Materials and Methods

In vitro serum stability

^{68}Ga-NEB was mixed with 50 μL aliquots of phosphate buffered saline (PBS) or mouse serum and incubated at 37 ºC. At 30, 60 and 120 min, the aliquots were mixed with an equal volume of CH_3CN, the layers were assayed to determine extraction efficiency, and a portion of the supernatant was subjected to radio-HPLC analysis using an on-line radioactivity detector.

Ex vivo biodistribution

Around 1.85 MBq of ^{68}Ga-NEB was injected *via* tail vein in 25 BALB/C mice. At different time points after tracer injection (5 min, 30 min, 1 h, 3 h and 6 h, n = 5/time point), the mice were sacrificed for tissue and organ collection, including blood, muscle, bone, liver, kidney, spleen, pancreas, stomach, intestine, heart and lung. The samples were weighed, and measured for radioactivity in a γ-counter (Wallac 1470-002, Perkin-Elmer). The results are presented as percentage injected dose per gram of tissue (%ID/g).

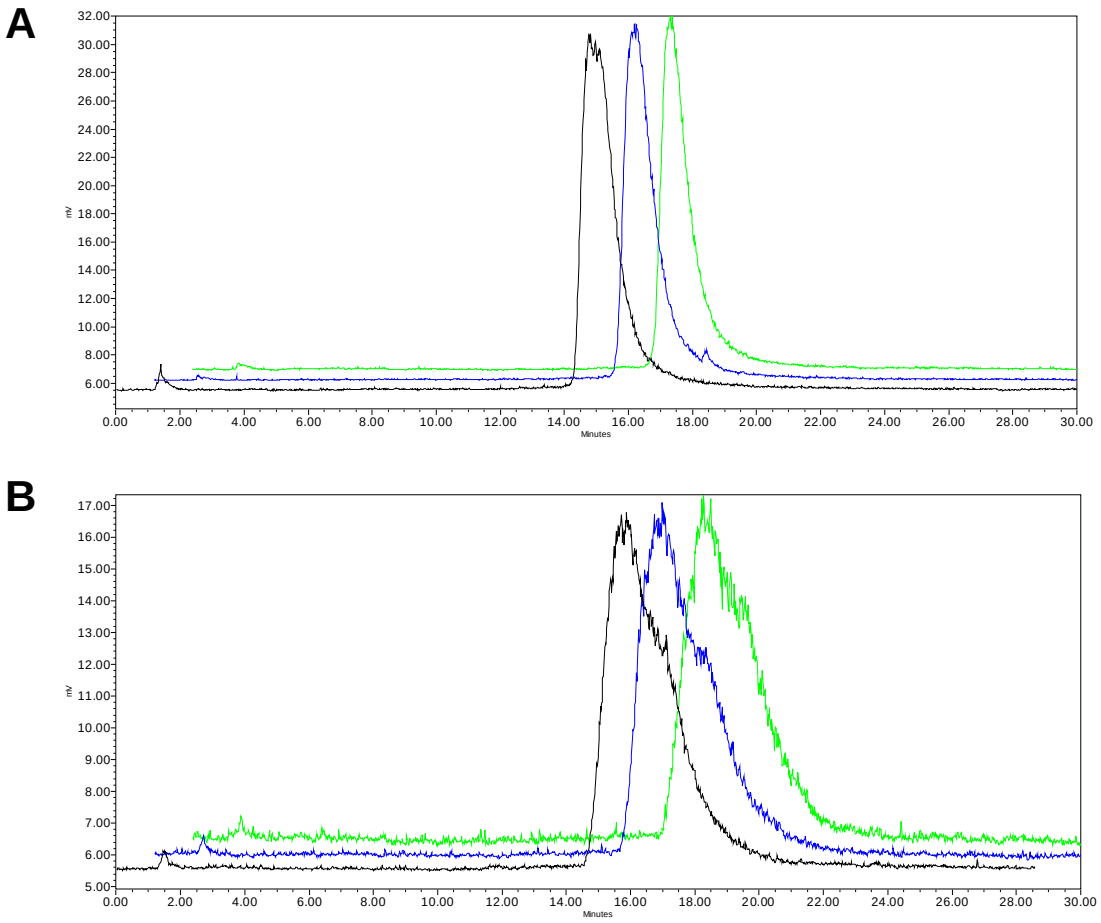
Dosimetry

Estimated human-absorbed doses of ^{68}Ga-NEB were calculated by using the biodistribution data in non-tumor-bearing BALB/c mice (Figure S2). Determination of organ doses and the effective dose for a reference human male were made using the OLINDA/EXM program (Vanderbilt University, Nashville, TN). The effective dose is the sum of the doses to individual organs times a tissue-weighting factor for that organ.

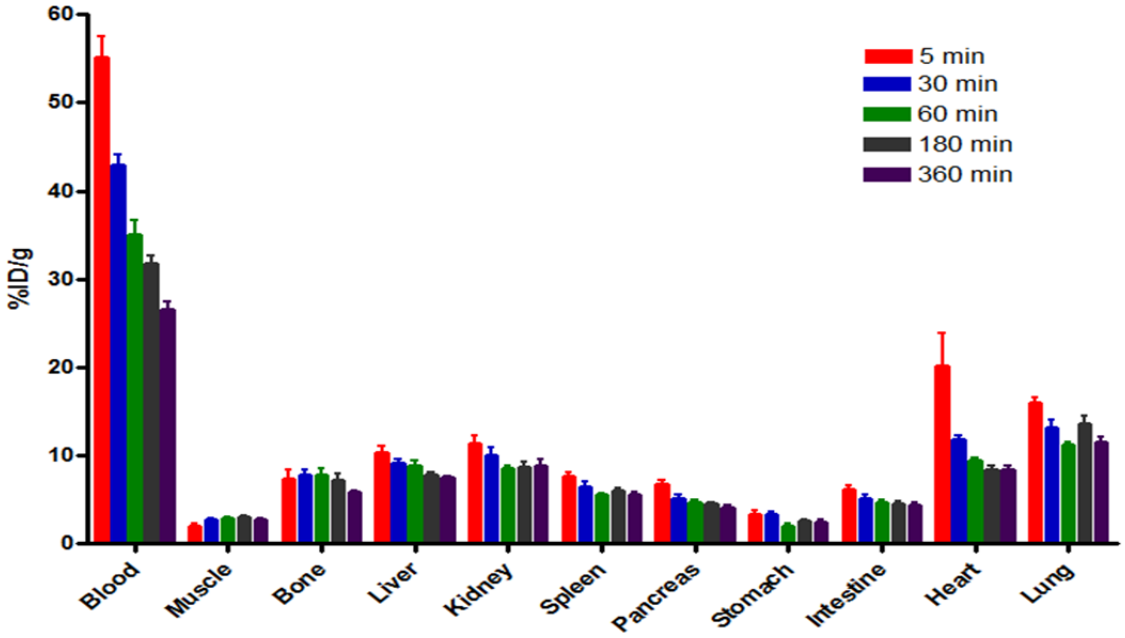
Patient recruitment

All the patients were recruited following strict inclusion and exclusion criteria. The inclusion criteria include (1) being identified with hepatic lesion(s) by MRI and/or CT. The lesions are

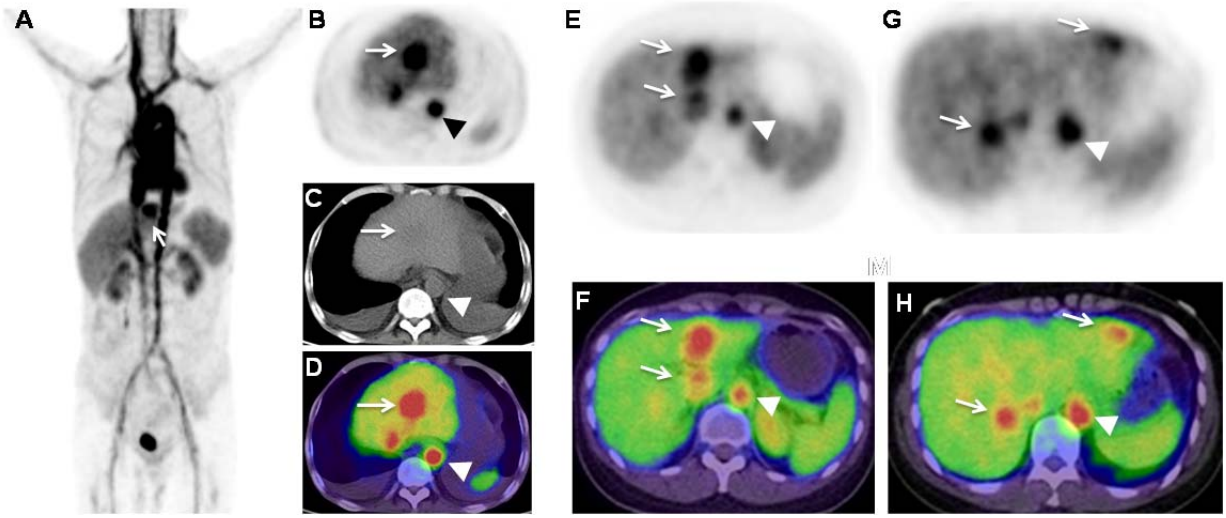
suspected as hemangioma, or hepatic malignancy, and need differentiation from other benign diseases with undergoing surgery or biopsy; (2) at least 18 years old; and (3) able to provide basic information and sign the written informed consent. The exclusion criteria are as the following: (1) female patients in pregnancy or breast feeding; (2) impaired renal function with serum creatinine > 3.0 mg/dl (270 μM); (3) impaired liver function with level of any hepatic enzyme was 5 times or more than normal upper limit; (4) known to have severe allergy or hypersensitivity to IV radiographic contrast; (5) claustrophobia to accept the PET/CT scanning; (6) inability to persist laying down in the scanning system due to cough, pain, etc.; (7) any other medical condition that, according to the investigator, may significantly interfere with the study.



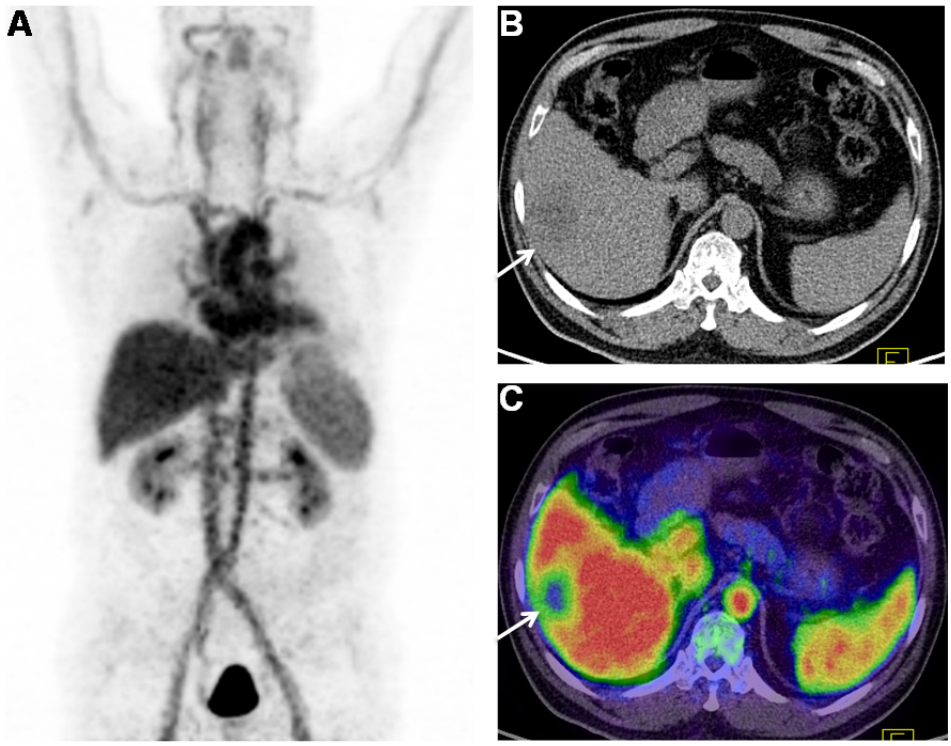
Supplemental Figure 1. *In vitro* stability assay of ^{68}Ga-NEB in PBS and serum. *In vitro* stability assay with PBS (**A**) and mouse serum (**B**). The black line denotes 30 min, blue 60 min and green 120 min.



Supplemental Figure 2. Decay corrected biodistribution of ^{68}Ga-NEB in normal Balb/C mice (n = 5/group)



Supplemental Figure 3. ^{68}Ga-NEB PET of a patient with multiple hemangiomas. The lesion located in the left lobe was discerned on the whole body MIP of PET (**A**). Different lesions of hemangioma were pointed out by arrows while the abdominal aorta was pointed out by triangle (**B-H**).



Supplemental Figure 4. ^{68}Ga-NEB PET of a patient hepatocellular carcinoma. A case of hepatocellular carcinoma presented by whole body MIP of PET (**A**), transaxial CT (**B**) and ^{68}Ga-NEB PET/CT (**C**). ^{68}Ga-NEB PET showed decreased accumulation of radioactivity within the hepatic nodule.

Supplemental Table 1. Absorbed dose estimated by intravenous administration of ^{68}Ga-NEB in Balb/C mice (mSv/MBq).

Target organ	Absorbed Dose
Adrenals	0.01370 ~ 0.01410
Brain	0.00868 ~ 0.01040
Breasts	0.00881 ~ 0.01000
Gallbladder Wall	0.01470 ~ 0.01490
LLI Wall	0.01040 ~ 0.01190
Small Intestine	0.01140 ~ 0.01280
Stomach Wall	0.01170 ~ 0.01270
ULI Wall	0.01150 ~ 0.01280
Heart Wall	0.03290 ~ 0.04530
Kidneys	0.10400 ~ 0.13500
Liver	0.04440 ~ 0.05750
Lungs	0.01970 ~ 0.02360
Muscle	0.00946 ~ 0.01100
Ovaries	0.01080 ~ 0.01220
Pancreas	0.06250 ~ 0.08210
Red Marrow	0.00882 ~ 0.00973
Osteogenic Cells	0.01330 ~ 0.01530
Skin	0.00804 ~ 0.00925
Spleen	0.02630 ~ 0.03170
Testes	0.00896 ~ 0.01030
Thymus	0.01010 ~ 0.01120
Thyroid	0.00936 ~ 0.01070
Urinary Bladder Wall	0.01020 ~ 0.01170
Uterus	0.01080 ~ 0.01230
Total Body	0.01460 ~ 0.01460
Effective Dose Equivalent	0.02510 ~ 0.02970
Effective Dose	0.01510 ~ 0.01590