Dr. Miller is currently the Professor of Surgery and Chief of the Division of Plastic and Reconstructive Surgery at the University of California and Executive Director of Operation Mend, a cooperative effort with the US Army reconstructing soldiers and Marines burned in Iraq and Afghanistan.

This research has focused on the development of a bone graft substitute, useful in repairing cranio-facial defects in patients with bone defects of the face secondary to the excision of malignant tumor, congenital deformities and traumatic injuries. Autogenous bone grafts are fraught with problems of premature resorption, inadequate size and most importantly severe donor site morbidity due to pain.

In recent years, this research has focused on the creation of biosynthetic grafts using tissue engineering. The animal model is a rabbit cranial defect. Using this model, his laboratory has successfully tested numerous biomaterials and growth factors.

Dr. Miller’s laboratory has won numerous awards for their research findings. Their work entitled “The Induction of Bone by an Osteogenic Protein and the Conduction of Bone by Porous Hydroxyapatite” was awarded the best research paper by the American Society of Plastic Surgery and the American Society of Maxillofacial Surgery in 1991. Their publication entitled “Human and mouse osteoprogenitor cells exhibit distinct patterns of osteogenesis in three-dimensional tissue engineering scaffolds” was awarded the 2nd place winner of the 2009 scientific essay competition by the Plastic Surgery Educational Foundation. In the last two decades, Dr. Miller’s laboratory has trained over 50 research fellows, residents and students. The laboratory has published more than 100 peer-reviewed research articles.

Recently the focus had been on the molecular mechanism underlying osteogenic differentiation of adult stem cells in 3-dimensional biomaterials. Most of the current understanding of stem cells is based on studies carried out on 2-dimensional surfaces. Understanding molecular behavior of stem cells in 3-dimensional has revealed substantial differences and important observations regarding the importance of the scaffold configuration. In 3-D systems, angiogenesis or neovascularization becomes a critical issue and is under intense study.