Suppression of T lymphocyte function is characteristically observed after trauma or surgery and is also described in various illnesses such as certain forms of cancer, and in chronic infections. In all of these, T lymphocyte suppression contributes to poor outcomes by increasing the susceptibility to infection and increasing the risk of wound breakdown, and worsens the prognosis of patients with cancer.

Arginine supplementation in the diet has been used to overcome T lymphocyte suppression. Arginine is an essential nutrient for normal T lymphocyte function. In surgery, arginine supplementation has been demonstrated to significantly decrease the risk of infection postoperatively. Yet, its use in septic patients is highly contentious with contrasting reports of benefit or harm. Arginine supplementation in cancer is also controversial with evidence that it can alternately induce or suppress tumor growth. As a result, arginine supplementation remains controversial and poorly utilized.

Understanding arginine metabolism by the immune system is central to unraveling the apparently contradictory results of clinical studies. A breakthrough came from the discovery of a heterogeneous group of immature myeloid cells, which are induced during illnesses. Arginine is metabolized alternately through inducible nitric oxide synthase or by arginase 1 (ASE), which is also inducible. Regulation of T lymphocyte function can occur through the production of nitric oxide by iNOS or through arginine depletion by myeloid cells expressing ASE; hence, these cells are identified by the name myeloid-derived suppressor cells (MDSC).

Our work has paid particular attention to the systemic development of arginine deficiency in illnesses through the preferential induction of MDSC expressing ASE. We explored the hypothesis that arginine deficiency caused by systemic activation of MDSC expressing ASE explains
the state of T cell suppression in illnesses such as trauma. Furthermore, we reviewed the hypothesis that diets containing supraphysiologic levels of arginine may overcome arginine deficiency and improve outcome in disease processes where MDSC expressing ASE may cause pathologic T cell suppression.