Imaging of Pleural Metastatic Lung Cancer using a ^{177}Lu-labled anti-CD55 antibody

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1. Introduction

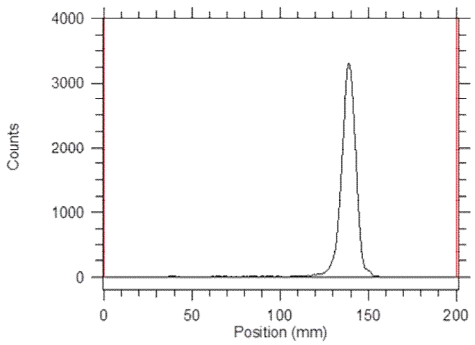
Pleural metastasis is a frequent cause of pain and dyspnea in patients with advanced cancer [1,2]. Treatment of pleural metastasis consists of tube thoracostomy and pleurodesis using sclerosing agents such as talc and Viscum album. However, in many cases, pleural metastases are refractory to these treatments because they are not primary systemic therapies that target metastatic lung cancer cells [3]. Therefore, in this study, we describe the imaging efficacy of ^{177}Lu-labeled antibody to target the CD55-expressing pleural metastatic lung cancer cells.

2. Methods and Results

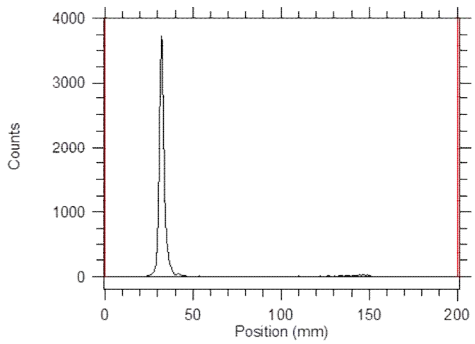
2.1 Preparation of ^{177}Lu-labeled anti-CD55 antibody

An anti-CD55-specific antibody was incubated with a 50-fold molar excess of p-SCN-Bn-CHX-A"-DTPA in 0.1 mol/L $NaHCO_3$ buffer (pH 8.2) and conjugated antibodies purified. The p-SCN-Bn-CHX-A"-DTPA-conjugated anti-CD55 antibody was labeled with ^{177}Lu in 0.1 mol/L ammonium acetate buffer (pH 5.4) for 30 min at room temperature.

As shown in Fig. 1, the ^{177}Lu was labeled with anti CD55 antibody by high radiochemical purity (>98%).



(a)



(b)

Fig. 1 Typical iTLC profiles of ^{177}Lu (a) and ^{177}Lu-anti CD55 antibody (b)

2.2 Stability of ^{177}Lu-labeled anti-CD55 antibody

^{177}Lu-anti CD55 antibody was stable in human serum at 37 ℃ for 7 days.

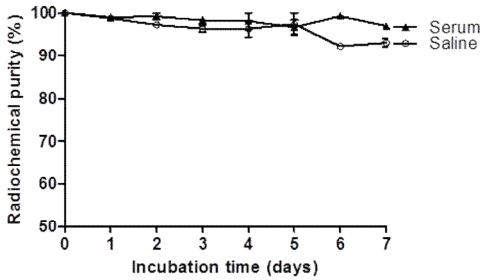


Fig. 2 *In vitro* stability of ^{177}Lu-anti CD55 antibody in saline and human serum

2.3 Binding and internalization characteristics

Saturation binding analyses were performed as described previously [4]. ^{177}Lu-anti CD55 antibody bound with high affinity to H460 cells, with a Kd of 7.149 ± 5.144 nmol/L and a Bmax of 30 ± 7.218 fmol/mg.

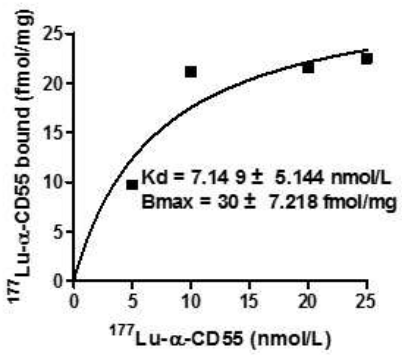


Fig. 3 Saturation binding assays of ^{177}Lu-anti CD55 antibody in H460 cells

Internalization was performed in 6 well plates as described by Hanwen et al [5]. As shown in Fig. 4, ^{177}Lu-anti-CD55 antibody showed a fast cell uptake, which reached a plateau within 1 hour of incubation at 37℃ in H460 cells.

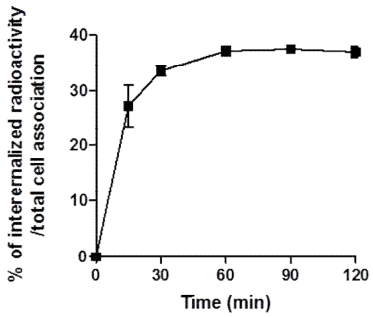


Fig. 4 Internalization rate of ^{177}Lu-anti CD55 antibody into H460 cells

2.4 Imaging study of ^{177}Lu-labeled anti-CD55 antibody

H460-pleural metastatic mice model were scanned to 3 hour and 24 hour post injection of ^{177}Lu-anti CD55 antibody and SPECT-CT images were acquired. Tumors in the chest cavity were visualized by the ^{177}Lu-anti-CD55 antibody.

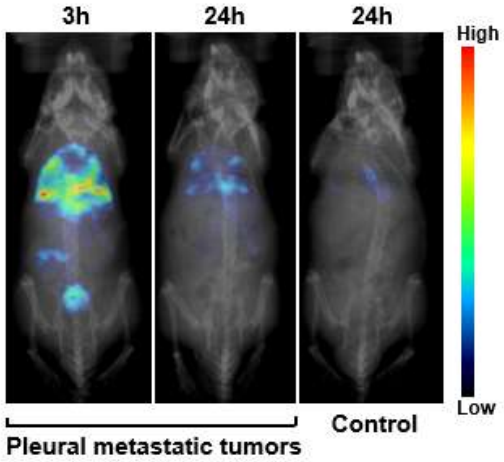


Fig. 5 SPECT-CT images from H460-pleural metastatic mice model.

3. Conclusions

These results suggest that ^{177}Lu-anti-CD55 antibody has promising characteristics as a novel nuclear medicine, especially for the imaging of CD55-expressing pleural metastatic lung cancer.

Acknowledgement

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