

Angiogenesis

Bibliography of One Hundred Key Papers

selected by **Jeffrey M. Isner, MD**

Tufts University School of Medicine - Chief, Vascular Medicine -
St Elizabeth's Medical Center - Boston - Mass - USA

-
- Adams RH, Wilkinson GA, Weiss C, et al.** *Roles of ephrinB ligands and EphB receptors in cardiovascular development: demarcation of arterial/venous domains, vascular morphogenesis, and sprouting angiogenesis.*
Genes Dev. 1999;13:295-306.
-
- Anton ES, Weskamp G, Reichhardt LF, Matthew WD.** *Nerve growth factor and its low affinity receptor promote Schwann cell migration.*
Proc Natl Acad Sci USA. 1994;91:2795-2799.
-
- Arras M, Ito WD, Scholz D, Winkler B, Schaper J, Schaper W.** *Monocyte activation in angiogenesis and collateral growth in the rabbit hindlimb.*
J Clin Invest. 1998;101:40-50.
-
- Asahara T, Bauters C, Zheng LP, et al.** *Synergistic effect of vascular endothelial growth factor and basic fibroblast growth factor on angiogenesis in vivo.*
Circulation. 1995;92:II365-II371.
-
- Asahara T, Chen D, Takahashi T, et al.** *Tie2 receptor ligands, angiopoietin-1 and angiopoietin-2, modulate VEGF-induced postnatal neovascularization.*
Circ Res. 1998;83:233-240.
-
- Asahara T, Masuda H, Takahashi T, et al.** *Bone marrow origin of endothelial progenitor cells responsible for postnatal vasculogenesis in physiological and pathological neovascularization.*
Circ Res. 1999;85:221-228.
-
- Asahara T, Murohara T, Sullivan A, et al.** *Isolation of putative progenitor endothelial cells for angiogenesis.*
Science. 1997;275:965-967.
-
- Asahara T, Takahashi T, Masuda H, et al.** *VEGF contributes to postnatal neovascularization by mobilizing bone marrow-derived endothelial progenitor cells.*
EMBO J. 1999;18:3964-3972.
-
- Banai S, Jaklitsch MT, Shou M, et al.** *Angiogenic-induced enhancement of collateral blood flow to ischemic myocardium by vascular endothelial growth factor in dogs.*
Circulation. 1994;89:2183-2189.
-
- Baumgartner I, Pieczek A, Manor O, et al.** *Constitutive expression of phVEGF₁₆₅ following intramuscular gene transfer promotes collateral vessel development in patients with critical limb ischemia.*
Circulation. 1998;97:1114-1123.
-
- Baumgartner I, Rauh G, Pieczek A, et al.** *Lower-extremity edema associated with gene transfer of naked DNA vascular endothelial growth factor.*
Ann Int Med. 2000;132:880-884.
-



- Bauters C, Asahara T, Zheng LP, et al.** *Physiologic assessment of augmented vascularity induced by VEGF in ischemic rabbit hindlimb.*
Am J Physiol. 1994;267:H1263-H1271.
-
- Bauters C, Asahara T, Zheng LP, et al.** *Recovery of disturbed endothelium-dependent flow in the collateral-perfused rabbit ischemic hindlimb after administration of vascular endothelial growth factor.*
Circulation. 1995;91:2802-2809.
-
- Bellomo D, Headrick JP, Silins GU, et al.** *Mice lacking the vascular endothelial growth factor-B gene (VEGF_B) have smaller hearts, dysfunctional coronary vasculature, and impaired recovery from cardiac ischemia.*
Circ Res. 2000;86:E29-E35.
-
- Breier G, Albrecht U, Sterrer S, Risau W.** *Expression of vascular endothelial growth factor during embryonic angiogenesis and endothelial cell differentiation.*
Development. 1992;114:521-532.
-
- Brogi E, Schatteman G, Wu T, et al.** *Hypoxia-induced paracrine regulation of VEGF receptor expression.*
J Clin Invest. 1996;97:469-476.
-
- Brogi E, Wu T, Namiki A, Isner JM.** *Indirect angiogenic cytokines upregulate VEGF and bFGF gene expression in vascular smooth muscle cells, while hypoxia upregulates VEGF expression only.*
Circulation. 1994;90:649-652.
-
- Brooks PC, Clark RAF, Cheresh DA.** *Requirement of vascular integrin alpha-v-beta-3 for angiogenesis.*
Science. 1994;264:569-571.
-
- Carmeliet P.** *Mechanisms of angiogenesis and arteriogenesis.*
Nat Med. 2000;6:389-395.
-
- Carmeliet P, Ferreira V, Breier G, et al.** *Abnormal blood vessel development and lethality in embryos lacking a single VEGF allele.*
Nature. 1996;380:435-439.
-
- Carmeliet P, Ng YS, Nuyens D, et al.** *Impaired myocardial angiogenesis and ischemic cardiomyopathy in mice lacking the vascular endothelial growth factor isoforms VEGF₁₆₄ and VEGF₁₈₈.*
Nature Med. 1999;5:495-502.
-
- Couffinhal T, Kearney M, Witzendichler B, et al.** *Vascular endothelial growth factor/vascular permeability factor (VEGF/VPF) in normal and atherosclerotic human arteries.*
Am J Pathol. 1997;150:1673-1685.
-
- Couffinhal T, Silver M, Kearney M, et al.** *Impaired collateral vessel development associated with reduced expression of vascular endothelial growth factor in ApoE^{-/-} mice.*
Circulation. 1999;99:3188-3198.
-
- Couffinhal T, Silver M, Zheng LP, Kearney M, Witzendichler B, Isner JM.** *A mouse model of angiogenesis.*
Am J Pathol. 1998;152:1667-1679.
-
- Davis S, Aldrich TH, Jones PF, et al.** *Isolation of angiopoietin-1, a ligand for the TIE2 receptor by secretion-trap expression cloning.*
Cell. 1996;87:1161-1169.
-
- Fabre JE, Rivard A, Magner M, Silver M, Isner JM.** *Tissue inhibition of angiotensin-converting enzyme activity stimulates angiogenesis in vivo.*
Circulation. 1999;99:3043-3049.

Bibliography of One Hundred Key Papers

- Ferrara N, Carver-Moore K, Chen H, et al.** *Heterozygous embryonic lethality induced by targeted inactivation of the VEGF gene.*
Nature. 1996;380:439-442.
-
- Flamme I, Risau W.** *Induction of vasculogenesis and hematopoiesis in vitro.*
Development. 1992;116:435-439.
-
- Folkman J.** *Tumor angiogenesis: therapeutic implications.*
N Engl J Med. 1971;285:1182-1186.
-
- Folkman J, Haudenschild C.** *Angiogenesis in vitro.*
Nature. 1980;288:551-556.
-
- Folkman J, Klagsbrun M.** *Angiogenic factors.*
Science. 1987;235:442-447.
-
- Folkman J, Shing Y.** *Angiogenesis.*
J Biol Chem. 1992;267:10931-10934.
-
- Fong GH, Rossant J, Gertsenstein M, Breitman ML.** *Role of Flt-1 receptor tyrosine kinase in regulating the assembly of vascular endothelium.*
Nature. 1995;376:66-70.
-
- Friedlander M, Brooks PC, Shaffer RW, Kincaid CM, Verner JA, Cheresch DA.** *Definition of two angiogenic pathways by distinct α_v integrins.*
Science. 1995;270:1500-1502.
-
- Gerber HP, Hillan KJ, Ryan AM, et al.** *VEGF is required for growth and survival in neonatal mice.*
Development. 1999;126:1149-1159.
-
- Gerber HP, McMurtrey A, Kowalski J, et al.** *Vascular endothelial growth factor regulates endothelial cell survival through the phosphatidylinositol 3'-kinase/Akt signal transduction pathway. Requirement for Flk-1/KDR activation.*
J Biol Chem. 1998;273:30336-30343.
-
- Giordano FJ, Ping P, McKirnan D, et al.** *Intracoronary gene transfer of fibroblast growth factor-5 increases blood flow and contractile function in an ischemic region of the heart.*
Nat Med. 1996;2:534-539.
-
- Gunsilius E, Duba HC, Petzer AL, et al.** *Evidence from a leukaemia model for maintenance of vascular endothelium derived endothelial cells.*
Lancet. 2000;355:1688-1691.
-
- Hanahan D, Folkman J.** *Patterns and emerging mechanisms of the angiogenic switch during tumorigenesis.*
Cell. 1996;86:353-364.
-
- Harada K, Friedman M, Lopez JJ, et al.** *Vascular endothelial growth factor in chronic myocardial ischemia.*
Am J Physiol. 1996;270:H1791-H1802.
-
- Harada K, Grossman W, Friedman M, et al.** *Basic fibroblast growth factor improves myocardial function in chronically ischemic porcine hearts.*
J Clin Invest. 1994;94:623-630.
-



-
- Hendel RC, Henry TD, Rocha-Singh K, et al.** *Effect of intracoronary recombinant human vascular endothelial growth factor on myocardial perfusion: evidence for a dose-dependent effect.*
Circulation. 2000;101:118-121.
-
- Henry TD, Abraham JA.** *Review of preclinical and clinical results with vascular endothelial growth factors for therapeutic angiogenesis.*
Curr Intervent Cardiol Rep. 2000;2:228-241.
-
- Houck KA, Leung DW, Rowland AM, Wiener J, Ferrara N.** *Dual regulation of vascular endothelial growth factor bioavailability by genetic and proteolytic mechanisms.*
J Biol Chem. 1992;267:26031-26037.
-
- Ingber DE, Folkman J.** *How does extracellular-matrix control capillary morphogenesis?*
Cell. 1989;58:803-805.
-
- Isner JM.** *Arterial gene transfer for naked DNA for therapeutic angiogenesis: early clinical results.*
Adv Drug Deliv. 1998;30:185-197.
-
- Isner JM.** *Tissue responses to ischemia: local and remote responses for preserving perfusion of ischemic muscle.*
J Clin Invest. 2000;106:615-619.
-
- Isner JM, Asahara T.** *Angiogenesis and vasculogenesis as therapeutic strategies for post-natal neovascularization.*
J Clin Invest. 1999;103:1231-1236. Perspective.
-
- Isner JM, Baumgartner I, Rauh G, et al.** *Treatment of thromboangiitis obliterans (Buerger's disease) by intramuscular gene transfer of vascular endothelial growth factor: preliminary clinical results.*
J Vasc Surg. 1998;28:964-975.
-
- Isner JM, Pieczek A, Schainfeld R, et al.** *Clinical evidence of angiogenesis following arterial gene transfer of phVEGF₁₆₅.*
Lancet. 1996;348:370-374.
-
- Isner JM, Walsh K, Symes J, et al.** *Arterial gene transfer for therapeutic angiogenesis in patients with peripheral artery disease.*
Hum Gene Ther. 1996;7:959-988.
-
- Iyer NV, Kotch LE, Agani F, et al.** *Cellular and developmental control of O₂ homeostasis by hypoxia-inducible factor 1 α .*
Genes Dev. 1998;12:149-162.
-
- Jeltsch M, Kaipainen A, Joukov V, et al.** *Hyperplasia of lymphatic vessels in VEGF-C transgenic mice.*
Science. 1997;276:1423-1425.
-
- Kalka C, Masuda H, Takahashi T, et al.** *Vascular endothelial growth factor(165) gene transfer augments circulating endothelial progenitor cells in human subjects.*
Circ Res. 2000;86:1198-1202.
-
- Kalka C, Masuda H, Takahashi T, et al.** *Transplantation of ex vivo expanded endothelial progenitor cells for therapeutic neovascularization.*
Proc Natl Acad Sci USA. 2000;97:3422-3427.
-

Bibliography of One Hundred Key Papers

- Kalka C, Tehrani H, Laudenberg B, et al.** *VEGF gene transfer mobilizes endothelial progenitor cells in patients with inoperable coronary disease.*
Ann Thorac Surg. 2000;70:829-834.
-
- Kawamoto A, Gwon HC, Iwaguro H, et al.** *Therapeutic potential of ex vivo expanded endothelial progenitor cells for myocardial ischemia.*
Circulation. 2001;103:634-637.
-
- Kureishi Y, Luo Z, Shiojima I.** *The HMG-CoA reductase inhibitor simvastatin activates the protein kinase Akt and promotes angiogenesis in normocholesterolemic animals.*
Nat Med. 2000;6:1004-1010.
-
- Laham RJ, Sellke FW, Edelman ER, et al.** *Local perivascular delivery of basic fibroblast growth factor in patients undergoing coronary bypass surgery: results of a phase I randomized, double-blind, placebo-controlled trial.*
Circulation. 1999;100:1865-1871.
-
- Lazarous DF, Unger EF, Epstein SE, et al.** *Basic fibroblast growth factor in patients with intermittent claudication: results of a phase I trial.*
J Am Coll Cardiol. 2000;36:1239-1244.
-
- Leung DW, Cachianes G, Kuang WJ, Goeddel DV, Ferrara N.** *Vascular endothelial growth factor is a secreted angiogenic mitogen.*
Science. 1989;246:1306-1309.
-
- Levy PL, Levy NS, Goldberg MA.** *Post-transcriptional regulation of vascular endothelial growth factor by hypoxia.*
J Biol Chem. 1996;271:2746-2753.
-
- Li J, Brown LF, Hibberd MG, Grossmann JD, Morgan JP, Simons M.** *VEGF, flk-1, andflt-1 expression in a rat myocardial infarction model of angiogenesis.*
Am J Physiol. 1996;270:H1803-H1811.
-
- Losordo DW, Vale PR, Symes J, et al.** *Gene therapy for myocardial angiogenesis: initial clinical results with direct myocardial injection of phVEGF₁₆₅ as sole therapy for myocardial ischemia.*
Circulation. 1998;98:2800-2804.
-
- Mack CA, Patel SR, Schwarz EA, et al.** *Biologic bypass with the use of adenovirus-mediated gene transfer of the complementary deoxyribonucleic acid for vascular endothelial growth factor 121 improves myocardial perfusion and function in the ischemic porcine heart.*
J Thorac Cardiovasc Surg. 1998;115:168-176.
-
- Maisonpierre P, Suri C, Jones PF, et al.** *Angiopoietin-2, a natural antagonist for Tie2 that disrupts in vivo angiogenesis.*
Science. 1997;277:55-60.
-
- Millauer B, Wizigmann-Voos S, Schnurch H, et al.** *High affinity VEGF binding and developmental expression suggest Flk-1 as a major regulator of vasculogenesis and angiogenesis.*
Cell. 1993;72:835-846.
-
- Murohara T, Asahara T, Silver M, et al.** *Nitric oxide synthase modulates angiogenesis in response to tissue ischemia.*
J Clin Invest. 1998;101:2567-2578.
-



- Nicosia RF, Ottinetti A.** *Modulation of microvascular growth and morphogenesis by reconstituted basement membrane gel in three-dimensional cultures of rat aorta: a comparative study of angiogenesis in matrigel, collagen, fibrin, and plasma clot.*
In vitro Cell Devel Biol. 1990;26:119-128.
-
- Park JE, Chen HH, Winer J, Houck KA, Ferrara N.** *Placenta growth factor: potentiation of vascular endothelial growth factor bioactivity, in vitro and in vivo, and high affinity binding to Flt-1 but not to Flk-1/KDR.*
J Biol Chem. 1994;269:25646-25654.
-
- Pearlman JD, Hibberd MG, Chuang ML, et al.** *Magnetic resonance mapping demonstrates benefits of VEGF-induced myocardial angiogenesis.*
Nat Med. 1995;1:1085-1089.
-
- Pepper MS, Montesano R.** *Proteolytic balance and capillary morphogenesis.*
Cell Differ Devel. 1990;32:319-328.
-
- Risau W, Sariola H, Zerwes HG, et al.** *Vasculogenesis and angiogenesis in embryonic stem cell-derived embryoid bodies.*
Development. 1988;102:471-478.
-
- Rivard A, Berthou-Soulie L, Principe N, et al.** *Age-dependent defect in vascular endothelial growth factor expression is associated with reduced hypoxia-inducible factor 1 activity.*
J Biol Chem. 2000;275:29643-29647.
-
- Rivard A, Fabre JE, Silver M, et al.** *Age-dependent impairment of angiogenesis.*
Circulation. 1999;99:111-120.
-
- Rivard A, Silver M, Chen D, et al.** *Rescue of diabetes-related impairment of angiogenesis by intramuscular gene therapy with adeno-VEGF*
Am J Pathol. 1999;154:355-363.
-
- Rosengart TK, Lee LY, Patel SR, et al.** *Angiogenesis gene therapy: phase I assessment of direct intramyocardial administration of an adenovirus vector expression VEGF121 cDNA to individuals with clinically significant severe coronary artery disease.*
Circulation. 1999;100:468-474.
-
- Sato TN, Tozawa Y, Deutsch U, et al.** *Distinct roles of the receptor tyrosine kinases Tie-1 and Tie-2 in blood vessel formation.*
Nature. 1995;376:70-74.
-
- Schaper W, Brabander MD, Lewi P.** *DNA synthesis and mitoses in coronary collateral vessels of the dog.*
Circ Res. 1971;28:671-679.
-
- Schnurch H, Risau W.** *Expression of tie-2, a member of a novel family of receptor tyrosine kinases, in the endothelial cell lineage.*
Development. 1993;119:957-968.
-
- Schratzberger P, Schratzberger G, Silver M, et al.** *Favorable impact of VEGF gene transfer on ischemic peripheral neuropathy.*
Nat Med. 2000;6:405-413.
-
- Schumacher B, Pecher P, von Specht BU, Stegmann T.** *Induction of neoangiogenesis in ischemic myocardium by human growth factors: first clinical results of a new treatment of coronary heart disease.*
Circulation. 1998;97:645-650.

Bibliography of One Hundred Key Papers

- Senger DR, Galli SJ, Dvorak AM, Perruzzi CA, Harvey VS, Dvorak NF.** *Tumor cells secrete a vascular permeability factor that promotes accumulation of ascites fluid.* **Science.** 1983;219:983-985.
-
- Shalaby F, Rossant J, Yamaguchi TP, et al.** *Failure of blood-island formation and vasculogenesis in Flk-1-deficient mice.* **Nature.** 1995;376:62-66.
-
- Shi Q, Rafii S, Wu MH, et al.** *Evidence for circulating bone marrow-derived endothelial cells.* **Blood.** 1998;92:362-367.
-
- Shin D, Garcia Cardena G, Hayashi SI, et al.** *Expression of ephrin-B2 identifies a stable genetic difference between arterial and venous vascular smooth muscle cells and marks subsets of microvessels at sites of adult neovascularization.* **Dev Biol.** 2001;230:139-150.
-
- Shweiki D, Itin A, Soffer D, Keshet E.** *Vascular endothelial growth factor induced by hypoxia may mediate hypoxia-initiated angiogenesis.* **Nature.** 1992;359:843-845.
-
- Shyu KG, Manor O, Magner M, Yankopoulos GD, Isner JM.** *Direct intramuscular injection of plasmid DNA encoding angiopoietin-1, but not angiopoietin-2, augments revascularization in the rabbit ischemic hind limb.* **Circulation.** 1998;98:2081-2087.
-
- Simovic D, Isner JM, Roper AH, Pieczek A, Weinberg DH.** *Improvement in chronic ischemic neuropathy following intramuscular phVEGF₁₆₅ gene transfer in patients with critical limb ischemia.* **Arch Neurol.** 2001;58:761-768.
-
- Soker S, Takashima S, Miao HQ, Neufeld G, Klagsbrun M.** *Neuropilin-1 is expressed by endothelial and tumor cells as an isoform-specific receptor for vascular endothelial growth factor.* **Cell.** 1998;92:735-745.
-
- Spyridopoulos I, Brogi E, Kearney M, et al.** *Vascular endothelial growth factor inhibits endothelial cell apoptosis induced by tumor necrosis factor-alpha: balance between growth and death signals.* **J Mol Cell Cardiol.** 1997;29:1321-1330.
-
- Stromblad S, Becker JC, Yebra M, Brooks PC, Cheresh DA.** *Suppression of p53 activity and p21 WAF1/CIP1 expression by vascular cell integrin alpha-v-beta-3 during angiogenesis.* **J Clin Invest.** 1996;98:426-433.
-
- Suri C, Jones PF, Patan S, et al.** *Requisite role of angiopoietin-1, a ligand for the TIE2 receptor, during embryonic angiogenesis.* **Cell.** 1996;87:1171-1180.
-
- Suri C, McClain J, Thurston G, et al.** *Increased vascularization in mice overexpressing angiopoietin-1.* **Science.** 1998;282:468-471.
-
- Tabata H, Silver M, Isner JM.** *Arterial gene transfer of acidic fibroblast growth factor for therapeutic angiogenesis in vivo: critical role of secretion signal in use of naked DNA.* **Cardiovasc Res.** 1997;35:470-479.
-



-
- Takahashi T, Kalka C, Masuda H, et al.** *Ischemia- and cytokine-induced mobilization of bone marrow-derived endothelial progenitor cells for neovascularization.* **Nat Med.** 1999;5:434-438.
-
- Takeshita S, Tsurumi Y, Couffinhal T, et al.** *Gene transfer of naked DNA encoding for three isoforms of vascular endothelial growth factor stimulates collateral development in vivo.* **Lab Invest.** 1996;75:487-501.
-
- Takeshita S, Zheng LP, Brogi E, et al.** *Therapeutic angiogenesis: a single intra-arterial bolus of vascular endothelial growth factor augments revascularization in a rabbit ischemic hind limb model.* **J Clin Invest.** 1994;93:662-670.
-
- Tio RA, Tkebuchava T, Scheuermann TH, et al.** *Intramyocardial gene therapy with naked DNA encoding vascular endothelial growth factor improves collateral flow to ischemic myocardium.* **Hum Gene Ther.** 1999;10:2953-2960.
-
- Tsurumi Y, Murohara T, Krasinski K, et al.** *Reciprocal relationship between VEGF and NO in the regulation of endothelial integrity.* **Nat Med.** 1997;3:879-886.
-
- Tsurumi Y, Takeshita S, Chen D, et al.** *Direct intramuscular gene transfer of naked DNA encoding vascular endothelial growth factor augments collateral development and tissue perfusion.* **Circulation.** 1996;94:3281-3290.
-
- Udelson JE, Dilsizian V, Laham RJ, et al.** *Therapeutic angiogenesis with recombinant fibroblast growth factor-2 improves stress and rest myocardial perfusion abnormalities in patients with severe symptomatic chronic coronary artery disease.* **Circulation.** 2000;102:1605-1610.
-
- Vale PR, Losordo DW, Milliken CE, et al.** *Left ventricular electromechanical mapping to assess efficacy of phVEGF₁₆₅ gene transfer for therapeutic angiogenesis in chronic myocardial ischemia.* **Circulation.** 2000;102:965-974.
-
- Vale PR, Losordo DW, Milliken CE, et al.** *Randomized, single-blind, placebo-controlled pilot study of catheter-based myocardial gene transfer for therapeutic angiogenesis utilizing LV electromechanical mapping in patients with chronic myocardial ischemia.* **Circulation.** 2001;103:2138-2143.
-
- Van Belle E, Rivard A, Chen D, et al.** *Hypercholesterolemia attenuates angiogenesis but does not preclude augmentation by angiogenic cytokines.* **Circulation.** 1997;96:2667-2674.
-
- Van Belle E, Witzenbichler B, Chen D, et al.** *Potentiated angiogenic effect of scatter factor/hepatocyte growth factor via induction of vascular endothelial growth factor: the case for paracrine amplification of angiogenesis.* **Circulation.** 1998;97:381-390.
-
- Vincent KA, Shyu KG, Luo Y, et al.** *Angiogenesis is induced in a rabbit model of hindlimb ischemia by naked DNA encoding a HIF-1alpha/VP16 hybrid transcription factor.* **Circulation.** 2000;102:2255-2261.
-

Bibliography of One Hundred Key Papers

Wang GL, Semenza GL.

Characterization of hypoxia-inducible factor 1 and regulation of DNA binding activity by hypoxia.

J Biol Chem. 1993;268:21513-21518.

Wang HU, Chen ZF, Anderson D.

Molecular distinction and angiogenic interaction between embryonic arteries revealed by ephrin-B2 and its receptor Eph-B4.

Cell. 1998;93:741-753.

Witzenbichler B, Asahara T, Murohara T, et al.

Vascular endothelial growth factor-C (VEGF-C/VEGF-2) promotes angiogenesis in the setting of tissue ischemia.

Am J Pathol. 1998;153:381-394.
