

BIOGRAPHICAL SKETCH

NAME SCHNITZER, Jan E., M.D.	POSITION TITLE Scientific Director, Professor		
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. 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 – Present	Professor of Molecular and Cellular Biology, Sidney Kimmel Cancer Center, San Diego, CA
1999 – Present	Director Vascular Biology & Angiogenesis Program, Sidney Kimmel Cancer Center, San Diego, CA
1999 – Present	Scientific Director, Sidney Kimmel Cancer Center, San Diego, CA

B. Selected publications:

1. 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.
 2. 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.
 3. **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.
 4. 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.
 5. 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
 6. **Schnitzer, J.E.**, Carley, W.W. & Palade, G.E. (1988) Specific albumin binding to microvascular endothelium in culture. **Am. J. Physiol.** 254:H425-H437.
 7. **Schnitzer, J.E.** Glycocalyx electrostatic potential profile analysis: Ion, pH, steric, and charge effects. **Yale J. Biol. Med.**, 61: 427-446, 1988.
 8. **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.
 9. **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.
 10. **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.
 11. **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.
 12. **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.
 13. 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.
 14. **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.
 15. **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. Nat 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.
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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.
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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.
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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

47. 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).
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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.
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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.
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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. In: Celis JE, ed. Cell Biology: A Laboratory Handbook 3ed. Vol. 2. Amsterdam: Elsevier, 2006:11-26.
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69. Raj, et al, (2007) Genomics and Proteomics of Lung Disease: Conference Summary. *Am J Physiol Lung Cell Mol Physiol.* 2007; 0: 00139.2007 v1.
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.

Patents

7 Patents issued

8 Patents under review

C. Research Support

1 R01 CA 83989 Schnitzer (PI)

3/01/02-2/28/08

NIH /NCI

Targeting Caveolae in Breast Tumors

This grant focuses on novel immunotherapies for treating rat breast tumors in vivo.

5 R01 HL58216 Schnitzer (PI)

12/1/97-3/31/08

NIH/NHLBI

Tissue-targeting to Endothelium and its Caveolae

This project investigates the trafficking and signal regulation of caveolae in normal lung endothelial cells.

R24 CA95893 Schnitzer (PI)

9/01/02-2/29/08

NIH

Proteomic Resource for Basic and Clinical Cancer

This is an R24 application for resource support for our proteomic facility at SKCC.

1R01CA115215 Schnitzer (PI)

9/23/04 – 8/31/09

NIH/NCI

Role and Utility of Annexins in Endothelium of Solid Tumors

This grant focuses on the function of annexins in neovascularization of solid tumors.

1R01 HL074063 Schnitzer (PI)

3/1/05 – 2/28/10

NIH/NHLBI

Mapping Vascular Proteome for Organ Targeting in Vivo

The goal of this project is to define the molecular anatomy of the vasculature in multiple rat organs and to unmask the distinct molecular signatures unique to each vasculature.

P01 CA104898 Schnitzer (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.

RO1CA119378 Schnitzer (PI)

12/01/05-11/30/10

NIH /NCI

Nanotechnology Platform for Targeting Solid Tumors

Developing nanoparticles to deliver imaging and therapeutic agents in preclinical cancer models in vivo.

R33 CA118602 Schnitzer (PI)

6/1/06 – 5/31/09

NIH

Technology to Map Endothelial Targets in Human Renal Tumors

The goal of this project is to investigate the endothelial cell surface proteome of the neovasculature for the first time in human solid tumor samples, specifically renal tumors.