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3D-printed omentum patch transplantation reduces kidney fibrosis after acute kidney injury

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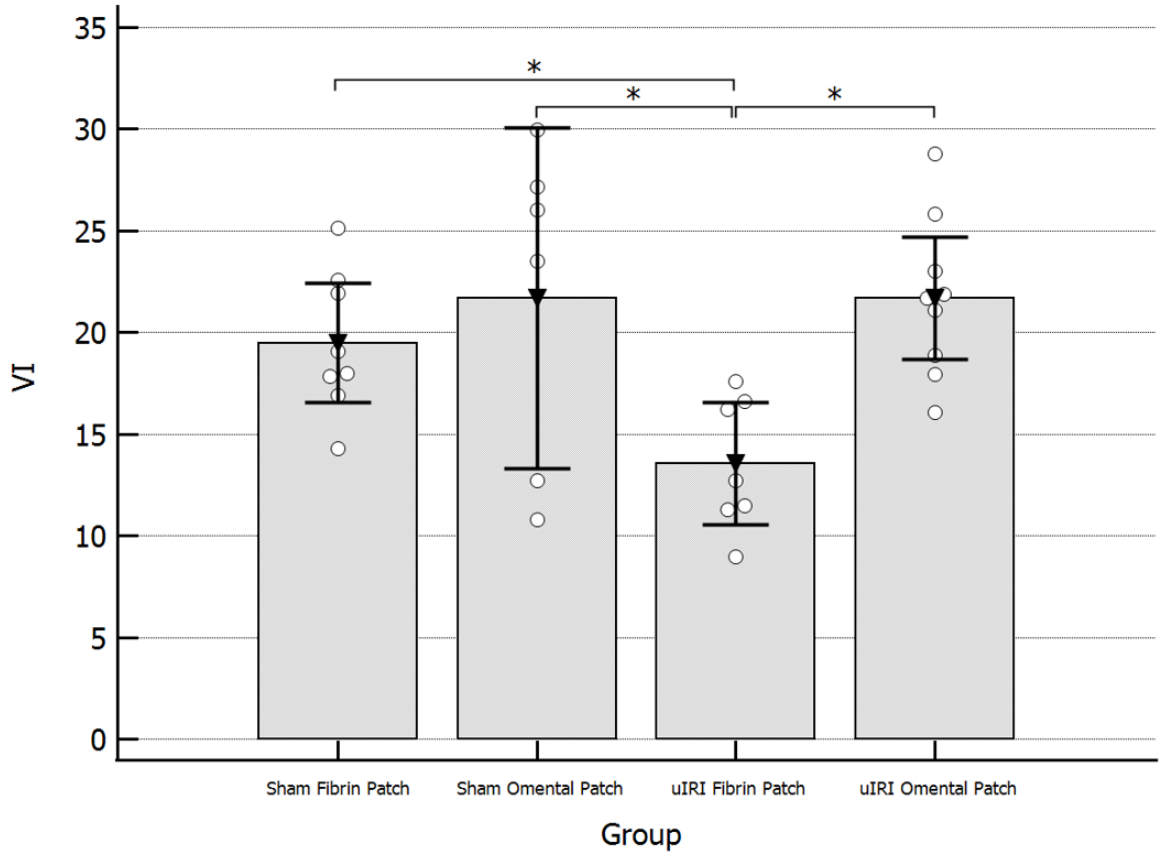
Objectives: The omentum has long been considered to have the ability to migrate to injured organs and promote their healing. These healing characteristics of the omentum are attributed to the high content of its progenitor cells and growth and angiogenesis factors. We aimed to study whether the omentum patch transplantation can reduce kidney fibrosis in the acute kidney injury (AKI) to chronic kidney disease (CKD) transition.

Methods: AKI to CKD transition was induced by unilateral ischemia-reperfusion injury (UIRI) was induced in 7- to 8-wk-old male C57BL/6 mice. 3D-printed omentum or fibrin patch were made by using mechanically micronized omentum or fibrin as a bio-ink. Then, the bio-printed patches were transplanted under the renal capsule in both sham and UIRI group. At 5 weeks after UIRI, ultrasound evaluation and histologic analysis were performed. By ultrasound, anatomical parameters (size, cortical thickness), doppler parameters resistance index (RI) and vascular index (VI, ratio of color-coded pixel area to pixels of the whole renal region) were examined.

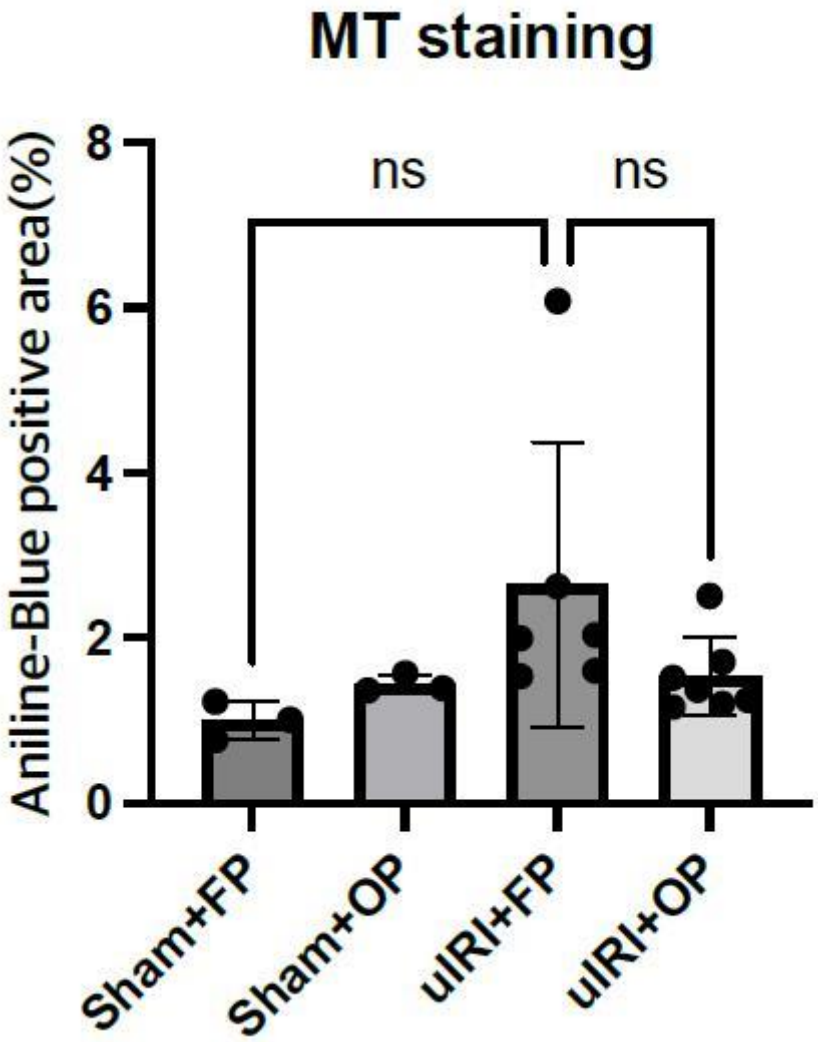
Results: AKI to CKD transition was induced by unilateral ischemia-reperfusion injury (UIRI) in 7- to 8-week-old male C57BL/6 mice. 3D-printed omentum or fibrin patches were made by using mechanically micronized omentum or fibrin as a bio-ink. Then, the bio-printed patches were transplanted under the renal capsule in both the sham and UIRI groups. At 5 weeks after UIRI, ultrasound evaluation, and histologic analysis were performed. By ultrasound, anatomical parameters (size, cortical thickness), doppler parameters (resistance index RI), and vascular index (VI, ratio of color-coded pixel area to pixels of the whole renal region) were examined.

Conclusions: Omentum patch, kidney fibrosis, acute kidney injury, unilateral ischemia-reperfusion injury.

Table1.Vascular Index (%)



Talbe2,Aniline-Blue positive area of MT staining


MT staining
Aniline-Blue positive area(%)
8
6
4
2
0
ns
ns
Sham+FP
Sham+OP
uIRI+FP
uIRI+OP