

6 Literaturverzeichnis

- Adams, J. M. and S. Cory (2001). "Life-or-death decisions by the Bcl-2 protein family." *Trends Biochem Sci* 26(1): 61-6.
- Adi, S., N. Y. Wu, et al. (2001). "Growth factor-stimulated phosphorylation of Akt and p70(S6K) is differentially inhibited by LY294002 and Wortmannin." *Endocrinology* 142(1): 498-501.
- Albrecht, E. W., C. A. Stegeman, et al. (2003). "Protective role of endothelial nitric oxide synthase." *J Pathol* 199(1): 8-17.
- Alderton, W. K., C. E. Cooper, et al. (2001). "Nitric oxide synthases: structure, function and inhibition." *Biochem J* 357(Pt 3): 593-615.
- Aleman, R., C. J. van Koppen, et al. (2007). "Regulation and functional roles of sphingosine kinases." *Naunyn Schmiedebergs Arch Pharmacol* 374(5-6): 413-28.
- Alessi, D. R. and C. P. Downes (1998). "The role of PI 3-kinase in insulin action." *Biochim Biophys Acta* 1436(1-2): 151-64.
- An, S., Y. Zheng, et al. (2000). "Sphingosine 1-phosphate-induced cell proliferation, survival, and related signaling events mediated by G protein-coupled receptors Edg3 and Edg5." *J Biol Chem* 275(1): 288-96.
- Ancellin, N. and T. Hla (1999). "Differential pharmacological properties and signal transduction of the sphingosine 1-phosphate receptors EDG-1, EDG-3, and EDG-5." *J Biol Chem* 274(27): 18997-9002.
- Andrew, P. J. and B. Mayer (1999). "Enzymatic function of nitric oxide synthases." *Cardiovasc Res* 43(3): 521-31.
- Anliker, B. and J. Chun (2004). "Cell surface receptors in lysophospholipid signaling." *Semin Cell Dev Biol* 15(5): 457-65.
- Awad, A. S., H. Ye, et al. (2006). "Selective sphingosine 1-phosphate 1 receptor activation reduces ischemia-reperfusion injury in mouse kidney." *Am J Physiol Renal Physiol* 290(6): F1516-24.
- Banno, Y., Y. Takuwa, et al. (2001). "Involvement of phospholipase D in sphingosine 1-phosphate-induced activation of phosphatidylinositol 3-kinase and Akt in Chinese hamster ovary cells overexpressing EDG3." *J Biol Chem* 276(38): 35622-8.
- Baudhuin, L. M., K. L. Cristina, et al. (2002). "Akt activation induced by lysophosphatidic acid and sphingosine-1-phosphate requires both mitogen-activated protein kinase kinase and p38 mitogen-activated protein kinase and is cell-line specific." *Mol Pharmacol* 62(3): 660-71.
- Baudhuin, L. M., Y. Jiang, et al. (2004). "S1P3-mediated Akt activation and cross-talk with platelet-derived growth factor receptor (PDGFR)." *Faseb J* 18(2): 341-3.
- Baudouin, J. E. and P. Tachon (1996). "Constitutive nitric oxide synthase is present in normal human keratinocytes." *J Invest Dermatol* 106(3): 428-31.
- Becciolini, L., E. Meacci, et al. (2006). "Sphingosine 1-phosphate inhibits cell migration in C2C12 myoblasts." *Biochim Biophys Acta* 1761(1): 43-51.
- Berges, R. and J. T. Isaacs (1993). "Programming events in the regulation of cell proliferation and death." *Clin Chem* 39(2): 356-61.
- Bernardi, R. J., C. S. Johnson, et al. (2002). "Antiproliferative effects of 1 α ,25-dihydroxyvitamin D(3) and vitamin D analogs on tumor-derived endothelial cells." *Endocrinology* 143(7): 2508-14.
- Bikle, D. D., D. Ng, et al. (2001). "Calcium- and vitamin D-regulated keratinocyte differentiation." *Mol Cell Endocrinol* 177(1-2): 161-71.
- Boissel, J. P., D. Ohly, et al. (2004). "The neuronal nitric oxide synthase is upregulated in mouse skin repair and in response to epidermal growth factor in human HaCaT keratinocytes." *J Invest Dermatol* 123(1): 132-9.
- Bollinger-Bollag, W. and R. J. Bollag (2001). "1,25-Dihydroxyvitamin D(3), phospholipase D and protein kinase C in keratinocyte differentiation." *Mol Cell Endocrinol* 177(1-2): 173-82.
- Boo, Y. C., G. Sorescu, et al. (2002). "Shear stress stimulates phosphorylation of endothelial nitric-oxide synthase at Ser1179 by Akt-independent mechanisms: role of protein kinase A." *J Biol Chem* 277(5): 3388-96.

- Bottermann, P. and G. Loffler (1971). "[Insulin effect]." *Internist (Berl)* 12(11): 457-62.
- Bradford, M. M. (1976). "A rapid and sensitive method for the quantitation of microgram quantities of protein utilizing the principle of protein-dye binding." *Anal Biochem* 72: 248-54.
- Bredt, D. S. (1999). "Endogenous nitric oxide synthesis: biological functions and pathophysiology." *Free Radic Res* 31(6): 577-96.
- Bredt, D. S. and S. H. Snyder (1992). "Nitric oxide, a novel neuronal messenger." *Neuron* 8(1): 3-11.
- Breitkreutz, D., L. Braiman-Wiksman, et al. (2007). "Protein kinase C family: on the crossroads of cell signaling in skin and tumor epithelium." *J Cancer Res Clin Oncol* 133(11): 793-808.
- Brinkmann, V., J. G. Cyster, et al. (2004). "FTY720: sphingosine 1-phosphate receptor-1 in the control of lymphocyte egress and endothelial barrier function." *Am J Transplant* 4(7): 1019-25.
- Brinkmann, V., M. D. Davis, et al. (2002). "The immune modulator FTY720 targets sphingosine 1-phosphate receptors." *J Biol Chem* 277(24): 21453-7.
- Brizuela, L., M. Rabano, et al. (2007). "Sphingosine-1-phosphate stimulates aldosterone secretion through a mechanism involving the PI3K/PKB and MEK/ERK 1/2 pathways." *J Lipid Res* 48(10): 2264-74.
- Brown, B. A., P. P. Kantesaria, et al. (2007). "Fingolimod: a novel immunosuppressant for multiple sclerosis." *Ann Pharmacother* 41(10): 1660-8.
- Bruch-Gerharz, D., K. Fehsel, et al. (1996). "A proinflammatory activity of interleukin 8 in human skin: expression of the inducible nitric oxide synthase in psoriatic lesions and cultured keratinocytes." *J Exp Med* 184(5): 2007-12.
- Bruch-Gerharz, D., T. Ruzicka, et al. (1998). "Nitric oxide and its implications in skin homeostasis and disease - a review." *Arch Dermatol Res* 290(12): 643-51.
- Bruch-Gerharz, D., O. Schnorr, et al. (2003). "Arginase 1 overexpression in psoriasis: limitation of inducible nitric oxide synthase activity as a molecular mechanism for keratinocyte hyperproliferation." *Am J Pathol* 162(1): 203-11.
- Cals-Grierson, M. M. and A. D. Ormerod (2004). "Nitric oxide function in the skin." *Nitric Oxide* 10(4): 179-93.
- Candi, E., R. Schmidt, et al. (2005). "The cornified envelope: a model of cell death in the skin." *Nat Rev Mol Cell Biol* 6(4): 328-40.
- Cauwels, A. (2007). "Nitric oxide in shock." *Kidney Int* 72(5): 557-65.
- Chang, H. R., D. A. Tsao, et al. (2003). "Expression of nitric oxide synthases in keratinocytes after UVB irradiation." *Arch Dermatol Res* 295(7): 293-6.
- Chang, H. Y. and X. Yang (2000). "Proteases for cell suicide: functions and regulation of caspases." *Microbiol Mol Biol Rev* 64(4): 821-46.
- Cheatham, B. and C. R. Kahn (1995). "Insulin action and the insulin signaling network." *Endocr Rev* 16(2): 117-42.
- Cheng, J. Q., D. A. Altomare, et al. (1997). "Transforming activity and mitosis-related expression of the AKT2 oncogene: evidence suggesting a link between cell cycle regulation and oncogenesis." *Oncogene* 14(23): 2793-801.
- Cheng, J. Q., C. W. Lindsley, et al. (2005). "The Akt/PKB pathway: molecular target for cancer drug discovery." *Oncogene* 24(50): 7482-92.
- Chirgwin, J. M., A. E. Przybyla, et al. (1979). "Isolation of biologically active ribonucleic acid from sources enriched in ribonuclease." *Biochemistry* 18(24): 5294-9.
- Chow, J. and V. A. Tron (2005). "Molecular aspects of ultraviolet radiation-induced apoptosis in the skin." *J Cutan Med Surg* 9(6): 289-95.
- Chung, H. T., H. O. Pae, et al. (2001). "Nitric oxide as a bioregulator of apoptosis." *Biochem Biophys Res Commun* 282(5): 1075-9.
- Clemens, M. J., I. Trayner, et al. (1992). "The role of protein kinase C isoenzymes in the regulation of cell proliferation and differentiation." *J Cell Sci* 103 (Pt 4): 881-7.
- Crowell, J. A., V. E. Steele, et al. (2007). "Targeting the AKT protein kinase for cancer chemoprevention." *Mol Cancer Ther* 6(8): 2139-48.

- Cuvillier, O. and T. Levade (2001). "Sphingosine 1-phosphate antagonizes apoptosis of human leukemia cells by inhibiting release of cytochrome c and Smac/DIABLO from mitochondria." *Blood* 98(9): 2828-36.
- Cuvillier, O., G. Pirianov, et al. (1996). "Suppression of ceramide-mediated programmed cell death by sphingosine-1-phosphate." *Nature* 381(6585): 800-3.
- Danielpour, D. and K. Song (2006). "Cross-talk between IGF-I and TGF-beta signaling pathways." *Cytokine Growth Factor Rev* 17(1-2): 59-74.
- Davaille, J., C. Gallois, et al. (2000). "Antiproliferative properties of sphingosine 1-phosphate in human hepatic myofibroblasts. A cyclooxygenase-2 mediated pathway." *J Biol Chem* 275(44): 34628-33.
- Davis, M. D., J. J. Clemens, et al. (2005). "Sphingosine 1-phosphate analogs as receptor antagonists." *J Biol Chem* 280(11): 9833-41.
- Davis, P. D., L. H. Elliott, et al. (1992). "Inhibitors of protein kinase C. 2. Substituted bisindolylmaleimides with improved potency and selectivity." *J Med Chem* 35(6): 994-1001.
- Dempsey, E. C., A. C. Newton, et al. (2000). "Protein kinase C isozymes and the regulation of diverse cell responses." *Am J Physiol Lung Cell Mol Physiol* 279(3): L429-38.
- Denning, M. F. (2004). "Epidermal keratinocytes: regulation of multiple cell phenotypes by multiple protein kinase C isoforms." *Int J Biochem Cell Biol* 36(7): 1141-6.
- DiGiovanni, J., D. K. Bol, et al. (2000). "Constitutive expression of insulin-like growth factor-1 in epidermal basal cells of transgenic mice leads to spontaneous tumor promotion." *Cancer Res* 60(6): 1561-70.
- Diker-Cohen, T., R. Koren, et al. (2006). "Programmed cell death of stressed keratinocytes and its inhibition by vitamin D: the role of death and survival signaling pathways." *Apoptosis* 11(4): 519-34.
- Dimmeler, S. and A. M. Zeiher (1997). "Nitric oxide and apoptosis: another paradigm for the double-edged role of nitric oxide." *Nitric Oxide* 1(4): 275-81.
- Dlugosz, A. A., H. Mischak, et al. (1992). "Transcripts encoding protein kinase C-alpha, -delta, -epsilon, -zeta, and -eta are expressed in basal and differentiating mouse keratinocytes in vitro and exhibit quantitative changes in neoplastic cells." *Mol Carcinog* 5(4): 286-92.
- Donati, C., E. Meacci, et al. (2005). "Sphingosine 1-phosphate regulates myogenic differentiation: a major role for S1P2 receptor." *Faseb J* 19(3): 449-51.
- Dudzinski, D. M., J. Igarashi, et al. (2006). "The regulation and pharmacology of endothelial nitric oxide synthase." *Annu Rev Pharmacol Toxicol* 46: 235-76.
- Durieux, M. E., S. J. Carlisle, et al. (1993). "Responses to sphingosine-1-phosphate in *X. laevis* oocytes: similarities with lysophosphatidic acid signaling." *Am J Physiol* 264(5 Pt 1): C1360-4.
- Eberle, J., L. F. Fecker, et al. (2007). "Apoptosis pathways as promising targets for skin cancer therapy." *Br J Dermatol* 156 Suppl 3: 18-24.
- Edmondson, S. R., S. P. Thumiger, et al. (2003). "Epidermal homeostasis: the role of the growth hormone and insulin-like growth factor systems." *Endocr Rev* 24(6): 737-64.
- Esposti, M. D. (2002). "The roles of Bid." *Apoptosis* 7(5): 433-40.
- Filippa, N., C. L. Sable, et al. (1999). "Mechanism of protein kinase B activation by cyclic AMP-dependent protein kinase." *Mol Cell Biol* 19(7): 4989-5000.
- Fischer, D. J., N. Nusser, et al. (2001). "Short-chain phosphatidates are subtype-selective antagonists of lysophosphatidic acid receptors." *Mol Pharmacol* 60(4): 776-84.
- Fleming, I. and R. Busse (2003). "Molecular mechanisms involved in the regulation of the endothelial nitric oxide synthase." *Am J Physiol Regul Integr Comp Physiol* 284(1): R1-12.
- Forstermann, U., J. P. Boissel, et al. (1998). "Expressional control of the 'constitutive' isoforms of nitric oxide synthase (NOS I and NOS III)." *Faseb J* 12(10): 773-90.
- Frank, S., H. Kampfer, et al. (2002). "Nitric oxide drives skin repair: novel functions of an established mediator." *Kidney Int* 61(3): 882-8.

- Frank, S., M. Madlener, et al. (1998). "Induction of inducible nitric oxide synthase and its corresponding tetrahydrobiopterin-cofactor-synthesizing enzyme GTP-cyclohydrolase I during cutaneous wound repair." *J Invest Dermatol* 111(6): 1058-64.
- Fuchs, E. and S. Raghavan (2002). "Getting under the skin of epidermal morphogenesis." *Nat Rev Genet* 3(3): 199-209.
- Furchgott, R. F. and J. V. Zawadzki (1980). "The obligatory role of endothelial cells in the relaxation of arterial smooth muscle by acetylcholine." *Nature* 288(5789): 373-6.
- Gartsbein, M., A. Alt, et al. (2006). "The role of protein kinase C delta activation and STAT3 Ser727 phosphorylation in insulin-induced keratinocyte proliferation." *J Cell Sci* 119(Pt 3): 470-81.
- Geller, D. A. and T. R. Billiar (1998). "Molecular biology of nitric oxide synthases." *Cancer Metastasis Rev* 17(1): 7-23.
- Gillitzer, R. and M. Goebeler (2001). "Chemokines in cutaneous wound healing." *J Leukoc Biol* 69(4): 513-21.
- Giovannucci, E. (1999). "Insulin-like growth factor-I and binding protein-3 and risk of cancer." *Horm Res* 51 Suppl 3: 34-41.
- Goetzl, E. J. and M. H. Graler (2004). "Sphingosine 1-phosphate and its type 1 G protein-coupled receptor: trophic support and functional regulation of T lymphocytes." *J Leukoc Biol* 76(1): 30-5.
- Goetzl, E. J., Y. Kong, et al. (1999). "Lysophosphatidic acid and sphingosine 1-phosphate protection of T cells from apoptosis in association with suppression of Bax." *J Immunol* 162(4): 2049-56.
- Gonzalez-Maglio, D. H., M. L. Paz, et al. (2005). "Skin damage and mitochondrial dysfunction after acute ultraviolet B irradiation: relationship with nitric oxide production." *Photodermatol Photoimmunol Photomed* 21(6): 311-7.
- Grey, A., Q. Chen, et al. (2002). "The phospholipids sphingosine-1-phosphate and lysophosphatidic acid prevent apoptosis in osteoblastic cells via a signaling pathway involving G(i) proteins and phosphatidylinositol-3 kinase." *Endocrinology* 143(12): 4755-63.
- Griess, J. P. (1864). "On a new series of bodies in which nitrogen is substituted for hydrogen." *Phil. Trans. Res. Soc. (London)* 154: 667-731.
- Gschwendt, M., S. Dieterich, et al. (1996). "Inhibition of protein kinase C mu by various inhibitors. Differentiation from protein kinase c isoenzymes." *FEBS Lett* 392(2): 77-80.
- Gschwendt, M., H. J. Muller, et al. (1994). "Rottlerin, a novel protein kinase inhibitor." *Biochem Biophys Res Commun* 199(1): 93-8.
- Guzik, T. J., R. Korbut, et al. (2003). "Nitric oxide and superoxide in inflammation and immune regulation." *J Physiol Pharmacol* 54(4): 469-87.
- Hanafin, N. M., K. S. Persons, et al. (1995). "Increased PKC activity in cultured human keratinocytes and fibroblasts after treatment with 1 alpha, 25-dihydroxyvitamin D3." *J Cell Biochem* 57(2): 362-70.
- Hannun, Y. A. and L. M. Obeid (2002). "The Ceramide-centric universe of lipid-mediated cell regulation: stress encounters of the lipid kind." *J Biol Chem* 277(29): 25847-50.
- Heise, C. E., W. L. Santos, et al. (2001). "Activity of 2-substituted lysophosphatidic acid (LPA) analogs at LPA receptors: discovery of a LPA1/LPA3 receptor antagonist." *Mol Pharmacol* 60(6): 1173-80.
- Hermann, C., B. Assmus, et al. (2000). "Insulin-mediated stimulation of protein kinase Akt: A potent survival signaling cascade for endothelial cells." *Arterioscler Thromb Vasc Biol* 20(2): 402-9.
- Hla, T. and T. Maciag (1990). "An abundant transcript induced in differentiating human endothelial cells encodes a polypeptide with structural similarities to G-protein-coupled receptors." *J Biol Chem* 265(16): 9308-13.
- Ho, J. W., K. Man, et al. (2005). "Effects of a novel immunomodulating agent, FTY720, on tumor growth and angiogenesis in hepatocellular carcinoma." *Mol Cancer Ther* 4(9): 1430-8.
- Hockenbery, D., G. Nunez, et al. (1990). "Bcl-2 is an inner mitochondrial membrane protein that blocks programmed cell death." *Nature* 348(6299): 334-6.

- Hockenbery, D. M., M. Zutter, et al. (1991). "BCL2 protein is topographically restricted in tissues characterized by apoptotic cell death." *Proc Natl Acad Sci U S A* 88(16): 6961-5.
- Hodak, E., A. B. Gottlieb, et al. (1996). "The insulin-like growth factor 1 receptor is expressed by epithelial cells with proliferative potential in human epidermis and skin appendages: correlation of increased expression with epidermal hyperplasia." *J Invest Dermatol* 106(3): 564-70.
- Horn, F., F. Marks, et al. (1987). "Decreased protein kinase C activity in psoriatic versus normal epidermis." *J Invest Dermatol* 88(2): 220-2.
- Hornia, A., Z. Lu, et al. (1999). "Antagonistic effects of protein kinase C alpha and delta on both transformation and phospholipase D activity mediated by the epidermal growth factor receptor." *Mol Cell Biol* 19(11): 7672-80.
- Hsieh, H. L., C. C. Sun, et al. (2007). "Sphingosine 1-phosphate induces EGFR expression via Akt/NF-kappaB and ERK/AP-1 pathways in rat vascular smooth muscle cells." *J Cell Biochem*.
- Igarashi, J., S. G. Bernier, et al. (2001a). "Sphingosine 1-phosphate and activation of endothelial nitric-oxide synthase. differential regulation of Akt and MAP kinase pathways by EDG and bradykinin receptors in vascular endothelial cells." *J Biol Chem* 276(15): 12420-6.
- Igarashi, J. and T. Michel (2001b). "Sphingosine 1-phosphate and isoform-specific activation of phosphoinositide 3-kinase beta. Evidence for divergence and convergence of receptor-regulated endothelial nitric-oxide synthase signaling pathways." *J Biol Chem* 276(39): 36281-8.
- Ignarro, L. J., G. M. Buga, et al. (1987). "Endothelium-derived relaxing factor produced and released from artery and vein is nitric oxide." *Proc Natl Acad Sci U S A* 84(24): 9265-9.
- Ikeda, H., H. Satoh, et al. (2003). "Antiproliferative property of sphingosine 1-phosphate in rat hepatocytes involves activation of Rho via Edg-5." *Gastroenterology* 124(2): 459-69.
- Inohara, S., Y. Tatsumi, et al. (1988). "Immunohistological identification of protein kinase C isozymes in normal and psoriatic epidermis." *Arch Dermatol Res* 280(7): 454-5.
- Jackson, D. N. and D. A. Foster (2004). "The enigmatic protein kinase Cdelta: complex roles in cell proliferation and survival." *Faseb J* 18(6): 627-36.
- Jackson, M., F. Frame, et al. (1998). "Expression of nitric oxide synthase III (eNOS) mRNA by human skin cells: melanocytes but not keratinocytes express eNOS mRNA." *Arch Dermatol Res* 290(6): 350-2.
- Jo, E., M. G. Sanna, et al. (2005). "S1P1-selective in vivo-active agonists from high-throughput screening: off-the-shelf chemical probes of receptor interactions, signaling, and fate." *Chem Biol* 12(6): 703-15.
- Jost, M., T. M. Huggett, et al. (2001). "Epidermal growth factor receptor-dependent control of keratinocyte survival and Bcl-xL expression through a MEK-dependent pathway." *J Biol Chem* 276(9): 6320-6.
- Jun, D. J., J. H. Lee, et al. (2006). "Sphingosine-1-phosphate modulates both lipolysis and leptin production in differentiated rat white adipocytes." *Endocrinology* 147(12): 5835-44.
- Kanda, N., T. Shimizu, et al. (2007). "IL-18 enhances IFN-gamma-induced production of CXCL9, CXCL10, and CXCL11 in human keratinocytes." *Eur J Immunol* 37(2): 338-50.
- Kandel, E. S. and N. Hay (1999). "The regulation and activities of the multifunctional serine/threonine kinase Akt/PKB." *Exp Cell Res* 253(1): 210-29.
- Katsuma, S., Y. Hada, et al. (2002). "Signalling mechanisms in sphingosine 1-phosphate-promoted mesangial cell proliferation." *Genes Cells* 7(12): 1217-30.
- Kerr, J. F., A. H. Wyllie, et al. (1972). "Apoptosis: a basic biological phenomenon with wide-ranging implications in tissue kinetics." *Br J Cancer* 26(4): 239-57.
- Kim, D. and J. Chung (2002). "Akt: versatile mediator of cell survival and beyond." *J Biochem Mol Biol* 35(1): 106-15.

- Kim, D. S., S. Y. Kim, et al. (2004). "Sphingosine-1-phosphate inhibits human keratinocyte proliferation via Akt/protein kinase B inactivation." *Cell Signal* 16(1): 89-95.
- Kim, Y. M., C. A. Bombeck, et al. (1999). "Nitric oxide as a bifunctional regulator of apoptosis." *Circ Res* 84(3): 253-6.
- Kimura, T., K. Sato, et al. (2003). "High-density lipoprotein stimulates endothelial cell migration and survival through sphingosine 1-phosphate and its receptors." *Arterioscler Thromb Vasc Biol* 23(7): 1283-8.
- Kimura, T., T. Watanabe, et al. (2000). "Sphingosine 1-phosphate stimulates proliferation and migration of human endothelial cells possibly through the lipid receptors, Edg-1 and Edg-3." *Biochem J* 348 Pt 1: 71-6.
- Kitabchi, A. E. (1977). "Proinsulin and C-peptide: a review." *Metabolism* 26(5): 547-87.
- Kluk, M. J. and T. Hla (2001). "Role of the sphingosine 1-phosphate receptor EDG-1 in vascular smooth muscle cell proliferation and migration." *Circ Res* 89(6): 496-502.
- Kluk, M. J. and T. Hla (2002). "Signaling of sphingosine-1-phosphate via the S1P/EDG-family of G-protein-coupled receptors." *Biochim Biophys Acta* 1582(1-3): 72-80.
- Ko, T. C., W. A. Bresnahan, et al. (1997). "Intestinal cell cycle regulation." *Prog Cell Cycle Res* 3: 43-52.
- Koide, Y., T. Hasegawa, et al. (2002). "Development of novel EDG3 antagonists using a 3D database search and their structure-activity relationships." *J Med Chem* 45(21): 4629-38.
- Kojima, H., K. Sakurai, et al. (1998). "Development of a fluorescent indicator for nitric oxide based on the fluorescein chromophore." *Chem Pharm Bull (Tokyo)* 46(2): 373-5.
- Kolb, H. and V. Kolb-Bachofen (1992). "Nitric oxide: a pathogenetic factor in autoimmunity." *Immunol Today* 13(5): 157-60.
- Kolb, H. and V. Kolb-Bachofen (1998). "Nitric oxide in autoimmune disease: cytotoxic or regulatory mediator?" *Immunol Today* 19(12): 556-61.
- Kolesnick, R. and Y. A. Hannun (1999). "Ceramide and apoptosis." *Trends Biochem Sci* 24(6): 224-5; author reply 227.
- Kone, B. C., T. Kuncewicz, et al. (2003). "Protein interactions with nitric oxide synthases: controlling the right time, the right place, and the right amount of nitric oxide." *Am J Physiol Renal Physiol* 285(2): F178-90.
- Konishi, H., H. Matsuzaki, et al. (1997). "Activation of protein kinase B (Akt/RAC-protein kinase) by cellular stress and its association with heat shock protein Hsp27." *FEBS Lett* 410(2-3): 493-8.
- Kooijman, R. (2006). "Regulation of apoptosis by insulin-like growth factor (IGF)-I." *Cytokine Growth Factor Rev* 17(4): 305-23.
- Koria, P. and S. T. Andreadis (2006). "Epidermal morphogenesis: the transcriptional program of human keratinocytes during stratification." *J Invest Dermatol* 126(8): 1834-41.
- Kou, R., J. Igarashi, et al. (2002). "Lysophosphatidic acid and receptor-mediated activation of endothelial nitric-oxide synthase." *Biochemistry* 41(15): 4982-8.
- Krajewski, S., M. Krajewska, et al. (1996). "Immunohistochemical analysis of in vivo patterns of Bak expression, a proapoptotic member of the Bcl-2 protein family." *Cancer Res* 56(12): 2849-55.
- Krischel, V., D. Bruch-Gerharz, et al. (1998). "Biphasic effect of exogenous nitric oxide on proliferation and differentiation in skin derived keratinocytes but not fibroblasts." *J Invest Dermatol* 111(2): 286-91.
- Kudo, Y., S. Kitajima, et al. (2005). "Down-regulation of Cdk inhibitor p27 in oral squamous cell carcinoma." *Oral Oncol* 41(2): 105-16.
- Kuhn, C., S. A. Hurwitz, et al. (1999). "Activation of the insulin-like growth factor-1 receptor promotes the survival of human keratinocytes following ultraviolet B irradiation." *Int J Cancer* 80(3): 431-8.
- Kulik, G. and M. J. Weber (1998). "Akt-dependent and -independent survival signaling pathways utilized by insulin-like growth factor I." *Mol Cell Biol* 18(11): 6711-8.
- Kunzendorf, U., E. Ziegler, et al. (2004). "FTY720--the first compound of a new promising class of immunosuppressive drugs." *Nephrol Dial Transplant* 19(7): 1677-81.

- Kuo, Y. C., K. Y. Huang, et al. (2007). "Regulation of phosphorylation of Thr308 of Akt, cell proliferation and survival by the B55alpha regulatory subunit targeting of the protein phosphatase 2A holoenzyme to Akt." *J Biol Chem*.
- Kwon, Y. G., J. K. Min, et al. (2001). "Sphingosine 1-phosphate protects human umbilical vein endothelial cells from serum-deprived apoptosis by nitric oxide production." *J Biol Chem* 276(14): 10627-33.
- Lawlor, M. A. and D. R. Alessi (2001). "PKB/Akt: a key mediator of cell proliferation, survival and insulin responses?" *J Cell Sci* 114(Pt 16): 2903-10.
- Lazar, D. F. and A. R. Saltiel (2006). "Lipid phosphatases as drug discovery targets for type 2 diabetes." *Nat Rev Drug Discov* 5(4): 333-42.
- Lee, C. W., R. Rivera, et al. (2007). "LPA(4)/GPR23 is a lysophosphatidic acid (LPA) receptor utilizing G(s)-, G(q)/G(i)-mediated calcium signaling and G(12/13)-mediated Rho activation." *J Biol Chem* 282(7): 4310-7.
- Lee, M. J., J. R. Van Brocklyn, et al. (1998). "Sphingosine-1-phosphate as a ligand for the G protein-coupled receptor EDG-1." *Science* 279(5356): 1552-5.
- Lee, P. C., A. N. Salyapongse, et al. (1999). "Impaired wound healing and angiogenesis in eNOS-deficient mice." *Am J Physiol* 277(4 Pt 2): H1600-8.
- Lee, S. C., J. W. Lee, et al. (2000). "Protective role of nitric oxide-mediated inflammatory response against lipid peroxidation in ultraviolet B-irradiated skin." *Br J Dermatol* 142(4): 653-9.
- Lee, T. K., K. Man, et al. (2004). "FTY720 induces apoptosis of human hepatoma cell lines through PI3-K-mediated Akt dephosphorylation." *Carcinogenesis* 25(12): 2397-405.
- Leffler, M., T. Hrach, et al. (2007). "Insulin attenuates apoptosis and exerts anti-inflammatory effects in endotoxemic human macrophages." *J Surg Res* 143(2): 398-406.
- Levade, T. and J. P. Jaffrezou (1999). "Signalling sphingomyelinases: which, where, how and why?" *Biochim Biophys Acta* 1438(1): 1-17.
- Lew, D. J. and S. Kornbluth (1996). "Regulatory roles of cyclin dependent kinase phosphorylation in cell cycle control." *Curr Opin Cell Biol* 8(6): 795-804.
- Li, H. and U. Forstermann (2000). "Nitric oxide in the pathogenesis of vascular disease." *J Pathol* 190(3): 244-54.
- Li, H., T. Wallerath, et al. (2002). "Regulation of endothelial-type NO synthase expression in pathophysiology and in response to drugs." *Nitric Oxide* 7(3): 149-64.
- Li, L., P. S. Lorenzo, et al. (1999). "Protein kinase Cdelta targets mitochondria, alters mitochondrial membrane potential, and induces apoptosis in normal and neoplastic keratinocytes when overexpressed by an adenoviral vector." *Mol Cell Biol* 19(12): 8547-58.
- Li, L., K. Sampat, et al. (2006). "Protein kinase C negatively regulates Akt activity and modifies UVC-induced apoptosis in mouse keratinocytes." *J Biol Chem* 281(6): 3237-43.
- Liang, J. and J. M. Slingerland (2003). "Multiple roles of the PI3K/PKB (Akt) pathway in cell cycle progression." *Cell Cycle* 2(4): 339-45.
- Liang, J., J. Zubovitz, et al. (2002). "PKB/Akt phosphorylates p27, impairs nuclear import of p27 and opposes p27-mediated G1 arrest." *Nat Med* 8(10): 1153-60.
- Lippens, S., G. Denecker, et al. (2005). "Death penalty for keratinocytes: apoptosis versus cornification." *Cell Death Differ* 12 Suppl 2: 1497-508.
- Liu, H., D. Chakravarty, et al. (2002). "Sphingosine kinases: a novel family of lipid kinases." *Prog Nucleic Acid Res Mol Biol* 71: 493-511.
- Luo, J. D. and A. F. Chen (2005). "Nitric oxide: a newly discovered function on wound healing." *Acta Pharmacol Sin* 26(3): 259-64.
- Machida, T., Y. Hamaya, et al. (2008). "Sphingosine 1-phosphate Inhibits Nitric Oxide Production induced by Interleukin-1{beta} in Rat Vascular Smooth Muscle Cells." *J Pharmacol Exp Ther*.
- MacMicking, J., Q. W. Xie, et al. (1997). "Nitric oxide and macrophage function." *Annu Rev Immunol* 15: 323-50.

- Manggau, M., D. S. Kim, et al. (2001). "1Alpha,25-dihydroxyvitamin D3 protects human keratinocytes from apoptosis by the formation of sphingosine-1-phosphate." *J Invest Dermatol* 117(5): 1241-9.
- Marks, F. and G. Furstenberger (1993). "Proliferative responses of the skin to external stimuli." *Environ Health Perspect* 101 Suppl 5: 95-101.
- Marletta, M. A. (1993). "Nitric oxide synthase structure and mechanism." *J Biol Chem* 268(17): 12231-4.
- Martin, P. (1997). "Wound healing--aiming for perfect skin regeneration." *Science* 276(5309): 75-81.
- Massague, J., J. Seoane, et al. (2005). "Smad transcription factors." *Genes Dev* 19(23): 2783-810.
- Matsui, M. S., S. L. Chew, et al. (1992). "Protein kinase C in normal human epidermal keratinocytes during proliferation and calcium-induced differentiation." *J Invest Dermatol* 99(5): 565-71.
- McCall, C. A. and J. J. Cohen (1991). "Programmed cell death in terminally differentiating keratinocytes: role of endogenous endonuclease." *J Invest Dermatol* 97(1): 111-4.
- Merrill, A. H., Jr. (2002). "De novo sphingolipid biosynthesis: a necessary, but dangerous, pathway." *J Biol Chem* 277(29): 25843-6.
- Meyer zu Heringdorf, D. (2004). "Lysophospholipid receptor-dependent and -independent calcium signaling." *J Cell Biochem* 92(5): 937-48.
- Meyer zu Heringdorf, D. and K. H. Jakobs (2007). "Lysophospholipid receptors: signalling, pharmacology and regulation by lysophospholipid metabolism." *Biochim Biophys Acta* 1768(4): 923-40.
- Miller, M. J. and M. Sandoval (1999). "Nitric Oxide. III. A molecular prelude to intestinal inflammation." *Am J Physiol* 276(4 Pt 1): G795-9.
- Mineo, C., H. Deguchi, et al. (2006). "Endothelial and antithrombotic actions of HDL." *Circ Res* 98(11): 1352-64.
- Mizuno, T., M. Y. Chou, et al. (1984). "A unique mechanism regulating gene expression: translational inhibition by a complementary RNA transcript (micRNA)." *Proc Natl Acad Sci U S A* 81(7): 1966-70.
- Moolenaar, W. H., L. A. van Meeteren, et al. (2004). "The ins and outs of lysophosphatidic acid signaling." *Bioessays* 26(8): 870-81.
- Morales-Ruiz, M., M. J. Lee, et al. (2001). "Sphingosine 1-phosphate activates Akt, nitric oxide production, and chemotaxis through a Gi protein/phosphoinositide 3-kinase pathway in endothelial cells." *J Biol Chem* 276(22): 19672-7.
- Morisco, C., C. Marrone, et al. (2007). "Insulin resistance affects the cytoprotective effect of insulin in cardiomyocytes through an impairment of MAPK phosphatase-1 expression." *Cardiovasc Res* 76(3): 453-64.
- Mungrue, I. N. and D. S. Bredt (2004). "nNOS at a glance: implications for brain and brawn." *J Cell Sci* 117(Pt 13): 2627-9.
- Munzel, T., A. Daiber, et al. (2005). "Vascular consequences of endothelial nitric oxide synthase uncoupling for the activity and expression of the soluble guanylyl cyclase and the cGMP-dependent protein kinase." *Arterioscler Thromb Vasc Biol* 25(8): 1551-7.
- Murayama, T. and M. Ui (1983). "Loss of the inhibitory function of the guanine nucleotide regulatory component of adenylate cyclase due to its ADP ribosylation by islet-activating protein, pertussis toxin, in adipocyte membranes." *J Biol Chem* 258(5): 3319-26.
- Nagano, T. (1999). "Practical methods for detection of nitric oxide." *Luminescence* 14(6): 283-90.
- Nagata, S. (2005). "DNA degradation in development and programmed cell death." *Annu Rev Immunol* 23: 853-75.
- Nakae, J., Y. Kido, et al. (2001). "Distinct and overlapping functions of insulin and IGF-I receptors." *Endocr Rev* 22(6): 818-35.
- Nakayama, K. and K. Nakayama (1998). "Cip/Kip cyclin-dependent kinase inhibitors: brakes of the cell cycle engine during development." *Bioessays* 20(12): 1020-9.

- Nathan, C. F. and J. B. Hibbs, Jr. (1991). "Role of nitric oxide synthesis in macrophage antimicrobial activity." *Curr Opin Immunol* 3(1): 65-70.
- Newsholme, E. A. and G. Dimitriadis (2001). "Integration of biochemical and physiologic effects of insulin on glucose metabolism." *Exp Clin Endocrinol Diabetes* 109 Suppl 2: S122-34.
- Nicholson, K. M. and N. G. Anderson (2002). "The protein kinase B/Akt signalling pathway in human malignancy." *Cell Signal* 14(5): 381-95.
- Nicotera, P. and G. Melino (2007). "Caspase-14 and epidermis maturation." *Nat Cell Biol* 9(6): 621-2.
- Noguchi, K., S. Ishii, et al. (2003). "Identification of p2y9/GPR23 as a novel G protein-coupled receptor for lysophosphatidic acid, structurally distant from the Edg family." *J Biol Chem* 278(28): 25600-6.
- Ohta, H., K. Sato, et al. (2003). "Ki16425, a subtype-selective antagonist for EDG-family lysophosphatidic acid receptors." *Mol Pharmacol* 64(4): 994-1005.
- Olivera, A., T. Kohama, et al. (1999). "Sphingosine kinase expression increases intracellular sphingosine-1-phosphate and promotes cell growth and survival." *J Cell Biol* 147(3): 545-58.
- Olivera, A. and S. Spiegel (1993). "Sphingosine-1-phosphate as second messenger in cell proliferation induced by PDGF and FCS mitogens." *Nature* 365(6446): 557-60.
- Ormerod, A. D., R. Weller, et al. (1998). "Detection of nitric oxide and nitric oxide synthases in psoriasis." *Arch Dermatol Res* 290(1-2): 3-8.
- Pankow, S., C. Bamberger, et al. (2006). "Regulation of epidermal homeostasis and repair by phosphoinositide 3-kinase." *J Cell Sci* 119(Pt 19): 4033-46.
- Papp, H., G. Czifra, et al. (2004). "Opposite roles of protein kinase C isoforms in proliferation, differentiation, apoptosis, and tumorigenicity of human HaCaT keratinocytes." *Cell Mol Life Sci* 61(9): 1095-105.
- Parrill, A. L., V. M. Sardar, et al. (2004). "Sphingosine 1-phosphate and lysophosphatidic acid receptors: agonist and antagonist binding and progress toward development of receptor-specific ligands." *Semin Cell Dev Biol* 15(5): 467-76.
- Perez-Garcia, M. J., V. Cena, et al. (2004). "Glial cell line-derived neurotrophic factor increases intracellular calcium concentration. Role of calcium/calmodulin in the activation of the phosphatidylinositol 3-kinase pathway." *J Biol Chem* 279(7): 6132-42.
- Permutt, A., J. Chirgwin, et al. (1981). "Insulin biosynthesis and diabetes mellitus." *Clin Biochem* 14(5): 230-6.
- Peter, M. E. and P. H. Krammer (2003). "The CD95(APO-1/Fas) DISC and beyond." *Cell Death Differ* 10(1): 26-35.
- Postma, F. R., K. Jalink, et al. (1996). "Sphingosine-1-phosphate rapidly induces Rho-dependent neurite retraction: action through a specific cell surface receptor." *Embo J* 15(10): 2388-92.
- Prinz, J. C. (2003). "[Latest aspects in psoriasis pathogenesis]." *Hautarzt* 54(3): 209-14.
- Pyne, S. and N. J. Pyne (2000). "Sphingosine 1-phosphate signalling in mammalian cells." *Biochem J* 349(Pt 2): 385-402.
- Radeff-Huang, J., T. M. Seasholtz, et al. (2004). "G protein mediated signaling pathways in lysophospholipid induced cell proliferation and survival." *J Cell Biochem* 92(5): 949-66.
- Raj, D., D. E. Brash, et al. (2006). "Keratinocyte apoptosis in epidermal development and disease." *J Invest Dermatol* 126(2): 243-57.
- Reed, J. C., K. Doctor, et al. (2003). "Comparative analysis of apoptosis and inflammation genes of mice and humans." *Genome Res* 13(6B): 1376-88.
- Riedl, S. J. and G. S. Salvesen (2007). "The apoptosome: signalling platform of cell death." *Nat Rev Mol Cell Biol* 8(5): 405-13.
- Ristow, H. J. (1993). "Effect of insulin-like growth factor-I/somatomedin C on thymidine incorporation in cultured psoriatic keratinocytes after growth arrest in growth factor-free medium." *Growth Regul* 3(2): 129-37.

- Rizk, M., M. B. Witte, et al. (2004). "Nitric oxide and wound healing." *World J Surg* 28(3): 301-6.
- Rosenberger, C., C. Solovan, et al. (2007). "Upregulation of Hypoxia-Inducible Factors in Normal and Psoriatic Skin." *J Invest Dermatol*.
- Rossig, L., A. S. Jadidi, et al. (2001). "Akt-dependent phosphorylation of p21(Cip1) regulates PCNA binding and proliferation of endothelial cells." *Mol Cell Biol* 21(16): 5644-57.
- Saba, J. D. (2004). "Lysophospholipids in development: Miles apart and edging in." *J Cell Biochem* 92(5): 967-92.
- Sadagurski, M., S. Yakar, et al. (2006). "Insulin-like growth factor 1 receptor signaling regulates skin development and inhibits skin keratinocyte differentiation." *Mol Cell Biol* 26(7): 2675-87.
- Saiki, R. K., S. Scharf, et al. (1985). "Enzymatic amplification of beta-globin genomic sequences and restriction site analysis for diagnosis of sickle cell anemia." *Science* 230(4732): 1350-4.
- Sakai, M., Y. Shimizu, et al. (1996). "Immunohistochemical localization of NO synthases in normal human skin and psoriatic skin." *Arch Dermatol Res* 288(10): 625-7.
- Salerno, L., V. Sorrenti, et al. (2002). "Progress in the development of selective nitric oxide synthase (NOS) inhibitors." *Curr Pharm Des* 8(3): 177-200.
- Sanchez, T., T. Estrada-Hernandez, et al. (2003). "Phosphorylation and action of the immunomodulator FTY720 inhibits vascular endothelial cell growth factor-induced vascular permeability." *J Biol Chem* 278(47): 47281-90.
- Sanchez, T., A. Skoura, et al. (2007). "Induction of vascular permeability by the sphingosine-1-phosphate receptor-2 (S1P2R) and its downstream effectors ROCK and PTEN." *Arterioscler Thromb Vasc Biol* 27(6): 1312-8.
- Sanchez, T., S. Thangada, et al. (2005). "PTEN as an effector in the signaling of antimigratory G protein-coupled receptor." *Proc Natl Acad Sci U S A* 102(12): 4312-7.
- Sanna, M. G., J. Liao, et al. (2004). "Sphingosine 1-phosphate (S1P) receptor subtypes S1P1 and S1P3, respectively, regulate lymphocyte recirculation and heart rate." *J Biol Chem* 279(14): 13839-48.
- Sansal, I. and W. R. Sellers (2004). "The biology and clinical relevance of the PTEN tumor suppressor pathway." *J Clin Oncol* 22(14): 2954-63.
- Santoro, M. M. and G. Gaudino (2005). "Cellular and molecular facets of keratinocyte reepithelization during wound healing." *Exp Cell Res* 304(1): 274-86.
- Sauer, B., R. Vogler, et al. (2004). "Involvement of Smad signaling in sphingosine 1-phosphate-mediated biological responses of keratinocytes." *J Biol Chem* 279(37): 38471-9.
- Schaffer, M. R., U. Tantry, et al. (1997). "Nitric oxide metabolism in wounds." *J Surg Res* 71(1): 25-31.
- Scheid, M. P. and J. R. Woodgett (2003). "Unravelling the activation mechanisms of protein kinase B/Akt." *FEBS Lett* 546(1): 108-12.
- Scheinfeld, N. S. (2007). "Actinic keratoses." *Skinmed* 6(4): 188-90.
- Schmidt, F. R. (2005). "About the nature of RNA interference." *Appl Microbiol Biotechnol* 67(4): 429-35.
- Schmidt, H. H., T. D. Warner, et al. (1992). "Regulation and subcellular location of nitrogen oxide synthases in RAW264.7 macrophages." *Mol Pharmacol* 41(4): 615-24.
- Segrelles, C., S. Ruiz, et al. (2002). "Functional roles of Akt signaling in mouse skin tumorigenesis." *Oncogene* 21(1): 53-64.
- Serriere-Lanneau, V., F. Teixeira-Clerc, et al. (2007). "The sphingosine 1-phosphate receptor S1P2 triggers hepatic wound healing." *Faseb J* 21(9): 2005-13.
- Sessa, W. C. (2004). "eNOS at a glance." *J Cell Sci* 117(Pt 12): 2427-9.
- Shabani, M., S. K. Pulfer, et al. (1996). "Enhancement of wound repair with a topically applied nitric oxide-releasing polymer." *Wound Repair Regen* 4(3): 353-62.
- Shaul, P. W. (2003). "Endothelial nitric oxide synthase, caveolae and the development of atherosclerosis." *J Physiol* 547(Pt 1): 21-33.
- Sheehan, J. M. and A. R. Young (2002). "The sunburn cell revisited: an update on mechanistic aspects." *Photochem Photobiol Sci* 1(6): 365-77.

- Shen, S., A. Alt, et al. (2001). "PKCdelta activation: a divergence point in the signaling of insulin and IGF-1-induced proliferation of skin keratinocytes." *Diabetes* 50(2): 255-64.
- Shen, Y., M. Cai, et al. (2007). "FTY720, a synthetic compound from *Isaria sinclairii*, inhibits proliferation and induces apoptosis in pancreatic cancer cells." *Cancer Lett* 254(2): 288-97.
- Shimizu, Y., M. Sakai, et al. (1997). "Immunohistochemical localization of nitric oxide synthase in normal human skin: expression of endothelial-type and inducible-type nitric oxide synthase in keratinocytes." *J Dermatol* 24(2): 80-7.
- Shin, I., F. M. Yakes, et al. (2002). "PKB/Akt mediates cell-cycle progression by phosphorylation of p27(Kip1) at threonine 157 and modulation of its cellular localization." *Nat Med* 8(10): 1145-52.
- Sierralta, J. and C. Mendoza (2004). "PDZ-containing proteins: alternative splicing as a source of functional diversity." *Brain Res Brain Res Rev* 47(1-3): 105-15.
- Siess, W. (2002). "Athero- and thrombogenic actions of lysophosphatidic acid and sphingosine-1-phosphate." *Biochim Biophys Acta* 1582(1-3): 204-15.
- Singh, V. K., S. Mehrotra, et al. (2000). "Modulation of autoimmune diseases by nitric oxide." *Immunol Res* 22(1): 1-19.
- Sirsjo, A., M. Karlsson, et al. (1996). "Increased expression of inducible nitric oxide synthase in psoriatic skin and cytokine-stimulated cultured keratinocytes." *Br J Dermatol* 134(4): 643-8.
- Song, G., G. Ouyang, et al. (2005). "The activation of Akt/PKB signaling pathway and cell survival." *J Cell Mol Med* 9(1): 59-71.
- Song, J., C. Matsuda, et al. (2008). "A novel sphingosine 1-phosphate receptor agonist, 2-amino-2-propanediol hydrochloride (KRP-203), regulates chronic colitis in interleukin-10 gene-deficient mice." *J Pharmacol Exp Ther* 324(1): 276-83.
- Spiegel, S. and S. Milstien (2002). "Sphingosine 1-phosphate, a key cell signaling molecule." *J Biol Chem* 277(29): 25851-4.
- Spiegel, S. and S. Milstien (2003a). "Exogenous and intracellularly generated sphingosine 1-phosphate can regulate cellular processes by divergent pathways." *Biochem Soc Trans* 31(Pt 6): 1216-9.
- Spiegel, S. and S. Milstien (2003b). "Sphingosine-1-phosphate: an enigmatic signalling lipid." *Nat Rev Mol Cell Biol* 4(5): 397-407.
- Spravchikov, N., G. Sizyakov, et al. (2001). "Glucose effects on skin keratinocytes: implications for diabetes skin complications." *Diabetes* 50(7): 1627-35.
- Stallmeyer, B., M. Anhold, et al. (2002). "Regulation of eNOS in normal and diabetes-impaired skin repair: implications for tissue regeneration." *Nitric Oxide* 6(2): 168-77.
- Stambolic, V., A. Suzuki, et al. (1998). "Negative regulation of PKB/Akt-dependent cell survival by the tumor suppressor PTEN." *Cell* 95(1): 29-39.
- Stanwell, C., M. F. Denning, et al. (1996). "Staurosporine induces a sequential program of mouse keratinocyte terminal differentiation through activation of PKC isozymes." *J Invest Dermatol* 106(3): 482-9.
- Stradner, M. H., J. Hermann, et al. (2007). "Sphingosine-1-phosphate stimulates proliferation and counteracts interleukin-1 induced nitric oxide formation in articular chondrocytes." *Osteoarthritis Cartilage*.
- Sun, W., R. Xu, et al. (2008). "Upregulation of the human alkaline ceramidase 1 and acid ceramidase mediates calcium-induced differentiation of epidermal keratinocytes." *J Invest Dermatol* 128(2): 389-97.
- Susчек, C. V., V. Krischel, et al. (1999). "Nitric oxide fully protects against UVA-induced apoptosis in tight correlation with Bcl-2 up-regulation." *J Biol Chem* 274(10): 6130-7.
- Takahashi, T. (2003). "Pathophysiological significance of neuronal nitric oxide synthase in the gastrointestinal tract." *J Gastroenterol* 38(5): 421-30.
- Takuwa, Y. (2002). "Subtype-specific differential regulation of Rho family G proteins and cell migration by the Edg family sphingosine-1-phosphate receptors." *Biochim Biophys Acta* 1582(1-3): 112-20.
- Tani, M., M. Ito, et al. (2007). "Ceramide/sphingosine/sphingosine 1-phosphate metabolism on the cell surface and in the extracellular space." *Cell Signal* 19(2): 229-37.

- Tapon, N., K. H. Moberg, et al. (2001). "The coupling of cell growth to the cell cycle." *Curr Opin Cell Biol* 13(6): 731-7.
- Thompson, B., N. Ancellin, et al. (2006). "Protein kinase Calpha and sphingosine 1-phosphate-dependent signaling in endothelial cell." *Prostaglandins Other Lipid Mediat* 80(1-2): 15-27.
- Thornberry, N. A. (1998). "Caspases: key mediators of apoptosis." *Chem Biol* 5(5): R97-103.
- Thors, B., H. Halldorsson, et al. (2003). "Inhibition of Akt phosphorylation by thrombin, histamine and lysophosphatidylcholine in endothelial cells. Differential role of protein kinase C." *Atherosclerosis* 168(2): 245-53.
- Tirone, T. A. and F. C. Brunicardi (2001). "Overview of glucose regulation." *World J Surg* 25(4): 461-7.
- Toker, A. (1998). "Signaling through protein kinase C." *Front Biosci* 3: D1134-47.
- Tölle, M., B. Levkau, et al. (2005). "Immunomodulator FTY720 Induces eNOS-dependent arterial vasodilatation via the lysophospholipid receptor S1P3." *Circ Res* 96(8): 913-20.
- Tölle, M., B. Levkau, et al. (2007). "Sphingosine-1-phosphate and FTY720 as anti-atherosclerotic lipid compounds." *Eur J Clin Invest* 37(3): 171-9.
- Toyoda, M. and M. Morohashi (2001). "Pathogenesis of acne." *Med Electron Microsc* 34(1): 29-40.
- Tsao, M. C., B. J. Walthall, et al. (1982). "Clonal growth of normal human epidermal keratinocytes in a defined medium." *J Cell Physiol* 110(2): 219-29.
- Uhlenbrock, K., H. Gassenhuber, et al. (2002). "Sphingosine 1-phosphate is a ligand of the human gpr3, gpr6 and gpr12 family of constitutively active G protein-coupled receptors." *Cell Signal* 14(11): 941-53.
- Valacchi, G., A. van der Vliet, et al. (2002). "Ozone exposure activates oxidative stress responses in murine skin." *Toxicology* 179(1-2): 163-70.
- van Corven, E. J., A. Groenink, et al. (1989). "Lysophosphatidate-induced cell proliferation: identification and dissection of signaling pathways mediated by G proteins." *Cell* 59(1): 45-54.
- van Meer, G. and J. C. Holthuis (2000). "Sphingolipid transport in eukaryotic cells." *Biochim Biophys Acta* 1486(1): 145-70.
- Vermes, I., C. Haanen, et al. (1995). "A novel assay for apoptosis. Flow cytometric detection of phosphatidylserine expression on early apoptotic cells using fluorescein labelled Annexin V." *J Immunol Methods* 184(1): 39-51.
- Victor, F. C., A. B. Gottlieb, et al. (2003). "Changing paradigms in dermatology: tumor necrosis factor alpha (TNF-alpha) blockade in psoriasis and psoriatic arthritis." *Clin Dermatol* 21(5): 392-7.
- Vincent, A. M. and E. L. Feldman (2002). "Control of cell survival by IGF signaling pathways." *Growth Horm IGF Res* 12(4): 193-7.
- Vinciguerra, M. and M. Foti (2006). "PTEN and SHIP2 phosphoinositide phosphatases as negative regulators of insulin signalling." *Arch Physiol Biochem* 112(2): 89-104.
- Vlahos, C. J., W. F. Matter, et al. (1994). "A specific inhibitor of phosphatidylinositol 3-kinase, 2-(4-morpholinyl)-8-phenyl-4H-1-benzopyran-4-one (LY294002)." *J Biol Chem* 269(7): 5241-8.
- Vogler, R., B. Sauer, et al. (2003). "Sphingosine-1-phosphate and its potentially paradoxical effects on critical parameters of cutaneous wound healing." *J Invest Dermatol* 120(4): 693-700.
- Vogt, W. (1949). "Ueber die stoffliche Grundlage der Darmbewegungen und des Vagusreizes am Darm." *Naunyn Schmiedebergs Arch Exp Pathol Pharmacol* 206(1): 1-11.
- Watt, F. M. (1998). "Epidermal stem cells: markers, patterning and the control of stem cell fate." *Philos Trans R Soc Lond B Biol Sci* 353(1370): 831-7.
- Watterson, K., H. Sankala, et al. (2003). "Pleiotropic actions of sphingosine-1-phosphate." *Prog Lipid Res* 42(4): 344-57.
- Weiner, J. A. and J. Chun (1999). "Schwann cell survival mediated by the signaling phospholipid lysophosphatidic acid." *Proc Natl Acad Sci U S A* 96(9): 5233-8.

- Weller, R. (2003). "Nitric oxide: a key mediator in cutaneous physiology." *Clin Exp Dermatol* 28(5): 511-4.
- Weller, R., A. Schwentker, et al. (2003). "Autologous nitric oxide protects mouse and human keratinocytes from ultraviolet B radiation-induced apoptosis." *Am J Physiol Cell Physiol* 284(5): C1140-8.
- Wertheimer, E., N. Spravchikov, et al. (2001). "The regulation of skin proliferation and differentiation in the IR null mouse: implications for skin complications of diabetes." *Endocrinology* 142(3): 1234-41.
- Wraight, C. J., P. J. White, et al. (2000). "Reversal of epidermal hyperproliferation in psoriasis by insulin-like growth factor I receptor antisense oligonucleotides." *Nat Biotechnol* 18(5): 521-6.
- Wu, H., V. Goel, et al. (2003). "PTEN signaling pathways in melanoma." *Oncogene* 22(20): 3113-22.
- Xin, C., S. Ren, et al. (2004). "Sphingosine 1-phosphate cross-activates the Smad signaling cascade and mimics transforming growth factor-beta-induced cell responses." *J Biol Chem* 279(34): 35255-62.
- Yamaoka, J., S. Kawana, et al. (2004). "Nitric oxide inhibits ultraviolet B-induced murine keratinocyte apoptosis by regulating apoptotic signaling cascades." *Free Radic Res* 38(9): 943-50.
- Yamaoka, J., M. Sasaki, et al. (2000). "Ultraviolet B radiation downregulates inducible nitric oxide synthase expression induced by interferon-gamma or tumor necrosis factor-alpha in murine keratinocyte Pam 212 cells." *Arch Dermatol Res* 292(6): 312-9.
- Yamasaki, K., H. D. Edington, et al. (1998). "Reversal of impaired wound repair in iNOS-deficient mice by topical adenoviral-mediated iNOS gene transfer." *J Clin Invest* 101(5): 967-71.
- Yetik-Anacak, G. and J. D. Catravas (2006). "Nitric oxide and the endothelium: history and impact on cardiovascular disease." *Vascul Pharmacol* 45(5): 268-76.
- Zhang, J., N. Honbo, et al. (2007). "Signals from type 1 sphingosine 1-phosphate receptors enhance adult mouse cardiac myocyte survival during hypoxia." *Am J Physiol Heart Circ Physiol* 293(5): H3150-8.
- Zheng, D. M., T. Kitamura, et al. (2006). "Sphingosine 1-phosphate protects rat liver sinusoidal endothelial cells from ethanol-induced apoptosis: Role of intracellular calcium and nitric oxide." *Hepatology* 44(5): 1278-87.
- Zhou, B. P., Y. Liao, et al. (2001). "Cytoplasmic localization of p21Cip1/WAF1 by Akt-induced phosphorylation in HER-2/neu-overexpressing cells." *Nat Cell Biol* 3(3): 245-52.
- Zimmermann, K. C. and D. R. Green (2001). "How cells die: apoptosis pathways." *J Allergy Clin Immunol* 108(4 Suppl): S99-103.