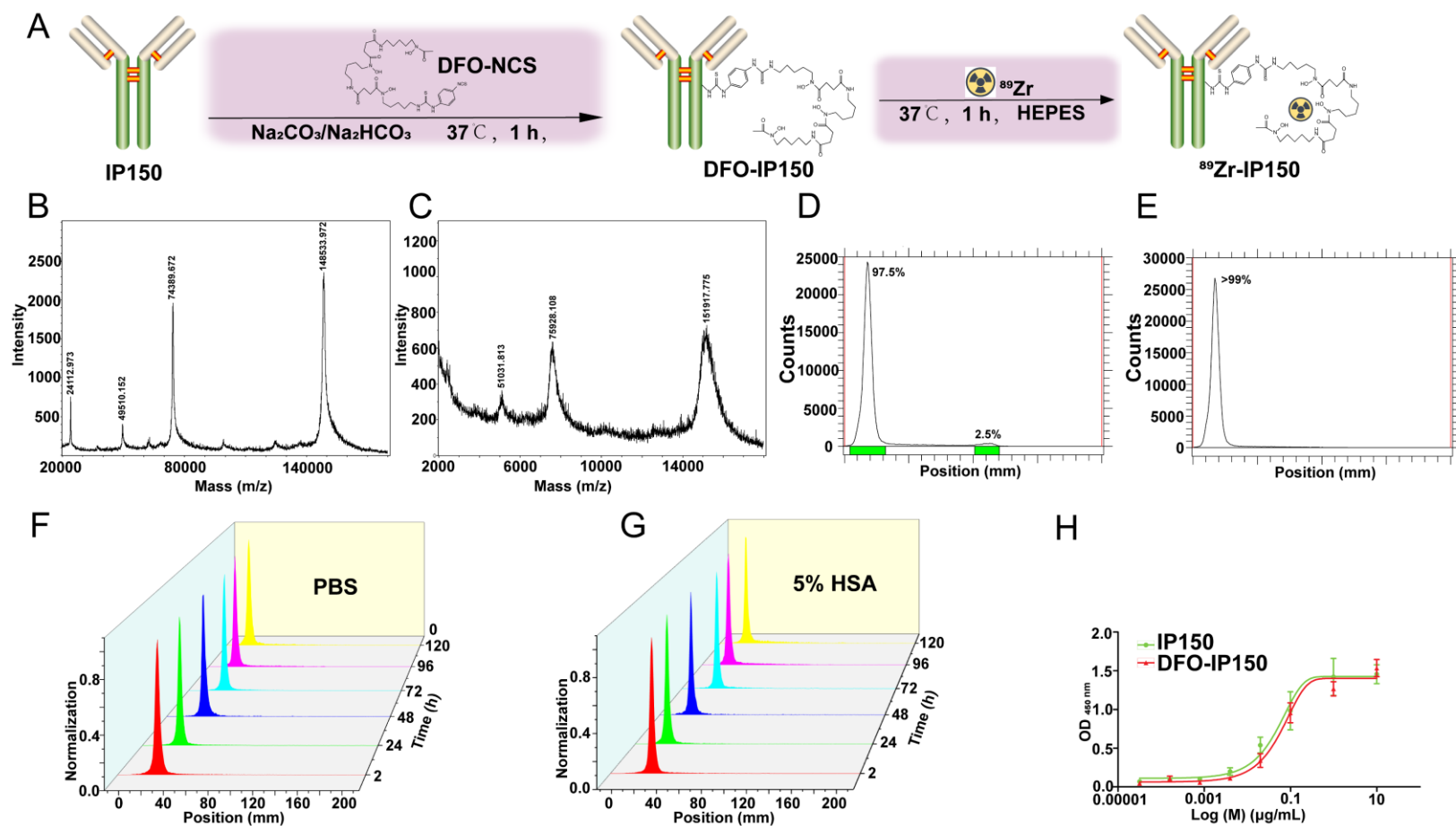


Figure 2. (A) Scheme of the ^{89}Zr -labeled IP150. (B), (C) Average molecular weight of IP150 and DFO-IP150 as measured by MALDI-TOF-MS. (D) (E) The radiochemical purity of unpurified/purified ^{89}Zr -IP150. (F), (G) In vitro stability analysis of ^{89}Zr -IP150 over time in 0.01 M pH 7.4 PBS and 5% HSA at RT. (H) Comparison of the binding ability of IP150 and DFO-IP150 to the MUC18 protein by ELISA assay.

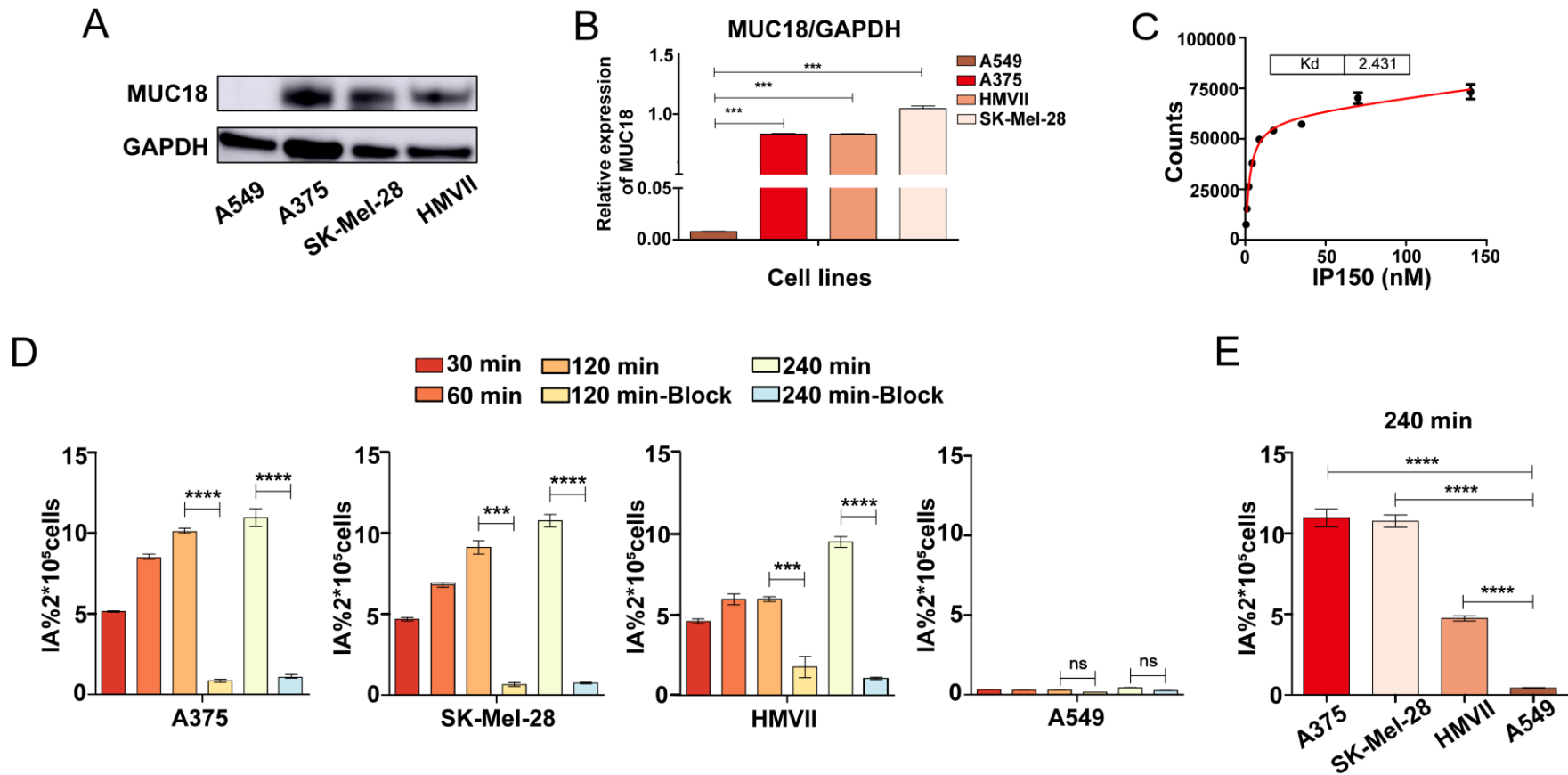


Figure 3. (A) (B) Protein expression levels of MUC18 in different human melanoma cell lines and human lung cancer cell. (C) Receptor binding assay of ^{89}Zr -IP150 in A375 cell line. (D) Cellular uptake of ^{89}Zr -IP150 in A375, SK-Mel-28 (cutaneous melanoma), HMVII (mucosal melanoma). (E) Comparison of the uptake in four cell lines at 240 min. ***, $p < 0.001$; ****, $p < 0.0001$.

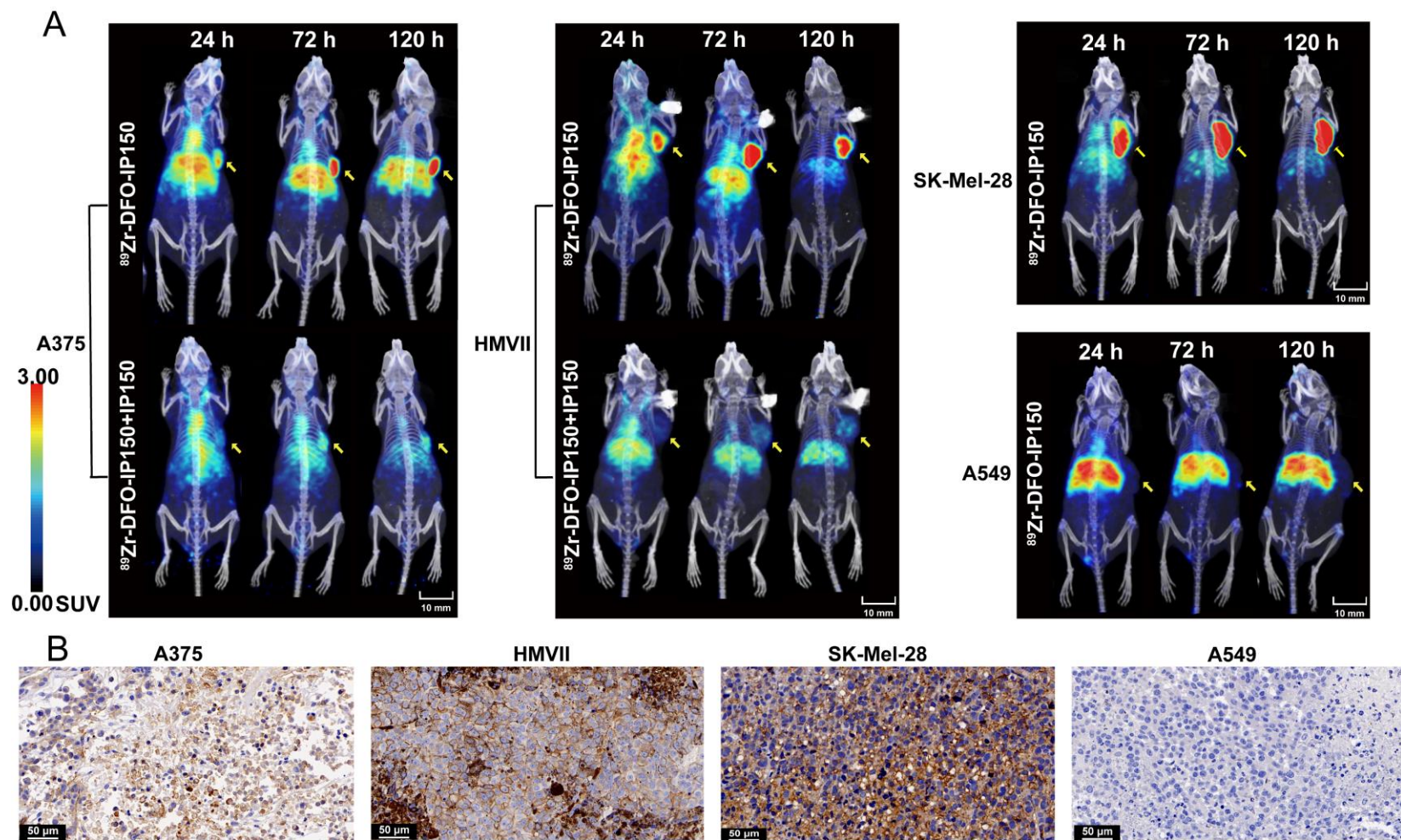


Figure 4. (A) Micro-PET/CT images of A375 tumor-bearing mice acquired 24, 72 and 120 hours after administration of $^{89}\text{Zr-IP150}$ (80 μCi , 15 μg , in 200 μL PBS) via tail-vein injections ($n = 3/\text{group}$). **(B)** IHC staining of MUC18 in A375, HMVII, SK-Mel-28 and A549.

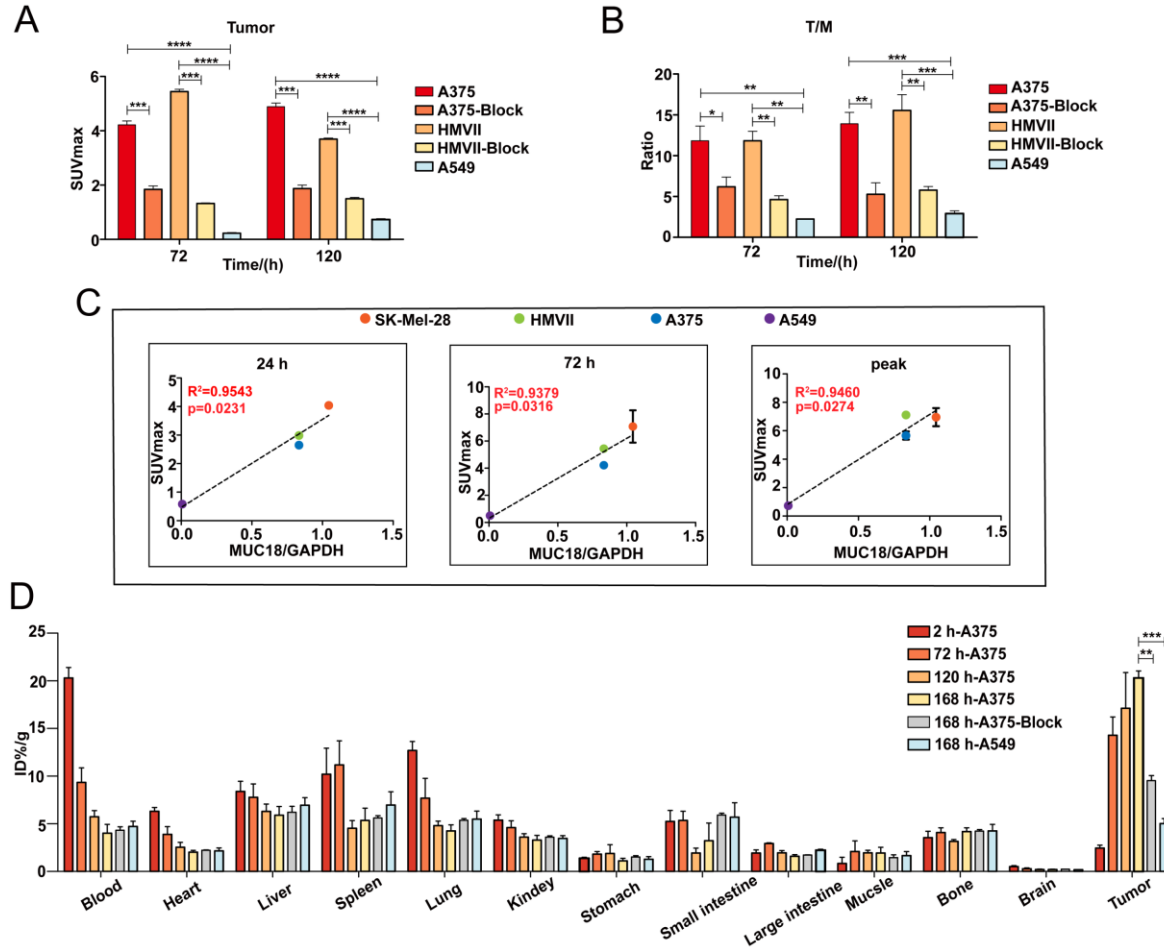


Figure 5. (A) (B) Region of interest (ROI) analysis of the PET images. values are presented as SUVmax($n = 3$). **(C)** Correlation analysis between SUVmax value and CD146 expression. **(D)** Ex-vivo biodistributions of A375 and A549 models at 2 h, 72 h, 120 h and 168 h p.i. ($n = 3$ /group). *, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$; ****, $p < 0.0001$.

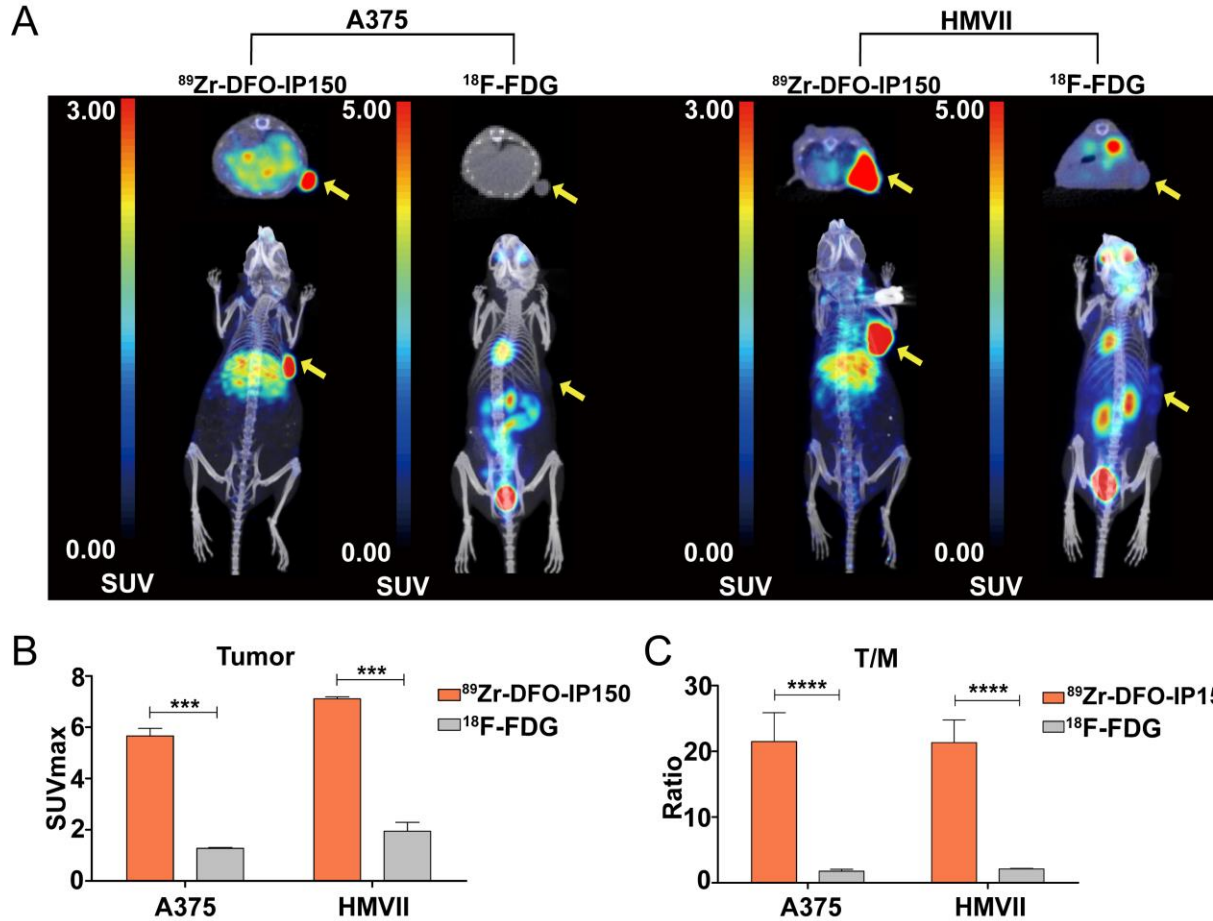


Figure 6. (A) Comparison of the Micro-PET/CT images of A375, HmVII tumor-bearing mice after administration of $^{89}\text{Zr-IP150}$ (80 μCi , 15 μg , in 200 μL PBS) and $^{18}\text{F-FDG}$ via tail-vein injections ($n = 3/\text{group}$). (B), (C) ROI and tumor/muscle ratio analysis of the PET images. values are presented as SUVmax($n = 3$). ***, $p < 0.001$; ****, $p < 0.0001$.

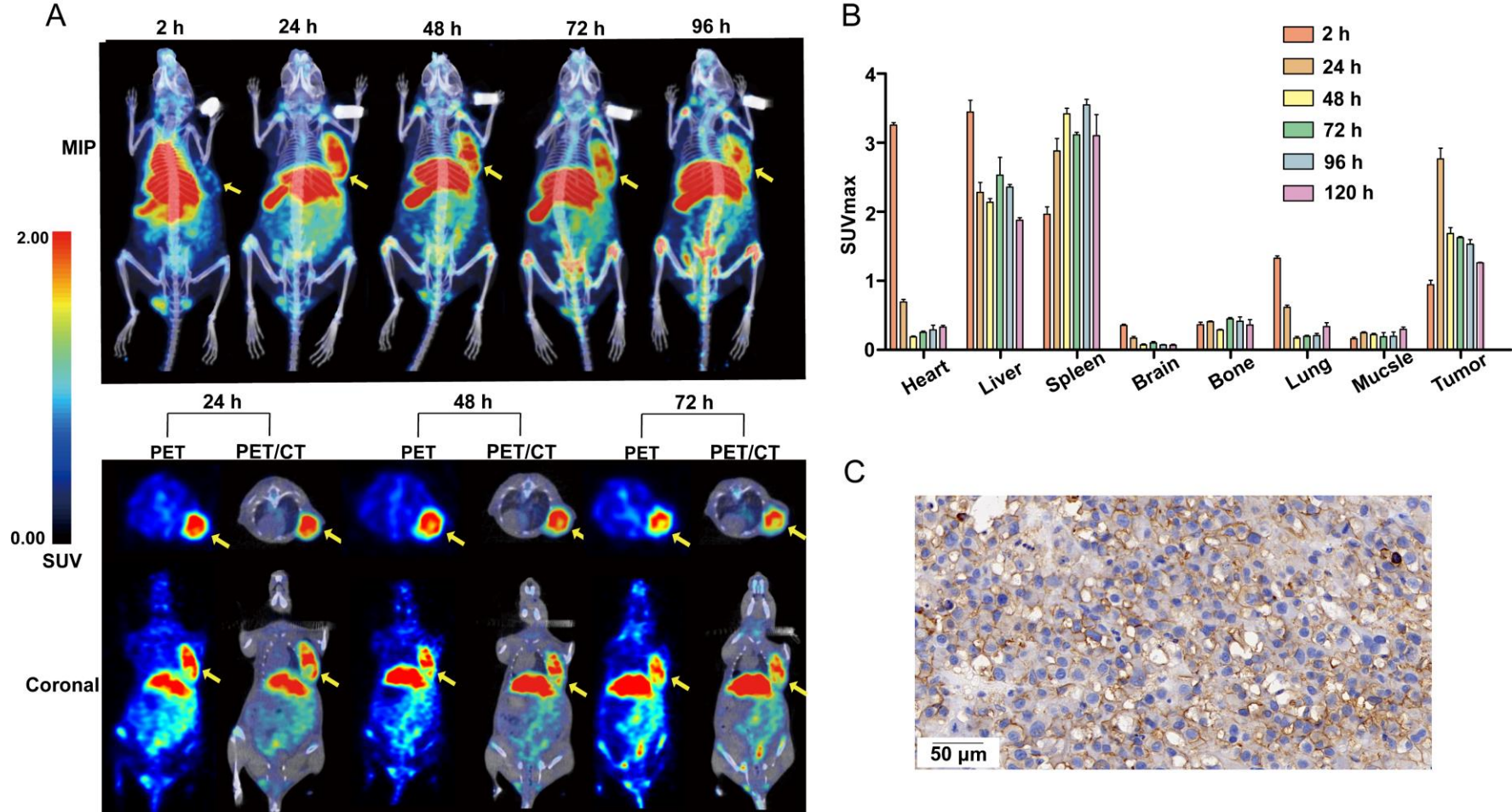


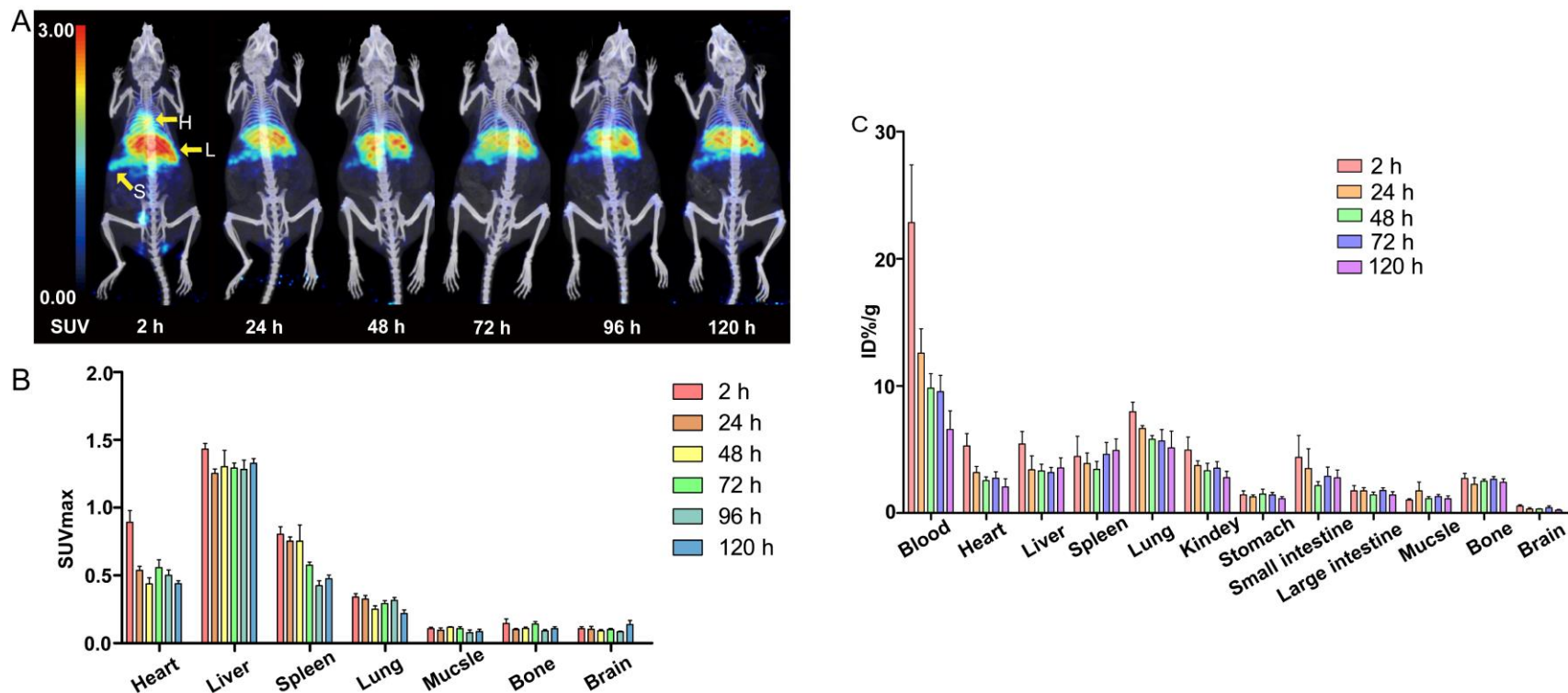
Figure 7. (A) MIP images and Coronal images of human melanoma PDX model (acrak lentiginous), after administration of ^{89}Zr -IP150 (80 μCi , 15 μg , in 200 μL PBS) via tail-vein injections (n = 3/group). (B) ROI analysis of the PET images, values are presented as SUVmax (n = 3). (C) IHC staining of MUC18 in PDX model.

Table 1. Quality Control of ^{89}Zr -IP150

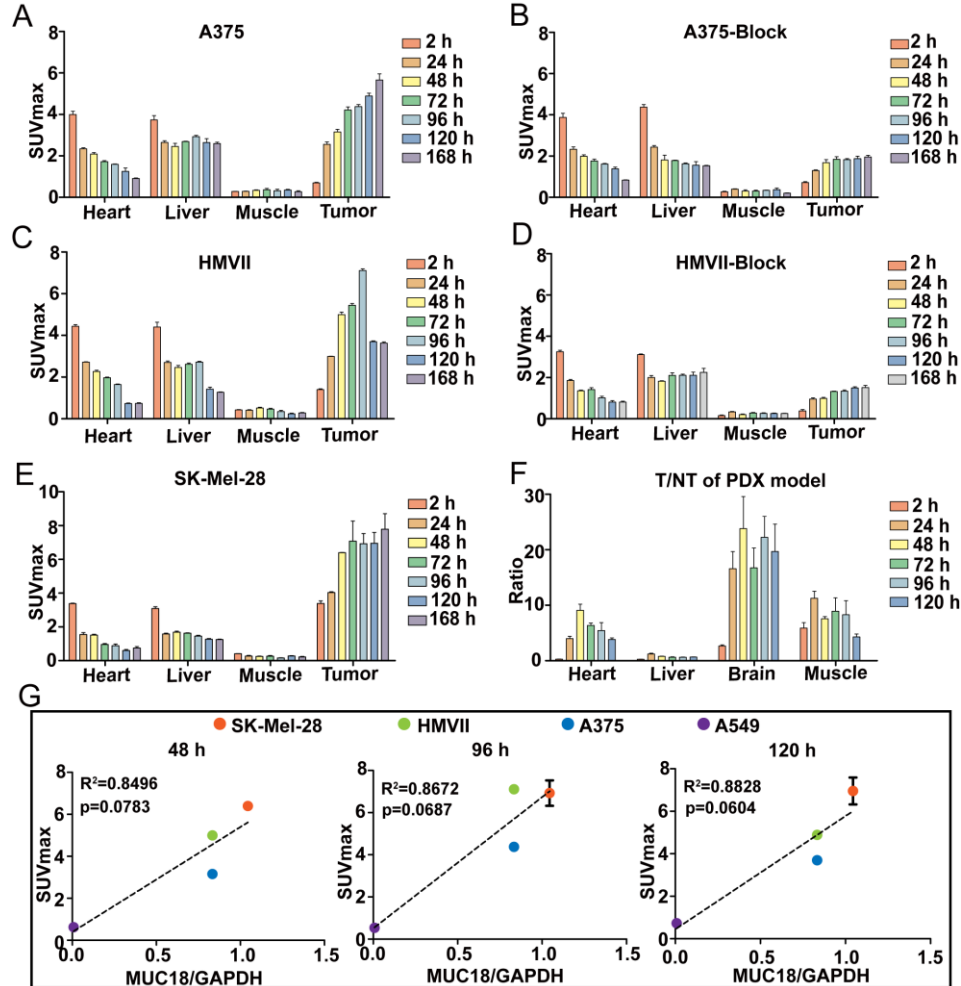
Parameters	Quality Control Speciffcation	Quality Control Result
Appearance	Clear, colorless	Clear, colorless
Volume	1-2 mL	1.5 mL
pH	5.0-8.0	7.4
Radiochemistry purity (iTLC)	> 95%	>99%
Ethanol	<5%	Pass
Endotoxins	< 15 EU/mL	Pass
Sterility	Sterile	Pass
Speciffc activity (GBq/ μmol)	18.5 – 296.0 GBq/ μmol	28.22 ± 8.53

Table 2. Human Organ Radiation Dosimetry Estimation of ^{89}Zr -IP150 in Adult Female Patients Using OLINDA/EXM 1.0

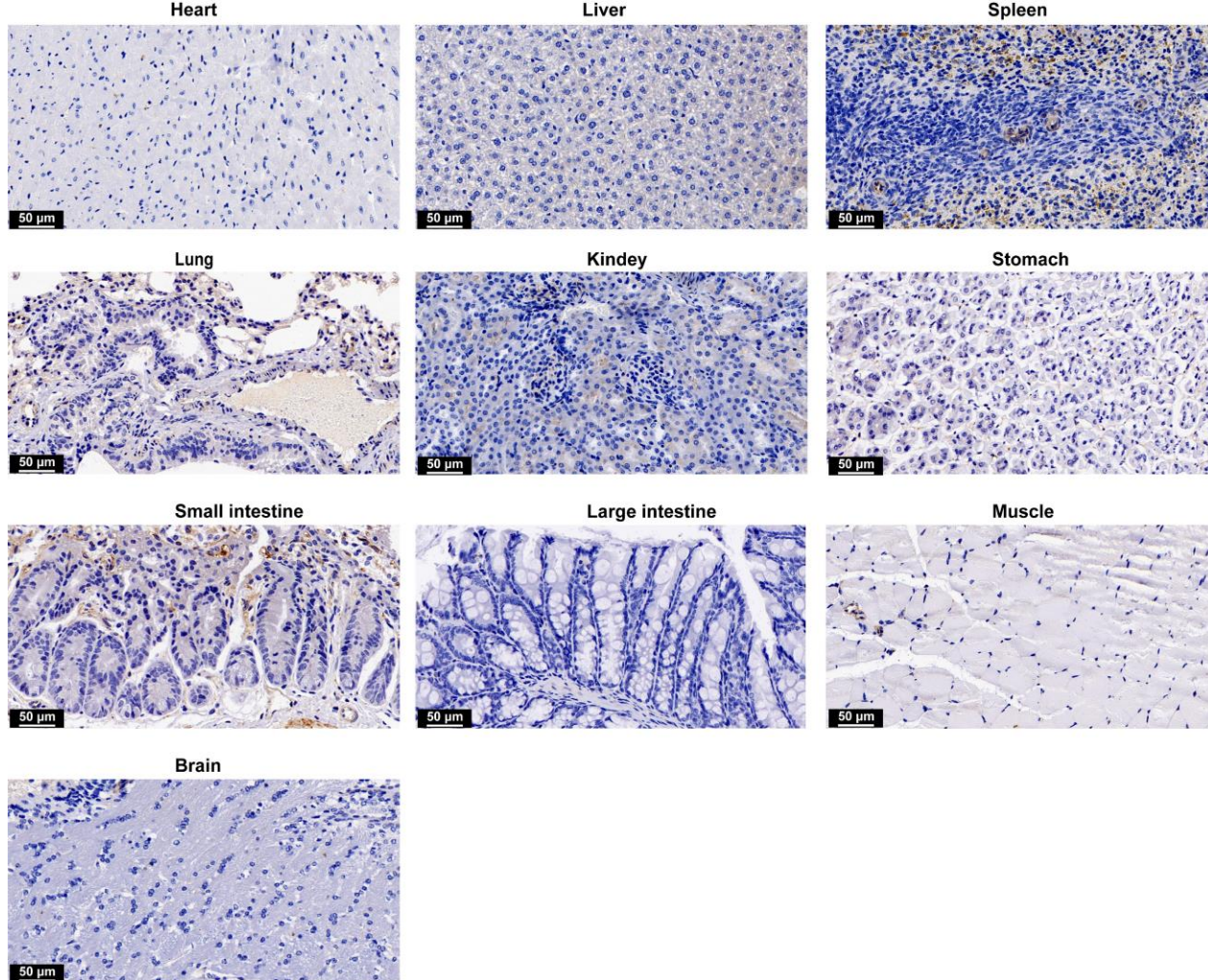
Target Organ	Total (mGy/MBq)
Adrenals	1.10E-01
Brain	6.99E-02
Breasts	2.25E-02
Esophagus	7.22E-02
Eyes	1.69E-02
Gallbladder Wall	6.38E-02
Left colon	3.48E-02
Small Intestine	1.23E-01
Stomach Wall	5.47E-02
Right colon	3.22E-02
Rectum	6.37E-02
Heart Wall	1.08E-01
Kidneys	1.17E-01
Liver	2.18E-01
Lungs	1.95E-01
Ovaries	1.73E-02
Pancreas	6.73E-02
Salivary Glands	1.66E-02
Red Marrow	3.14E-02
Osteogenic Cells	3.71E-02
Spleen	2.11E-01
Thymus	6.37E-02
Thyroid	3.19E-02
Urinary Bladder Wall	1.25E-02
Uterus	2.48E-02
Total Body	3.02E-02
Effective Dose(mSV/MBq)	6.45E-02



Supplementary Figure 1. (A) Micro-PET/CT images of KM mice after administration of ^{89}Zr -IP150 (80 μCi , 15 μg , in 200 μL PBS) via tail-vein injections ($n = 3/\text{group}$). (B) ROI analysis of the PET images, values are presented as SUVmax($n = 3$). (C) Ex vivo biodistributions of KM mice at 2 h, 24 h, 48 h, 72 h and 120 h p.i. ($n = 3/\text{group}$).



Supplementary Figure 2. (A) (B) (C) (D) (E) ROI analysis of the PET images. (F) T/NT of PDX models. values are presented as SUVmax (n = 3). (G) Correlation analysis between SUVmax value at 48, 96, 120 h and MUC18 expression.



Supplementary Figure 3. IHC staining of MUC18 in normal tissues of PDX model.