

Novel Fejervarin peptides promote acute and chronic skin wound healing

Yanmei Zha, Shangjun Jiang, Ting Zhao, Xiao Jin, Yingxia Zhang* Key Laboratory of Tropical Biological Resources of Ministry of Education, School of Pharmaceutical Sciences, Collaborative Innovation Center of One Health, Hainan University, Haikou, China.

MOTIVATION

The healing process of skin wounds is complicated and susceptible to various factors, including accidental injury, microbial infection, skin diseases and metabolic dysfunction. Amphibians are a potential resource of bioactive peptides and have great capacity to recover from wounds.

OBJECTIVE Skin wound healing Peptides Frog

This study aims to identify bioactive peptides with skin wound healing efficacy from skin mucus of Fejervarya frog.

CONCLUSION Cytomembrane ооТуре Ба Smad7

The novel negatively charged Fejervarin (Fej) peptides composed of 8 amino acids were cloned. They are promising multifunctional wound healing agents to reshape the damaged tissue environment, providing an effective strategy for the restoration and regeneration of acute and chronic cutaneous wounds.

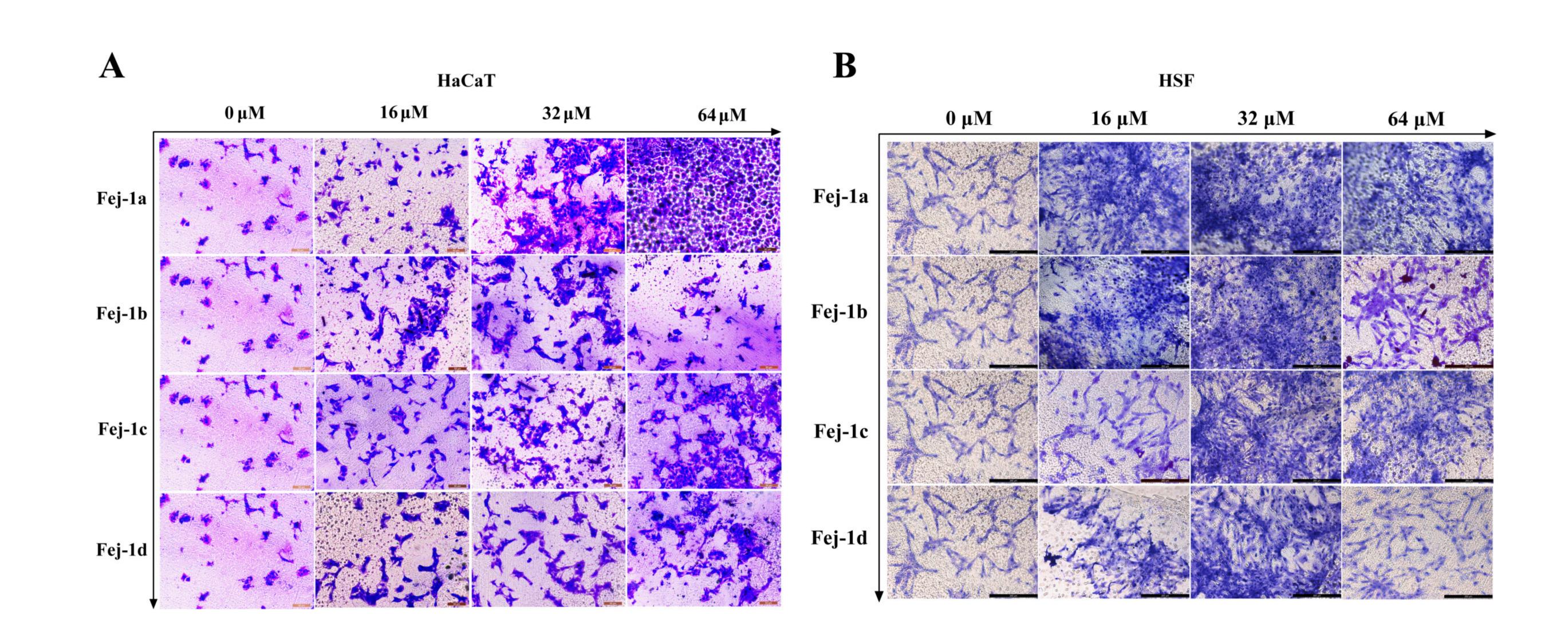


Figure 1. Effect of Fej peptides on cell migration was determined by transwell migration assay. (A) Effect of Fej peptides on HaCaT cells. (B) Effect of Fej peptides on HSF cells. (The magnification of the microscope was 20×; scale bar was 200 μm.)

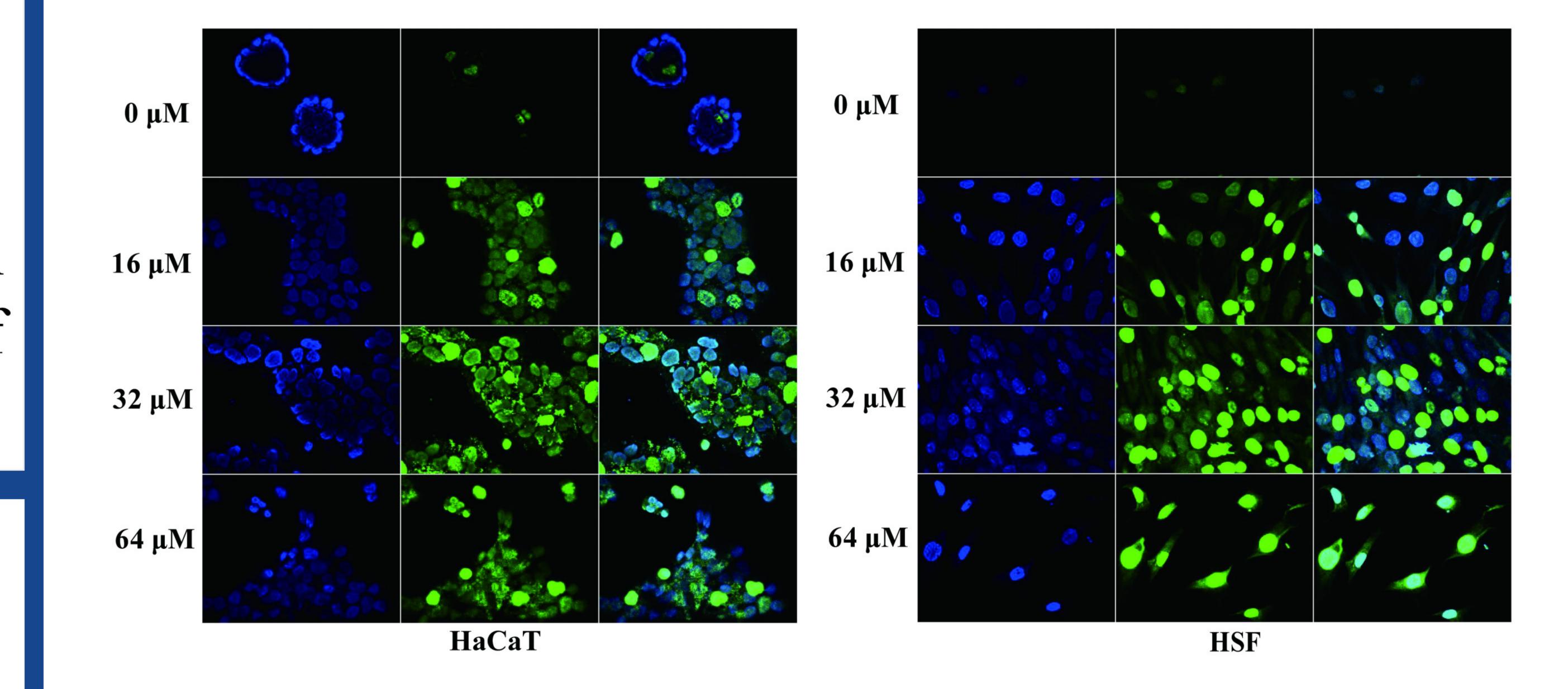


Figure 2. An EdU incorporation assay was used to determine s-phase DNA synthesis of HaCaT and HSF cells. (The magnification of the microscope was 60×; scale bar was 200 μm.)

REEULTS: Fej peptides promote full-thickness skin wound healing.

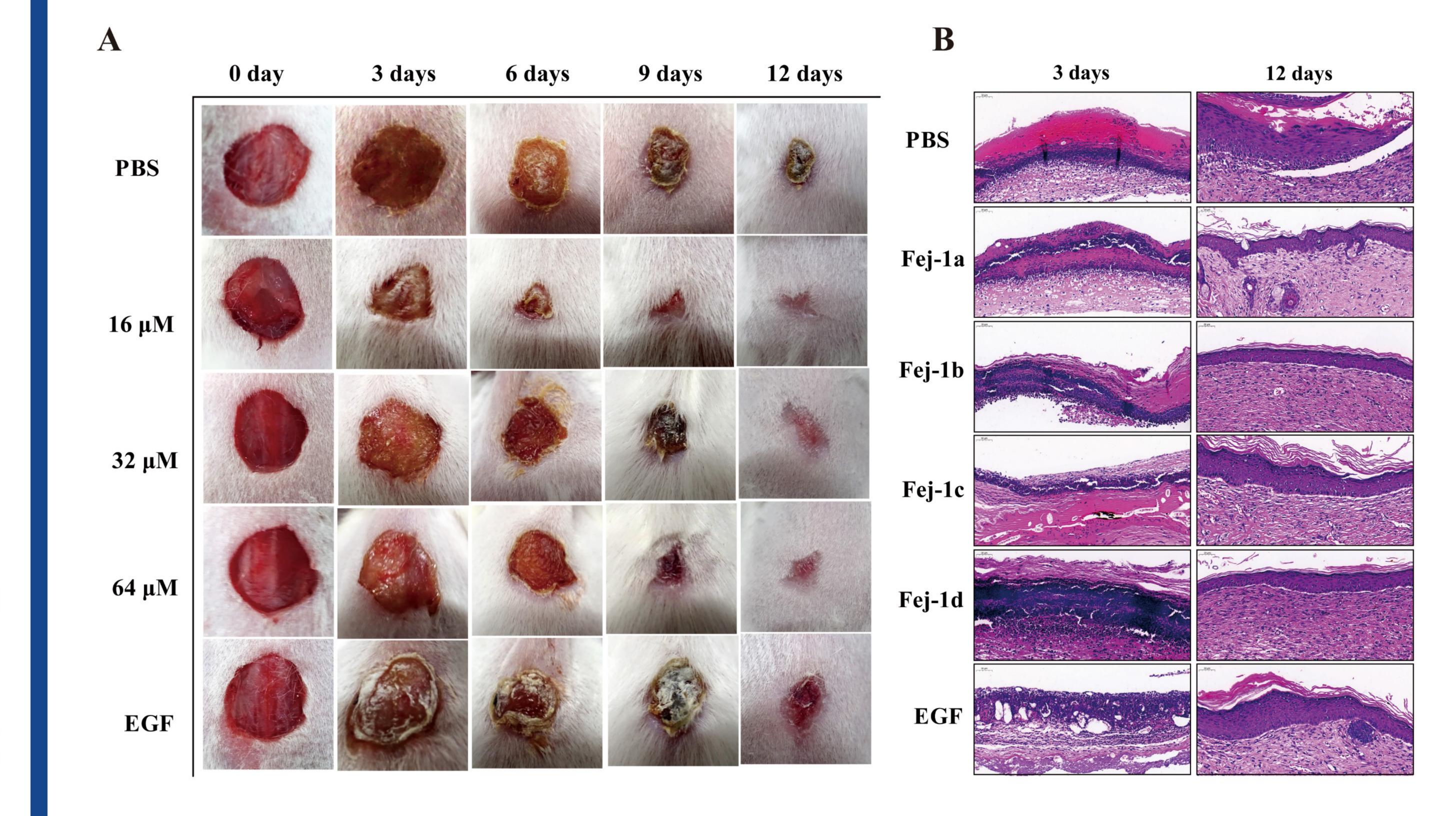


Figure 3. Fej-1a accelerated full-thickness skin wound healing in mice. (A) Representative images of skin wounds treated by PBS, human epidermal growth factor (EGF) and Fej-1a (16 μM, 32 μM and 64 μM). (B) The skin wound sections were stained with hematoxylin and eosin (H&E). (Scale bar was $500 \, \mu m.$)

REEULTS: Fej peptides promote cell proliferation. REEULTS: Fej peptides promote second-degree deep scald wound healing.

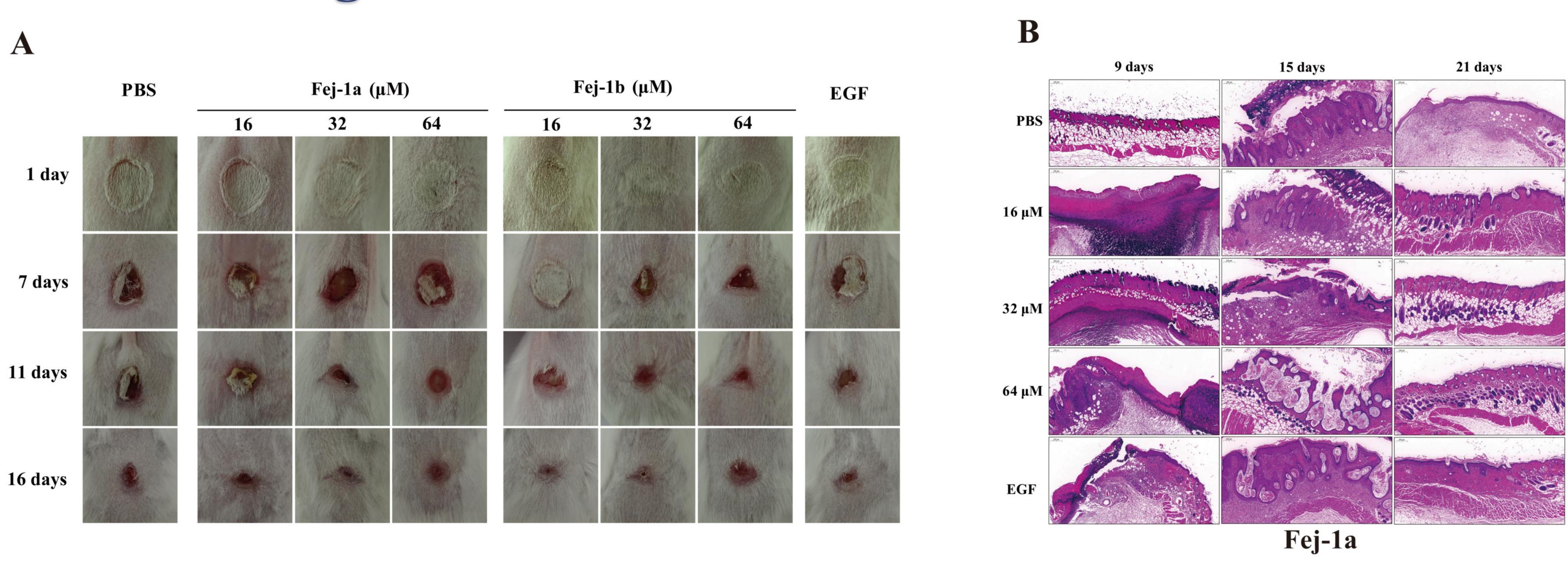


Figure 4. Fej-1a and Fej-1b promoted deep second-degree scald wounds healing in mice. (A) Representative photographs of deep second-degree wounds treated by PBS, EGF and Fej peptides (16μM, 32μM and 64μM). (B) The skin wound sections were stained with H&E. (Scale bar was 500 µm.)

REEULTS: Fej peptides can reduce inflammation and increase the rate of re-epithelialization, leading to accelerated healing by intensify EGF and TGF-B.

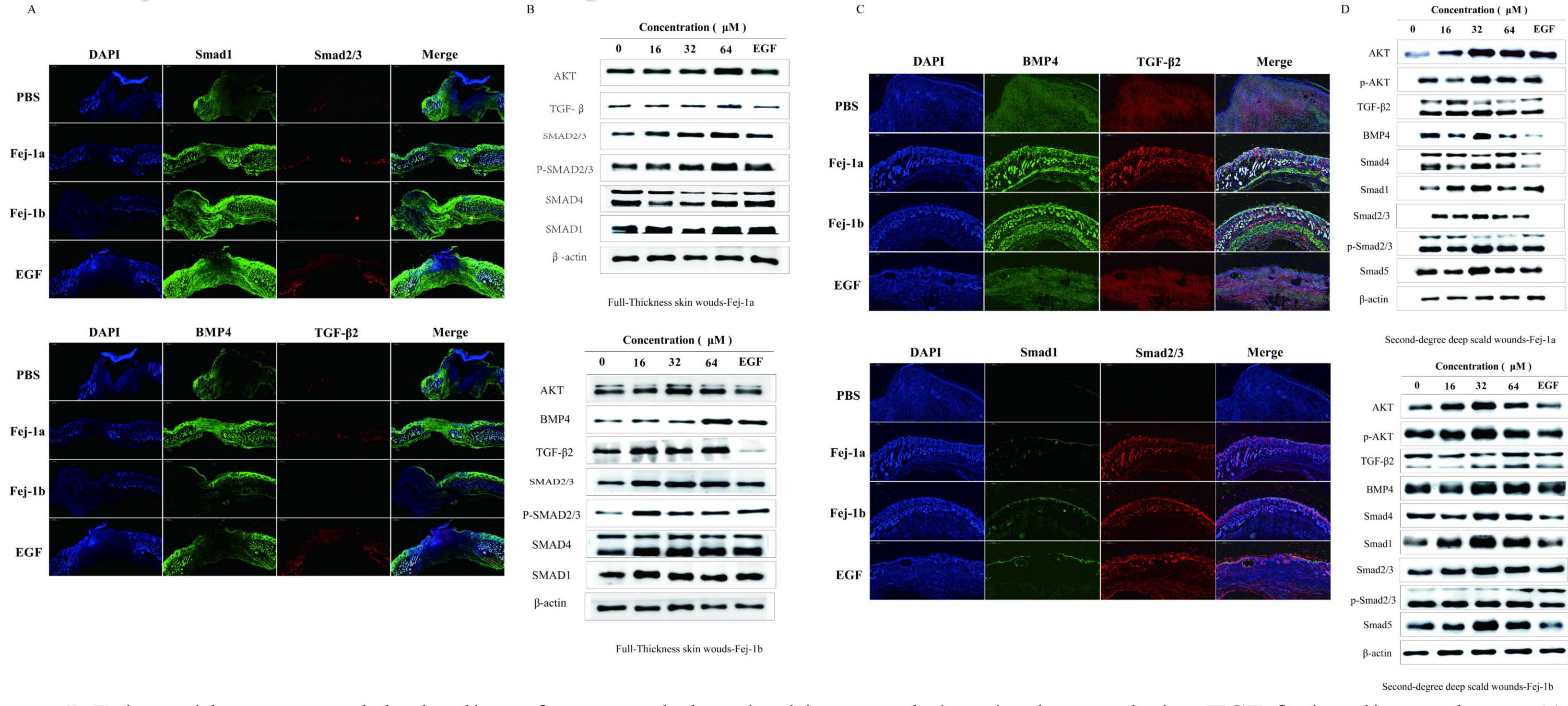


Figure 5. Fej peptides promoted the healing of acute and chronic skin wounds in mice by regulating TGF-β signaling pathway. (A) The expression of TGF-β2 (red), BMP4 (green), Smad1 (green) and Smad2/3 (red) of mouse full-thickness wounds were stained by immunofluorescence staining, after the mice were exposed to Fej peptides for 12 days. (B) The expression of Akt, p-Akt, TGF-β2, BMP4, Smad1, Smad2/3, p-Smad2/3, Smad4 and Smad5 were analyzed by western blot. (C) The expression of TGF-β2 (red), BMP4 (green), Smad1 (green) and Smad2/3 (red) in second-degree deep scald wounds were detected by immunofluorescence staining, after the mice were treated with Fej peptides for 21 days. (**D**) The expression of Akt, p-Akt, TGF-β2, BMP4, Smad1, Smad2/3, p-Smad2/3, Smad4 and Smad5 in second-degree deep scald wounds were detected by western blot.

METHODS

