

BIOGRAPHICAL SKETCH

NAME SCHNITZER, Jan E., M.D.		POSITION TITLE Director	
eRA COMMONS USER NAME jschnitzer			
INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
Princeton University, Princeton, NJ	B.S.E.	1980	Chem / Biomedical Eng.
University of Pittsburgh, Pittsburgh, PA	M.D.	1985	Medicine
Yale University School of Medicine, New Haven, CT	---	1985-1987	Cell Biology

A. Personal Statement

B. Positions and Employment

1985 – 1987	Post-doctoral Fellow, Dept. of Cell Biology, Yale University School of Medicine, New Haven, CT
1987 – 1989	Research Scientist, Dept. of Cell Biology, Yale University School of Medicine, New Haven, CT
1990 – 1993	Assistant Professor of Medicine and Pathology, University of California, San Diego, CA
1994 – 1995	Assistant Professor of Pathology, Harvard Medical School, Beth Israel Hospital, Boston, MA
1996 – 1998	Associate Professor of Pathology, Harvard Medical School, Beth Israel Hospital, Boston, MA
1999 – 2009	Director Vascular Biology & Angiogenesis Program, Sidney Kimmel Cancer Center, San Diego, CA
1999 – 2009	Scientific Director, Prof. Molecular & Cellular Biology, Sidney Kimmel Cancer Center, San Diego, CA
2008 – Present	Faculty, Institute of Engineering for Medicine, University of California San Diego
2009 – Present	Director, Proteogenomics Research Institute for Systems Medicine, San Diego, CA
2011 – Present	Adjunct Professor, School of Medicine, University of California San Diego, CA

C. Selected publications:

- McKinstry, P., Light, T.R., **Schnitzer, J.** & Ogden, J.A. Quantitative description of regional circulation within the immature canine tibia. **American College of Surgeons Surgical Forum**, (XXXI):509-511, 1980.
- Wackers, F.J., Klay, J.W., Laks, H., **Schnitzer, J.**, Zaret, B.L. & Geha, A.S. Pathophysiologic correlates of right ventricular thallium - 201 uptake in the canine model. **Circulation**, 64 (6):1256-1264, 1981.
- Schnitzer, J.E.**, McKinstry, P., Light, T.R. & Ogden, J.A. Quantitation of regional chondro-osseous circulation in the canine tibia and femur. **Am. J. Physiol.**, 242 (3):H365-H375, 1982.
- McKinstry, P., **Schnitzer, J.E.**, Light, T.R., Ogden, J.A. & Hoffer, P. Relationship of 99mTc-MDP uptake to regional osseous circulation in skeletally immature and mature dogs. **Skeletal-Radiol.**, 8(2):115-21, 1982.
- Light, T.R., McKinstry, M.R., **Schnitzer, J.E.** & Ogden, J.A. Bone blood flow regulates a variety of skeletal mutations. In: Bone Circulation, J. Arlet, R.P. Ficat and D.S. Hungerford, editors. Baltimore/London: Williams and Williams Publishing Company, 29:178-185, 1984
- Schnitzer, J.E.**, Carley, W.W. & Palade, G.E. (1988) Specific albumin binding to microvascular endothelium in culture. **Am. J. Physiol.** 254:H425-H437.
- Schnitzer, J.E.** Glycocalyx electrostatic potential profile analysis: Ion, pH, steric, and charge effects. **Yale J. Biol. Med.**, 61: 427-446, 1988.
- Schnitzer, J.E.**, Carley, W.W. & Palade, G.E. (1988) Albumin interacts specifically with a 60-kDa microvascular endothelial glycoprotein. **Proc. Nat. Acad. Sci. (USA)** 85:6773-6777.
- Schnitzer, J.E.** (1988) Analysis of steric partition behavior of molecules in membranes using statistical physics. Application to gel chromatography and electrophoresis. **Biophys. J.** 54:1065-1076.
- Schnitzer, J.E.**, Shen, C-P.J. & Palade, G.E. Lectin analysis of common glycoproteins detected on the surface of continuous microvascular endothelium in situ and in culture: Identification of sialoglycoproteins. **Eur. J. Cell Biol.**, 52: 241-251, 1990.
- Schnitzer, J.E.**, Ulmer, J.B. & Palade, G.E. (1990) A major endothelial plasmalemmal sialoglycoprotein, gp60, is immunologically related to glycoporphin. **Proc. Nat. Acad. Sci. (USA)**, 87:6843-6847.
- Schnitzer, J.E.** & Lambrakis, K.C. (1991) Electrostatic potential and Born energy of charged molecules interacting with phospholipid membranes: calculation via 3-D numerical solution of the Poisson equation. **J. Theor. Biol.** 152:203-222.
- Siflinger-Birnboim, A., **Schnitzer, J.E.**, Lum, H., Blumenstock, F.A., Shen, C.-P. J., Del Vecchio, P.J. & Malik, A.B. Lectin binding to gp60 decreases specific albumin binding and transport in pulmonary endothelial monolayers. **J. Cell. Physiol.**, 149: 575-584, 1991.
- Schnitzer, J.E.** (1992) Gp60 is an albumin binding glycoprotein expressed by continuous endothelium involved in albumin transcytosis. **Am. J. Physiol.** 262(31):H246-254.
- Schnitzer, J.E.** (1992) Fiber matrix model re-analysis: matrix exclusion limits define effective pore radius

- describing capillary and glomerular permselectivity. *Microvasc. Res.* 43:342-346.
16. **Jacobson, B.S., **Schnitzer, J.E. McCaffery, M. & G.E. Palade; Isolation and partial characterization of the luminal plasmalemma of microvascular endothelium from rat lungs. *Eur. J. Cell Biol.*, 58, 296-306, 1992.
 - ** co-first authorships on manuscript
 17. **Schnitzer, J.E.** & Pinney, E. (1992) Quantitation of specific binding of orosomucoid to cultured microvascular endothelium: role in capillary permeability. *Am. J. Physiol.* 263:H48-H55.
 18. **Schnitzer, J.E.**, Ulmer, J.B. & Palade, G.E.: Common peptide epitopes in glycophorin and the endothelial sialoglycoprotein gp60. *Biochem. Biophys. Res. Comm.*, 187, 1158-1165, 1992.
 19. **Schnitzer, J.E.**, Sung, A., Horvat, R. & Bravo, J. Preferential interaction of albumin binding proteins, gp30 and gp18, with modified albumins: Presence in many cells and tissues with a possible role in catabolism. *J. Biol. Chem.*, 264, 24544-24553, 1992.
 20. **Schnitzer, J.E.** & Oh, P. (1992) Antibodies to SPARC inhibit albumin binding to SPARC, gp60 and microvascular endothelium. *Am. J. Physiol.* 263:H1872-1879.
 21. **Schnitzer, J.E.**, Sung, A., Horvat, R. & Bravo, J. (1992) Preferential interaction of albumin binding proteins, gp30 and gp18, with modified albumins. *J. Biol. Chem.* 267:24544-24553.
 22. **Schnitzer, J.E.** & Bravo, J. (1993) High affinity binding, endocytosis, and degradation of conformationally modified albumins. Potential role of gp30 and gp18 as novel scavenger receptors. *J. Biol. Chem.* 268:7562-7570.
 23. **Schnitzer, J.E.** (1993) Update on the cellular & molecular basis of capillary permeability. *Trends Cardiovasc. Med.* 3:124-130.
 24. **Schnitzer, J.E.** & Oh, P. (1994) Albondin-mediated capillary permeability to albumin. Differential role of receptors in endothelial transcytosis and endocytosis of native and modified albumins. *J. Biol. Chem.* 269:6072-6082.
 25. **Schnitzer, J.E.**, Siflinger-Birnboim, A., Del Vecchio, P.J. & Malik, A.B. Segmental differentiation of permeability, protein glycosylation, and morphology of cultured bovine lung vascular endothelium. *Biochem. Biophys. Res. Comm.*, 199, 11-19, 1994.
 26. **Schnitzer, J.E.**, Oh, P., Pinney, E. & Allard, J. (1994) Filipin-sensitive caveolae-mediated transport in endothelium: reduced transcytosis, scavenger endocytosis and capillary permeability of select macromolecules. *J. Cell Biol.* 127:1217-1232.
 27. **Schnitzer, J.E.**, Allard, J. & Oh, P. (1995) NEM inhibits transcytosis, endocytosis, and capillary permeability: implication of caveolae fusion in endothelia. *Am. J. Physiol.* 268(37):H48-55.
 28. **Schnitzer, J.E.**, Oh, P., Jacobson, B.S. & Dvorak, A.M. (1995) Caveolae from luminal plasmalemma of rat lung endothelium: microdomains enriched in caveolin, Ca²⁺-ATPase & IP₃ receptor. *Proc. Natl. Acad. Sci. USA* 92:1759-1763.
 29. **Schnitzer, J.E.**, Lui, J. & Oh, P. (1995) Endothelial caveolae have the molecular transport machinery for vesicle budding, docking, and fusion including VAMP, NSF, SNAP, annexins, & GTPases. *J. Biol. Chem.* 270:14399-14404.
 30. **Schnitzer, J.E.**, McIntosh, D.P., Dvorak, A.M., Liu, J. & Oh, P. (1995) Separation of caveolae from associated microdomains of GPI-anchored proteins. *Science* 269:1435-1439.
 31. **Schnitzer, J.E.** & Oh, P. (1996) Aquaporin-1 on the plasma membrane and caveolae provides mercury-sensitive water channels across lung endothelium. *Am. J. Physiol.* 270:416-422.
 32. Jacobson, B.S., Stolz, D.B. & **Schnitzer, J.E.** (1996) Identification of endothelial cell-surface proteins as potential targets for diagnosis and treatment of disease. *Nature Med.* 2:482-484.
 33. Garcia-Cardena, G., Oh, P., Liu, J., **Schnitzer, J.E.** & Sessa, W.C. (1996) Targeting of nitric oxide synthase to endothelial cell caveolae via palmitoylation: implications for nitric oxide signaling. *Proc. Natl. Acad. Sci. USA* 93:6448-6453.
 34. **Schnitzer, J.E.**, Oh, P. & McIntosh, D.P. (1996) Role of GTP hydrolysis in fission of caveolae directly from plasma membranes. *Science* 274:239-242. [Printer's erratum-*Science*, 274:1069, 1996.]
 35. Lui, J., Oh, P., Horner, T., Rogers, R.A. & **Schnitzer, J.E.** (1997) Organized endothelial cell surface signal transduction in caveolae distinct from glycosylphosphatidylinositol-anchored protein microdomains. *J. Biol. Chem.* 272:7211-7222.
 36. Bickel, P.E., Scherer, P.E., **Schnitzer, J.E.**, Oh, P., Lisanti, M.P. & Lodish, H.F. (1997) Flotillin and epidermal surface antigen define a new family of caveolae-associated integral membrane proteins. *J. Biol. Chem.* 272:13793-13802.
 37. **Schnitzer, J.E.** (1997) The endothelial cell surface and caveolae in health and disease. In: *Vascular Endothelium: Physiology, Pathology and Therapeutic Opportunities*. Ed., Born, GVR, Schwartz, CJ, Schattauer, Stuttgart, p.77-95.
 38. **Schnitzer, J.E.** (1998) Transport functions of the glycocalyx, specific proteins, and caveolae in endothelium. In: *Capillary Permeation, Cellular Transport and Reaction Kinetics*, Ed., J.B. Bassingthwaite, C.A., Goresky & J.H. Linehan, p31-69.
 39. Lee, S.W., Reimer, C.L., Oh, P., Campbell, D.B. & **Schnitzer, J.E.** (1998) Tumor cell growth inhibition by caveolin re-expression in human breast cancer cells. *Oncogene* 16:1391-1397.
 40. Oh, P., McIntosh, D.P. & **Schnitzer, J.E.** (1998) Dynamin at the neck of caveolae mediates their budding to form transport vesicles by GTP-driven fission from the plasma membrane of endothelium. *J. Cell Biol.* 141:101-114.
 41. **Schnitzer, J.E.** (1998) Vascular targeting as a strategy for cancer therapy. *New Eng. J. Med.* 339:472-474.
 42. Rizzo, V., Sung, A., Oh, P. & **Schnitzer, J.E.** (1998) Rapid mechanotransduction *in situ* at the luminal cell surface of vascular endothelium and its caveolae. *J. Biol. Chem.* 273:26323-26329.
 43. Oh, P. & **Schnitzer, J.E.** (1998) Isolation and subfractionation of plasma membranes to purify caveolae separately from glycosyl-phosphatidylinositol-anchored protein microdomains. In: *Cell Biology: A laboratory handbook*, Academic Press, 2nd. ed., Vol. 2, pp. 34-46.

44. Schnitzer, J.E. Aquaporins, caveolae and capillary permeability, In: Pulmonary Edema, Ed., Weir, E.K. & Reeves, J.T.; Futura Publ. Co., Inc., Armonk, NY, pp. 65-75, 1998.
45. Rizzo V, McIntosh DP, Oh P, **Schnitzer JE**. (1998) *In situ* flow activates endothelial nitric oxide synthase in luminal caveolae of endothelium with rapid caveolin dissociation and calmodulin association. **J.Biol.Chem.** 273:34724-34729.
46. Liu, J. & **Schnitzer, J.E.** (1999) Analysis of lipids in caveolae. **Methods Mol. Biol.** 116:61-72.
47. Oh, P. & **Schnitzer, J.E.** (1999) Immunolocalization of caveolae with high affinity antibodies binding the caveolin cage. Toward understanding the basis of purification. **J. Biol. Chem.** 274:23144-23154.
48. McIntosh, D.P. & **Schnitzer, J.E.** (1999) Caveolae require intact VAMP for targeted transport in vascular endothelium. **Am. J. Physiol.** 277:H2222-2232.
49. Rizzo, V. & **Schnitzer, J.E.** (1999) Role of caveolae on mechanotransduction. In: Vascular endothelium: Mechanisms of Cell Signaling, Ed. Catravas, J.D., Callow, A.D. & Ryan, U.S., IOS Press, NATO Science Series A, vol. 308, pp. 97-116.
50. Gyorloff-Wingren, A., Saxena, M., Han, S., Wang, X., Alonso, A., Renedo, M., Oh, P., Williams, S., **Schnitzer, J.** & Mustelin, T. (2000) Subcellular localization of intracellular protein tyrosine phosphatases in T cells. **Eur. J. Immunol.** 8:2412-2421.
51. Oh, P. & **Schnitzer, J.E.** (2001) Segregation of heterotrimeric G proteins in cell surface microdomains. G_q binds caveolin to concentrate in caveolae, whereas G_i and G_s target lipid rafts by default. **Mol. Biol. Cell** 12:685-698.
52. **Schnitzer, J.E.** (2001) Caveolae: from basic trafficking mechanisms to targeting transcytosis for tissue-specific drug and gene delivery *in vivo*. **Adv Drug Rev.** 49:265-280.
53. Razandi, M., Oh, P., Pedram, A., **Schnitzer, J.** & Levin, E.R. (2002) ERs associate with and regulate the production of caveolin: Implications for signaling and cellular actions. **Mol. Endocrin.** 16:100-115.
54. McIntosh, D.P., Tan, X.Y., Oh, P., & **Schnitzer, J.E.** (2002) Targeting endothelium and its dynamic caveolae *in vivo* for tissue-specific delivery and transcytosis *in vivo*: A pathway to overcome cell barriers to drug and gene delivery. **Proc. Natl. Acad. Sci. USA** 99, 1996-2001.
55. Zabel, U., Kleinschnitz, C., Oh, P., Nedvedsky, P., Smolenski, A., Kugler, P., Walter, U., **Schnitzer, J.E.**, & Schmidt, H.H.H.W. (2002) Calcium-dependent membrane association sensitizes soluble guanylyl cyclase to NO. **Nature Cell Biol.** 4: 307-311.
56. Carver, L. A. and **Schnitzer, J. E.** Tissue-specific pharmacodelivery and overcoming key cell barriers in vivo: Vascular targeting of caveolae. in Biomedical Aspects of Drug Targeting (eds. Muzykantov, V. and Torchilin, B.) pp. 107-128 (Kluwer Academic Publishers, Boston, 2002).
57. Czarny, M., Liu, J., Oh, P. & **Schnitzer, J. E.** (2003) Transient mechanoactivation of neutral sphingomyelinase in caveolae to generate ceramide. **J Biol Chem** 278, 4424-30.
58. Carver LA, **Schnitzer, J.E.**, Anderson RG, Mohla S. (2003) Role of caveolae and lipid rafts in cancer: Workshop summary and future needs. **Cancer Res** 63(20):6571-4.
59. Rizzo, V., Morton, C., DePaola N., **Schnitzer J.E.**, Davies P.F., (2003) Recruitment of endothelial caveolae into mechanotransduction pathways by flow-conditioning in vitro. **Am J Physiol Heart Circ Physiol.** 285(4):H1720-9.
60. Carver, L. and **Schnitzer, J.E.** (2003) Caveolae: Mining little caves for new cancer targets; **Nature Rev Cancer** 3:571-581.
61. Czarny M., **Schnitzer J.E.** (2004) Neutral sphingomyelinase inhibitor scyphostatin prevents and ceramide mimics mechanotransduction in vascular endothelium. **Am J Physiol.** 287(3):H1344-52.
62. Oh, P., Li, Y., Yu, J., Durr, E., Krasinska, K. Carver, L., Testa, J.E., and **Schnitzer, J.E.** (2004) Subtractive proteomic mapping of the endothelial surface in lung and solid tumours for tissue-specific therapy, **Nature**, 2004 429:629-35.
63. Durr E., Yu J., Krasinska K.M., Carver L.A., Yates J.R. III, Testa J.E., Oh P., **Schnitzer J.E.** (2004) Direct proteomic mapping of the lung microvascular endothelial cell surface in vivo and in cell culture. **Nat Biotechnol.** 22(8):985-92.
64. Valadon P, Garnett JD, Testa JE, Bauerle M, Oh P, **Schnitzer JE**. (2006) Screening phage display libraries for organ-specific vascular immunotargeting in vivo. **Proc Natl Acad Sci U S A.** 103(2):407-412.
65. Carver, L.A. & **Schnitzer, J.E.** Focusing target discovery and validation through proteogenomics and molecular imaging. In The Oncogenomics Handbook: Understanding and Treating Cancer in the 21st Century. Eds. Shimkets, R.A. & LaRochelle, W.J., The Humana Press, Inc., Totowa, NJ, 2004: 151-164.
66. Oh P, Carver LA, **Schnitzer JE**. Isolation and Subfractionation of Plasma Membranes to Purify Caveolae Separately from Lipid Rafts. Celis JE, ed. Cell Biology: A Laboratory Handbook 3ed. Vol. 2. Amsterdam: Elsevier, 2006:11-26.
67. Koziol JA., Feng AC, **Schnitzer JE**. (2006) Application of Capture-Recapture Models to Estimation of Protein Count in MudPIT Experiments. **Analytical Chemistry.** 78:3203-3207.
68. Oh P., Borgström P., Witkiewicz H., Li Y., Borgström B.J., Chrastina A., Iwata K., Zinn K.R, Baldwin R., Testa J.E., & **Schnitzer J.E.** (2007) Live dynamic imaging of caveolae pumping targeted antibody rapidly and specifically across endothelium in the lung. **Nature Biotechnol.** 25(3) 327-337.
69. Raj, J.U., Aliferis, C., Caprioli, R.M., Cowley, A.W. Jr., Davies, P.F., Duncan, M.W., Erle, D.J., Erzurum, S.C., Finn, P.W., Ischiropoulos, H., Kaminski N., Kleeberger, S.R., Leikauf, G.D., Loyd, J.E., Martin, T.R., Matalon, S., Moore, J.H., Quackenbush, J., Sabo-Attwood, T., Shapiro, S.D., **Schnitzer, J.E.**, Schwartz, D.A., Schwiebert, L.M.,

- Sheppard, D., Ware, L.B., Weiss, S.T., Whitsett, J.A., Wurfel, M.M., and Matthay, M.A. (2007) Genomics and Proteomics of Lung Disease: Conference Summary. **Am J Physiol.** 293: L45-L51.
70. Simonson, A.B. and **Schnitzer, J.E.**, (2007) Vascular proteomic mapping *in vivo*. **J Thomb and Haemo.** 5: 183-187.
 71. Carver LA, and **Schnitzer JE.** Multiple Functions and Clinical Uses of Caveolae in Endothelium. In: **Endothelial Biomedicine**, Ed. William C. Aird, M.D., Cambridge University Press, NY, NY, 2007:664-678,.
 72. Carver LA, and **Schnitzer JE.** Proteomic Mapping of Endothelium and Vascular Targeting in Vivo. In: **Endothelial Biomedicine**, Ed. William C. Aird, M.D., Cambridge University Press, NY, NY, 2007:881-897.
 73. Koziol, JA, Feng AC, Yu J, Griffin NM, **Schnitzer JE** (2008) Range Charts for Agreement in Measurement Comparison Studies, with Application to Replicate Mass Spectrometry Experiments. **J. Proteomics Bioinformatics** 1(6):287-292.
 74. NM Griffin and **JE Schnitzer**, Chapter 8 Proteomic mapping of the vascular endothelium in vivo for vascular targeting. *Methods Enzymol* 1 Jan 2008 445: p. 177-208.
 75. J. E. Testa, Chrastina, A., Li, Y., Oh, P. and **Schnitzer, J.E.**. (2008) Ubiquitous yet distinct expression of podocalyxin on vascular surfaces in normal and tumor tissues in rat. **J. Vasc Research** 46(4):311-324. PMID: PMC2798848.
 76. Li Y, Yu J, Wang Y, Griffin NM, Long F, Shore S, Oh P, **Schnitzer J.E.** (2009) Enhancing identifications of lipid-embedded proteins by mass spectrometry for improved mapping of endothelial plasma membranes in vivo. **Mol. Cell. Proteomics** 8: 1219-1235. PMID: PMC2690480.
 77. Testa, J.E., Chrastina, A., Oh, P., Li, Y., Witkiewicz, H., Czarny, M., Buss, T. and **Schnitzer, J.E.** (2009) Immunotargeting and cloning of two CD34 variants exhibiting restricted expression in adult rat endothelia *in vivo*. **Am J Physiol Lung Cell Mol Physiol.** 2009 297(2): L251-L262. PMID: PMC2742801.
 78. Massey, K.A. & **Schnitzer J.E.** (2009) Targeting and Imaging Signature Caveolar Molecules in Lungs. **Proc. Am. Thor. Soc.**, 6: 419-430. PMID: PMC2731802.
 79. Yi, M. and **J.E. Schnitzer.** Impaired tumor growth, metastasis, angiogenesis and wound healing in annexin A1-null mice. **Proc Natl Acad Sci U S A** 106:17886-17891. PMID: PMC2764877
 80. Valadon P, Darsow B, Buss TN, Czarny M, Griffin NM, Nguyen HN, Oh P, Chrastina A, Borgstrom P, and **Schnitzer JE.** Designed auto-assembly of nanostreptabodies for rapid tissue-specific targeting in vivo. **J Biol Chem.** 285:713-722. PMID: 19850928.
 81. Griffin NM, Yu J, Long F, Oh P, Shore S, Li Y, Koziol JA, & **Schnitzer JE,** Label-free, normalized quantification of complex mass spectrometry data for proteomics analysis. **Nature Biotechnol.** Epub ahead of print. PMID: 20010810.
 82. Massey KA and **Schnitzer JE.** (2010) Caveolae and Cancer. **Recent Results Cancer Res.**180:217-2331, 2010. PMID: 20033386.
 83. Chrastina, A., Valadon P., Massey, K.A. & **Schnitzer J.E.** Lung vascular targeting using antibody to aminopeptidase P: CT-SPECT imaging, biodistribution and pharmacokinetic analysis. **J. Vasc Research.** 47(6):531-543, 2010. PMID: 20431301
 84. Nakajima, T., Suarez C.J., Lin K.W., Jen K.Y., **Schnitzer J.E.**, Makani S.S., Parker N., Perkins D.L., Finn, P.W. T Cell Pathways Involving CTLA4 Contribute To a Model of Acute Lung Injury. **J Immunol.** May 15;184(10):5835-41, 2010. PMID: 20385880.
 85. Chrastina, A., & **Schnitzer J.E.** Iodine-125 radiolabeling of silver nanoparticles for in vivo SPECT imaging. **Int J Nanomedicine.** Sep 7 5:653-659, 2010. PMID: 20856841.
 86. Griffin, N.M., & **Schnitzer J.E.** Overcoming key technological challenges in using mass spectrometry for mapping cell surfaces in tissues. **Mol Cell Proteomics.** Feb;10(2), 2011. Epub 2010 Jun 14. PMID: 20548103.
 87. Chrastina, A., Valadon P., Massey K.A. & **Schnitzer J.E.** Lung vascular targeting using antibody to aminopeptidase P: CT-SPECT imaging, biodistribution and pharmacokinetic analysis. **J. Vasc Research.** 47(6):531-543, 2010. PMID: 20431301.
 88. Liu Y., Valadon P., & **Schnitzer J.E.** Construction of metabolically biotinylated adenovirus with deleted fiber knob as targeting vector. **Viro J.** 2010 Nov 12;7:316, 2010. PMID: 21073735.
 89. Li Y., Massey K., Witkiewicz H., & **Schnitzer J.E.** Systems analysis of endothelial cell plasma membrane proteome of rat lung microvasculature. **Proteome Sci.** Mar 29;9(1):15, 2011. PMID: 21447187.
 90. Chrastina, A., Massey K., & Schnitzer J.E. Overcoming in vivo barriers to targeted nanodelivery. *Nanomedicine & Nanobiotechnology. Review.* 1. Chrastina, A., Massey K., & Schnitzer J.E. Overcoming in vivo barriers to targeted nanodelivery. **Nanomedicine & Nanobiotechnology.** 2011 Apr 27. [Epub ahead of print]

Patents

7 patents issued; 8 patents pending.

D. Research Support

18XT-196 Schnitzer 07/01/2009-06/30/2011
California Tobacco Related Disease Research Program
Immunotargeting Lung Cancer
The goal of this project is to test the efficacy of targeting blood vessels to treat rodent lung cancer models.

P01 CA104898 Schnitzer (Co-PI) 5/01/05-4/30/10
NIH /NCI
Targeting Vessels in Tumors - A Program Project Grant
This program project (P01) is focused on integrating the activities of 4 projects and 4 core facilities toward the goal of discovering selective tumor vascular targets in spontaneous mouse tumor models and developing and testing tumor vascular targeting agents for cancer treatment. Dr. Schnitzer is a leader of 1 project and 2 cores in this program.

RO1CA119378 Schnitzer (Co-PI) 12/01/05-07/31/10
NIH /NCI
Nanotechnology Platform for Targeting Solid Tumors
Developing nanoparticles to deliver imaging and therapeutic agents in preclinical cancer models in vivo.

R01 HL074063 Schnitzer 02/01/2005-06/30/2010 (NCE)
NIH /NCI
Mapping Vascular Proteome for Organ Targeting in vivo (No Cost Extension)
The goal of this project is to define the normal molecular anatomy of the vasculature in multiple rat organs, specifically focusing on the distinct molecular signatures unique to each vasculature.

KG100983 Schnitzer 04/20/2010-04/19/2013
Susan G. Komen for the Cure
Immunotargeting Breast Tumors
The goal of this project is to evaluate the safety and efficacy of radioimmunotherapy and targeted drug deliver in rodent models.

19XT-0152 Schnitzer 07/01/2010-06/30/2012
Tobacco Related Disease Research Program
Targeted nanodelivery of anti-inflammatory drugs
The goal of this project is to develop new nanoparticles delivery platforms useful in the treatment of inflammatory lung disease.

PC 105550 Schnitzer
Department of Defense Prostate Cancer Research
Targeting antibodies into prostate tumors
The goal of this project is to demonstrate that targeting caveolae provides a means to concentrate radionuclides and drugs into prostate tumors and increase efficacy over non-targeted forms of therapy.