What is the Studer lab working on: Our laboratory aims at exploiting recent advances in stem cell biology to develop radically new therapies for degenerative disease and cancer. We work with both embryonic and adult stem cell types in the lab. However, the main current focus is on the biology and use of human embryonic stem cells. Embryonic stem cells may provide a truly unlimited source for deriving therapeutically relevant cell types. In the mouse, studies have demonstrated that embryonic stem cells can give rise to virtually any cell type present in the adult organism.

We have recently succeeded in converting mouse and human embryonic stem cells into specific types of brain cells. This technology can combine the power of mouse genetics with defined in vitro assays of neural development. Manipulation of the embryonic stem cell genome to carry dominant and recessive mutations is the basis for the current revolution in mammalian genetics. Our techniques will allow dissection of the specific function of such mutations in brain development, including mutations that would lead to an early embryonic death during in vivo development. Study of developmental processes in a culture dish will also provide a platform for developing high-throughput functional genomic approaches.

Novel protocols in the lab allow the isolation of multipotent mesenchymal precursors from human embryonic stem cells. Such human embryonic stem cell derived mesenchymal precursors can be expanded in vitro or differentiated into fat, cartilage, bone and skeletal muscle cells. We are currently assessing the therapeutic potential of human stem cell derived mesenchymal precursors in musculoskeletal disease.