

Beijing Dilun Biotechnology Co., Ltd.

Specializes in R&D and manufacturing of peptide synthesis equipment, providing comprehensive technical solutions and services.

Web: www.peptidescientific.com Email: chengchao.wei@dilunbio.com

Functional Peptides for Aortic Aneurysm PET Imaging & Vascular Repair

1. Research Background

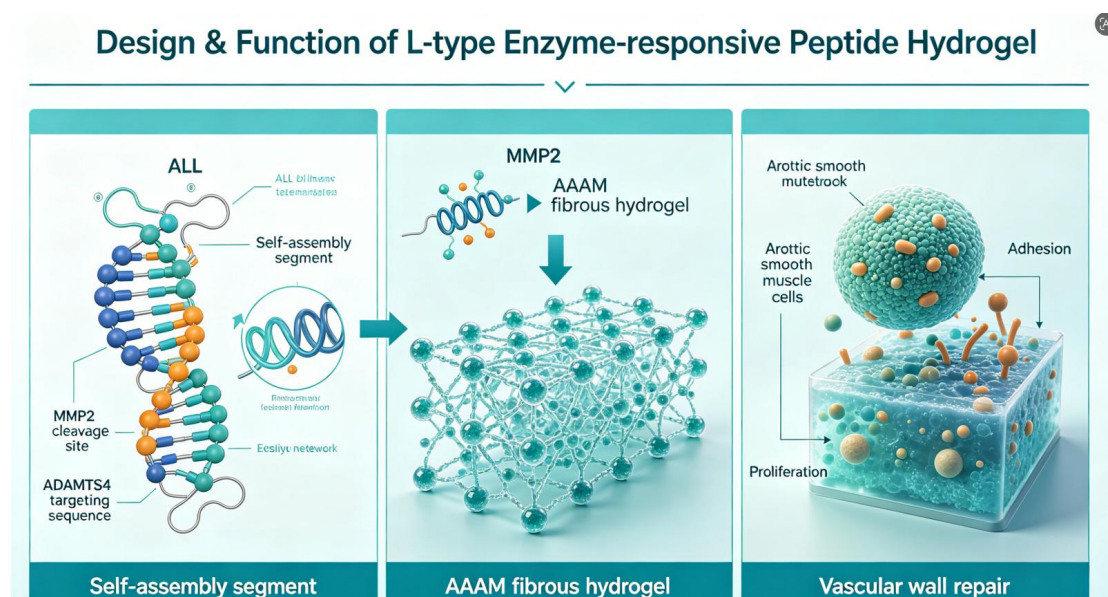
Aortic aneurysm is a high-risk cardiovascular disorder with hidden onset and high rupture mortality, and early accurate imaging diagnosis is critical to reduce clinical fatal risks. Conventional imaging reagents have poor lesion targeting and low in-vivo stability, restricting early screening application. L-type and D-type synthetic peptides stand out as promising diagnostic materials: L-peptides can form enzyme-responsive hydrogels to repair damaged vascular tissue, D-peptides resist protease degradation and maintain long in-vivo half-life, ideal for developing novel PET targeted imaging probes. This research develops two series of functional peptides for aneurysm diagnosis and vascular restoration.

2. Research Purpose and Significance

The study separately designs enzyme-responsive L-type peptide and optimized PD-L1 targeted D-type peptide, prepares corresponding PET radioactive tracers, and verifies their in-vitro bioactivity and in-vivo aneurysm targeting performance via cell and animal models. The findings

provide new raw material options for developing minimally invasive aortic aneurysm diagnostic reagents and injectable repair biomaterials, lay technical reference for industrialized synthesis of medical peptide probes.

3. Research Content



For L-type peptide research, researchers adopt solid-phase synthesis to prepare ALL peptide containing self-assembly segment, MMP2 enzyme cleavage fragment and ADAMTS4 targeted sequence. After MMP2 specific cleavage, ALL turns into AAAM fibrous hydrogel with dense network structure; cell tests confirm AAAM effectively promotes aortic smooth muscle cell adhesion and proliferation, facilitating vessel wall repair. Labeled with gallium-68 via DOTA chelator, the finished probe $^{68}\text{Ga-DOTA-ALL}$ achieves obvious focal accumulation on aortic aneurysm site in mouse PET/CT imaging.

For D-type peptide development, original PD-L1 targeted DPA peptide is optimized by alanine scanning and multimerization modification, DilunBio Peptide Synthesizer :www.peptidescientific.com.

synthesizing 12 single-point mutated peptides (D1~D12) and two multimeric peptides (DP2, DP3). Multiple subcutaneous tumor animal PET screening picks out D3 and DP3 with outstanding target enrichment. Subsequent aneurysm model imaging verifies both two D-peptide probes can gather at aneurysm lesions and realize clear PET visualization.

4.Conclusion & Outlook

Both enzyme-responsive L-peptide hydrogel and optimized D-type targeted peptide show excellent aneurysm targeting and imaging capability, with L-series possessing vascular repair potential and D-series featuring superior metabolic stability for in-vivo imaging. In follow-up development, the team will further optimize peptide sequence to upgrade targeting affinity, simplify synthesis process and cut production cost, explore dual-function formulations integrating diagnosis and vascular repair, accelerate pilot trial and clinical conversion of peptide-based aneurysm diagnostic products.