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Abstract Title:	**A Plasma-Alginate Composite Gel Provides Improved Mechanical Support For Stem Cell Growth And Delivery**
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Objective:	1) Consider the importance of material stiffness in prolonged field care. 2) Analyze the decoupling of stiffness and degradation properties in a biomaterial. 3) Discuss the effects of biomaterial homogeneity/heterogeneity on cell behavior.
Abstract:	**Background**: Plasma-based products have been recently utilized in military-based tissue engineering applications, including soft tissue repair and burn wound healing. Plasma contains soluble fibrinogen, which can be converted into an insoluble fibrin-based gel in the presence of active thrombin. Plasma gels can serve as three-dimensional templates to deliver therapeutic cells or as growth factor-laden supplements for tissue regeneration in vivo. Unfortunately, plasma-based materials are often soft and easily deformed, thus limiting their usefulness in demanding clinical settings. Therefore, simpler methods to create sturdier plasma/fibrin-based materials are needed. To this end, we hypothesized that mixing alginate and plasma together will create a plasma-alginate composite (PAC) material with improved mechanical and biological properties. **Methods**: Plasma and alginate were mixed together to create PAC gels with unique compositions. The stiffness and degradation kinetics of the PAC gels were assessed using rheology and a tissue plasminogen activator (tPA)-based degradation assay, respectively. Adipose-derived stem cells were cultured in the PAC gels for 8 days to assess in vitro cell viability and phenotype. Alginate-free plasma gels were used as controls throughout. **Results**: Our results demonstrated that PAC gels with specific compositions of alginate and plasma resulted in a 10-fold increase in gel stiffness as compared to the plasma-only gels. Interestingly, tPA-mediated gel lysis rates were independent of alginate concentration. The stiffer PAC gels enabled stem cell proliferation and maintained cell

	stemness over 8 days in vitro. The presence of alginate within the PAC gel also helped maintain gel shape and size in culture. **Conclusion**: In sum, we envision this PAC gel system will extend the utility of plasma-based therapies for tissue engineering and wound healing applications. The improved mechanical properties of the PAC gel system will be useful in challenging clinical settings, including far forward scenarios in military medicine. **Acknowledgement**: This research was supported in part by an appointment to the Postgraduate Research Participation Program at the U.S. Army Institute of Surgical Research administered by the Oak Ridge Institute for Science and Education through an interagency agreement between the U.S. Department of Energy and USAISR.