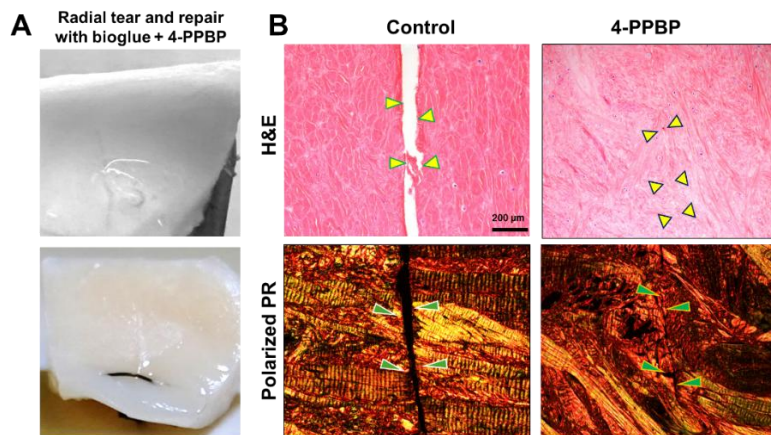


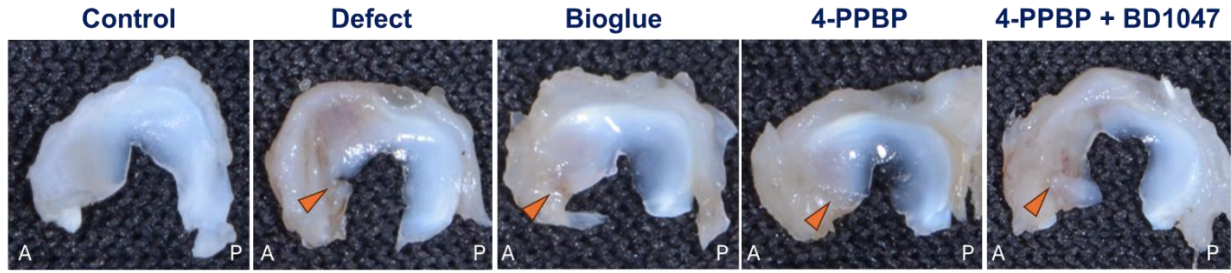
Supplementary Figure 1. Anti-inflammatory function of 4-PPBP in human and bovine meniscal cells: CCK-8 assay (**A, C**) (different letters indicate significant difference; $p < 0.001$) and qRT-PCR (**B, D**) (*: $p < 0.01$ compared to control; #: $p < 0.01$ compared to all the other groups).



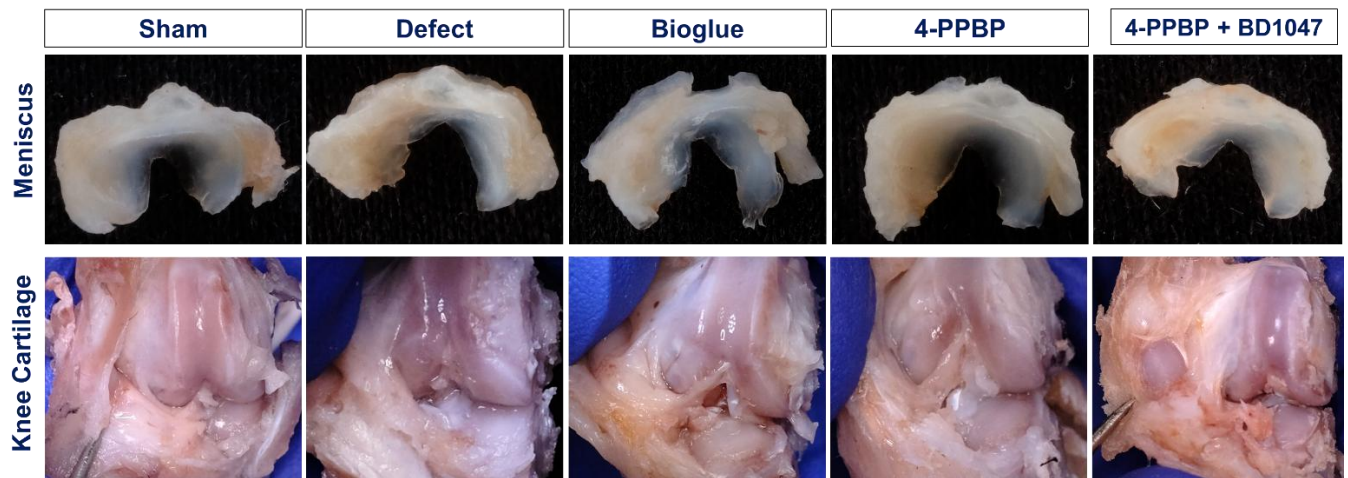
Supplementary Figure 2. Healing of radial tears in meniscus explants by 4-PPBP. Full-thickness radial tears were created at the inner avascular zone of bovine meniscus explants, followed by all-inside suture repair with 4-PPBP/FibGen treatment (A). After 4 weeks, 4-PPBP treatment resulted in integrated healing of fibrocartilaginous tissue as compared to the remaining gap in the control with FibGen alone (B).



Supplementary Figure 3. Surgical procedure to create longitudinal tears in anterior portion of rat meniscus, followed by application of bioglue.

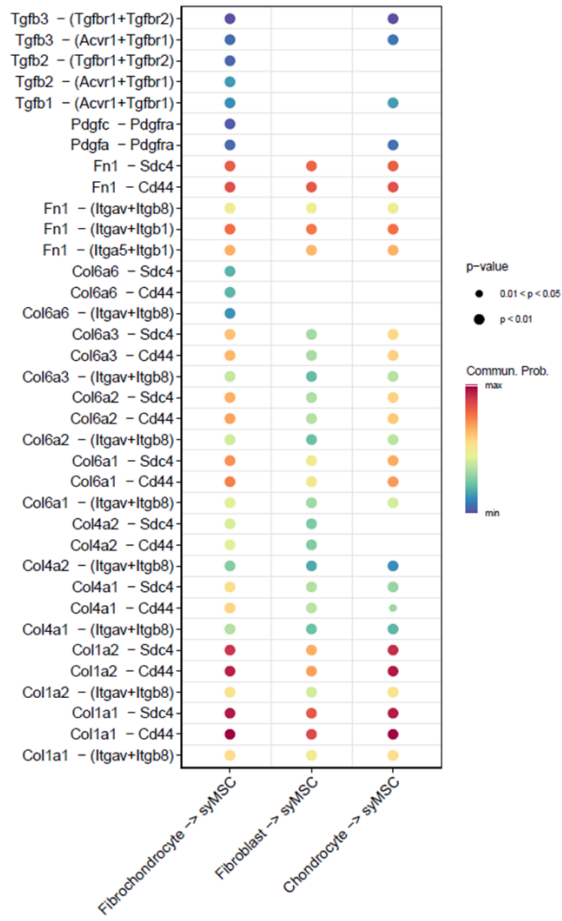


Supplementary Figure 4. Macroscopic evaluation of rat menisci harvested 2 weeks post-op (A: anterior, B: Posterior; arrow: defect).

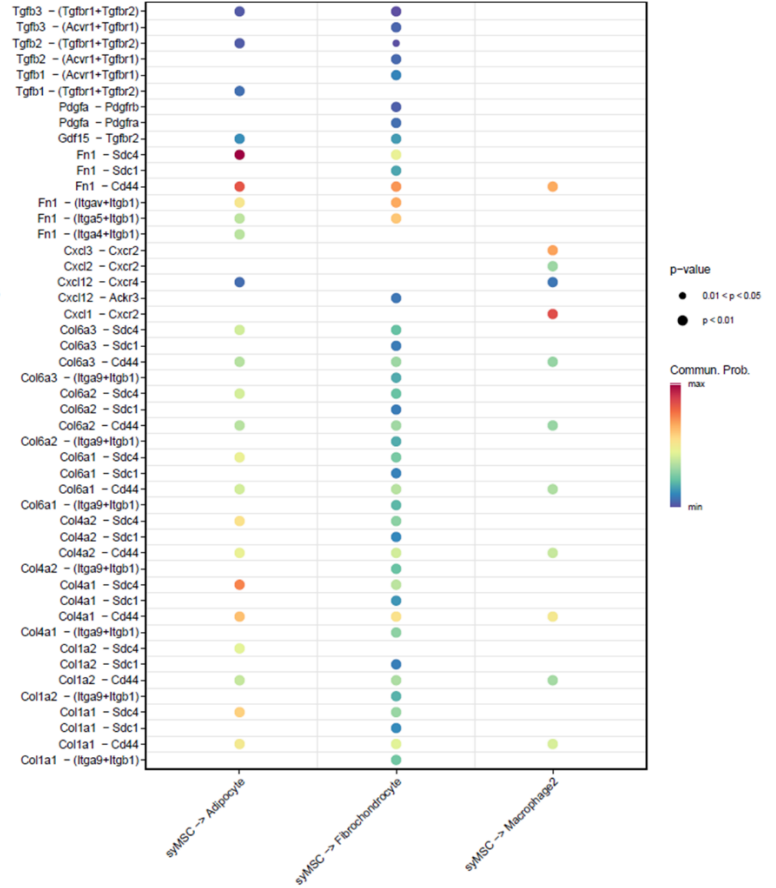


Supplementary Figure 5. Macroscopic evaluation of meniscus and cartilages at 4 weeks post-op.

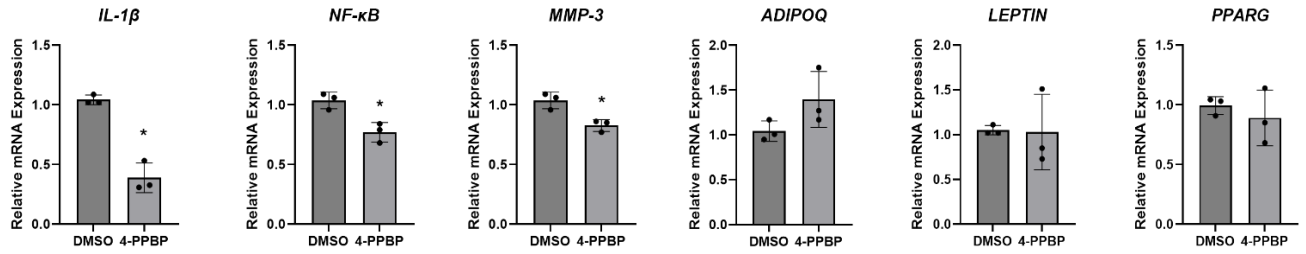
A syMSC Incoming



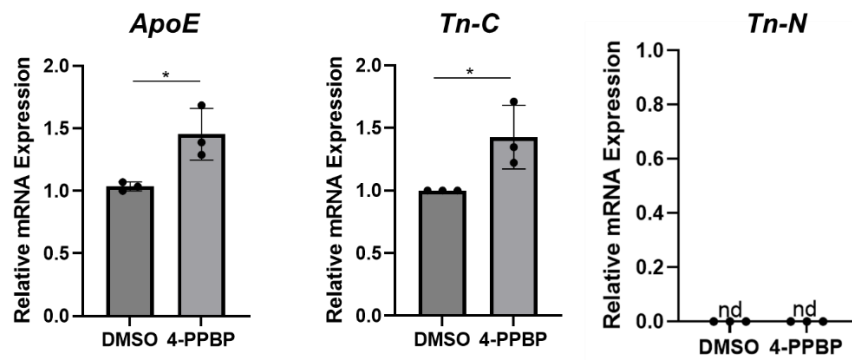
B syMSC Outgoing



Supplementary Figure 6. Bubble plots showing robust cell-cell communication signals involved with syMSCs in the 4-PPBP treatment group.



Supplementary Figure 7. Effect of 4-PPBP on adipocytes *in vitro*. (n = 3 per group; *:p<0.01 compared to DMSO control).



Supplementary Figure 8. ApoE, Tn-C, and Tn-N expressions in fibrochondrocytes with 4-PPBP treatment (n = 3 per group; *:p<0.01).