Top Ten Things To Know
Models for the Study of Angiogenesis and Tissue Vascularization

1. Vascular dysfunction contributes to many diseases, including cardiovascular disease, the leading cause of death in the western world.

2. Following ischemia or injury, new blood vessel growth driven by the endothelium is essential to maintain oxygen supply to the injured tissue, yet the signals that determine whether the tissue regenerates and the degree of vascularization are not completely understood.

3. The purpose of this statement is to summarize in vitro assays and in vivo models suitable for study of the basic mechanisms of vessel growth and for clinical translation studies.

4. Simple in vitro assays are best for examining biochemical processes, but in vivo models are needed to understand the complex cellular interactions that support generation of functional blood vessel networks. Selection of an appropriate model is critical for determining physiological relevance of findings.

5. In vitro assays reviewed include:
   - Primary human endothelial cells cultured in multi-dimensional growth matrices
   - Animal aortic ring assays

6. In vivo models discussed include:
   - Transgenic mouse
   - Avian embryo (egg)
   - Zebrafish and African clawed frog

7. Additional areas of angiogenic research are reviewed including placental growth, wound healing and inflammatory response, tumor angiogenesis, and numerous signaling pathways.

8. Special issues are addressed such as diabetic pathology, imaging methods, pro-angiogenic molecule delivery, stenting, ischemia-reperfusion, acute occlusion, and vascular permeability.

9. This statement addresses the progress and challenges to identifying appropriate models for basic research and for testing novel therapeutic strategies in tissue revascularization.

10. Considerable progress has been made in understanding the basic mechanisms of angiogenesis, however preclinical testing of potential vascular therapies requires further development of relevant animal models.