We recently reported the late term results of the first clinical trial evaluating the use of tissue engineered vascular grafts (TEVG) in humans. Results of this pilot study demonstrate the feasibility of using this technology in humans and highlight the great utility of using TEVG in congenital heart surgery where their growth capacity can be used to its greatest potential. Results of this study also demonstrate that stenosis is the primary graft related complication. The rationale design of an improved TEVG will be predicated on our ability to understand the cellular and molecular mechanisms underlying the formation of stenosis in TEVG. To this end we have developed and validated a murine model that faithfully recapitulates neovessel formation as seen in our clinical and preclinical studies. Using this model system we have begun to elucidate the cellular and molecular mechanisms underlying the formation of stenosis in TEVG. In this session we will update the audience on our recent findings including the role of cell seeding and the role of inflammation on neovessel formation and the development of TEVG stenosis.