

REFERENCES

- Agus, D.B.; Gambhir, S.S.; Pardridge, W.M.; Spielholz, C.; Baselga, J.; Vera J.C., and Golde, D.W. Vitamin C crosses the blood-brain barrier in the oxidized form through the glucose transports. *J. Clin. Invest.* 100(1) (1997): 2842-8.
- Alberts, B.; Alexander, J.; Julian, L.; Martin, R.; Keith, R., and Peter, W. Cell signaling. In *Molecular Biology of the Cell*. 3rd ed. pp 721-85. New York, NY: Garland Publishing, Inc, 1994.
- Al-Zuhair, H., and Mohamed, H.E. Vitamin C attenuation of the development of type I diabetes mellitus by interferon-alpha. *Pharmacol. Res.* 38(1) (July 1998): 59-64.
- Angulo, C.; Rauch, M.C.; Droppleman, A.; Reyes, A.M.; Slebe, J.C.; Delgado-Lopez, F.; Guaiquil, V.H.; Vera, J.C., and Concha, I.I. Hexose transporter expression and function in mammalian spermatozoa: Cellular localization and transport of hexoses and vitamin C. *J. Cell Biochem.* 71 (2) (1998): 189-203.
- Appenroth, D., and Winnefeld, K. Vitamin E and C in the prevention of metal nephrotoxicity in developing rats. *Exp. Toxicol. Pathol.* 50(4-6) (1998): 391-6.
- Asayama, K.; Hayashibe, H.; Dobashi, K.; Niitsu, T.; Miyao, A., and Kato, K. Antioxidant enzyme status and lipid peroxidation in various tissues of diabetic and starved rats. *Diabetes Res.* 12(2) (October 1989): 85-91.
- Avers, C.J. Molecular cell biology. California: The Benjamin/Cummings Publishing Company, 1986.
- Ayo, S.H.; Radnik, R.A.; Garoni, J.A.; Glass, W. F., and Kreisberg, J.I.; High glucose causes an increase in extracellular matrix proteins in cultured mesangial cells. *Am. J. Pathol.* 136 (1990): 1339-48.
- Bak, M.; Thomsen, K., and Flyvbjerg, A. Effects of the somatostatin analogue octreotide on renal function in conscious diabetic rats. *Nephrol. Dial. Transplant* 16 (2001): 2002-7.
- Bank, N., and Aynedjian, H. S. Progressive increases in luminal glucose stimulate proximal sodium absorption in normal and diabetic rats. *J. Clin. Invest.* 86(1) (July 1990): 309-16.
- Bardoux, P.; Martin, H.; Ahloulay, M.; Schmitt, F.; Bouby, N.; Trinh-Trang-Tan, M. , and Bankir, L. Vasopressin contributes to hyperfiltration, albuminuria, and

- renal hypertrophy in diabetes mellitus: Study in vasopressin-deficient Brattleboro rats. PNAS 96 (August 1999): 10397 - 402.
- Bastar, I.; Seckin, S.; Uysal, M., and Aykac-Toker, G. Effect of streptozotocin on glutathione and lipid peroxide levels in various tissues of rats. Res. Commun. Mol. Pathol. Pharmacol. 102(3) (December 1998): 265-72.
- Baynes, J.W. Role of oxidative stress in development of complications in diabetes. Diabetes 40(4) (1991): 405-12.
- Benigni, A.; Zoja, C., and Remuzzi, G. The renal toxicity of sustained glomerular protein traffic. Lab. Invest. 73(4) (Oct 1995): 461-8.
- Bergsten, P.; Moura, A.S; Atwater, I., and Levine, M. Ascorbic acid and insulin secretion in pancreatic islets. J. Biol. Chem. 14;269(2) (January 1994):1041-5.
- Berne, R., and Levy, M. N. The cardiovascular system: the arterial system. In R.M. Berne and M.N. Levy (eds.), Physiology, pp. 457-9. USA: Mosby-Year Book, Inc., 1993.
- Bohle, A.; Wehrmann, M.; Bogenschutz, O.; Batz, C.; Muller, C.A., and Muller, G.A. The pathogenesis of chronic renal failure in diabetic nephropathy: Investigation of 488 cases of diabetic glomerulosclerosis. Pathol. Res. Pract. 187(2-3) (1991): 251-9.
- Bolli, G.; De Feo, P.; De Cosmo, S.; Perriello, G.; Angeletti, G.; Ventura, M. R.; Santeusanio, F.; Brunetti, P., and Gerich, J.E. Effects of long-term optimization and short-term deterioration of glycemic control on glucose counterregulation in type I diabetes mellitus. Diabetes 33(4) (1984): 394-400.
- Bonting, S.L.; Simon, K.A., and Hawkins, N.M. Studies on sodium-potassium-activated adenosine triphosphatase : I. Quantitative distribution in several tissues of the cat. Arch. Biochem. Biophys. 95 (1961): 416-23.
- Brody, S.; Preut, R.; Schommer, K., and Schurmeyer, T.H. A randomized controlled trial of high dose ascorbic acid for reduction of blood pressure, cortisol, and subjective responses to psychological stress. Psychopharmacol. (Berl). 159(3) (January 2002): 319-24.
- Brownlee, M., and Spiro, R.G. Glomerular basement membrane metabolism in the diabetic rat. Diabetes 28 (1979): 121-5.

- Carr, A., and Frei, B. The role of natural antioxidants in preserving the biological activity of endothelium-derived nitric oxide. Free Radic. Biol. Med. 28(12) (Junuary 2000): 1806-14.
- Catherwood, M.A.; Powell, L.A.; Anderson, P.; McMaster, D.; Sharpe, P.C., and Trimble, E.R. Glucose-induced oxidative stress in mesangial cells. Kidney Int. 61(2) (2002): 599-608.
- Cediel, E.; Vazquez-Cruz, B.; Navarro-Cid, J.; De Las Heras, N.; Sanz-Rosa, D.; Cachofeiro, V., and Lahera, V. Role of endothelin-1 and thromboxane A2 in renal vasoconstriction induced by angiotensin II in diabetes and hypertension. Kidney Int. (Suppl.) 82 (December 2002): 2-7.
- Ceol, M.; Gambaro, G.; Sauer, U.; Baggio, B.; Anglani, F.; Forino, M.; Facchin, S.; Bordin, L.; Weigert, C.; Nerlich, A., and Schleicher, E.D. Glycosaminoglycan therapy prevents TGF- β 1 overexpression and pathologic changes in renal tissue of long-term diabetic rats. J. Am. Soc. Nephrol. 11 (2000): 2324-36.
- Chaiyabutr, N.; Sitprija, V.; Kato, S., and Sugino, N. Effect of converting enzyme inhibitor on renal function of rats following Russell's viper venom administration. ICMR Annual. 5 (1985): 169-79.
- Chappey, O.; Dosquet, C.; Wautier, M. P., and Wautier, J. L. Advanced glycation end products, oxidant stress and vascular lesions. Eur. J. Clin. Invest. 27(2) (February 1997): 97-108.
- Chen, H.C.; Guh, J.Y.; Shin, S.J.; Tsai, J.H., and Lai, Y.H. Insulin and heparin suppress superoxide production in diabetic glomeruli stimulated with low-density lipoprotein. Kidney Int. 55 (1999): 1704-12.
- Chen, K.; Suh, J.; Carr, A.C.; Morrow, J.D.; Zeind, J., and Frei, B. Vitamin C suppresses oxidative lipid damage *in vivo*, even in the presence of iron overload. Am. J. Physiol. Endocrinol. Metab. 279 (December 2000): 1406 - 12.
- Cherrington, A.D.; Williams, P.E.; Shulman, G.I., and Lacy, W. W. Differential time course of glucagon's effect on glycogenolysis and gluconeogenesis in the conscious dog. Diabetes. 30(3) (1981): 180-7.
- Christiansen, J.S.; Gammelgaard, J.; Frandsen, M., and Parving, H. H. Increased kidney size, glomerular filtration rate and renal plasma flow in short-term insulin-dependent diabetics. Diabetologia. 20(4) (April 1981): 451-6. 1981.

- Clarkson, M.R.; Murphy, M.; Gupta, S.; Lambe, T.; Mackenzie, H.S.; Godson, C.; Martin, F., and Brady, H.R.; High glucose-altered gene expression in mesangial cells. Actin-regulatory protein gene expression is triggered by oxidative stress and cytoskeletal disassembly. *J. Biol. Chem.* 277(12) (2002): 9707-12.
- Craven, P.A.; De Rubertis, F.R.; Kagan, V.E.; Melhem, M., and Studer, R.K.; Effects of supplementation with vitamin C or E on albuminuria, glomerular TGF-beta, and glomerular size in diabetes. *J. Am. Soc. Nephrol.* 8(9) (1997): 1405-14.
- Dahl-Jorgensen, K.; Bjoro, T.; Kierulf, P.; Sandvik, L.; Bangstad, H.J., and Hanssen, K.F. Long-term glycemic control and kidney function in insulin-dependent diabetes mellitus. *Kidney Int.* 41 (1992): 920-3.
- Dai, S., and McNeill, J.H. Ascorbic acid supplementation prevents hyperlipidemia and improves myocardial performance in streptozotocin-diabetic rats. *Diabetes Res. Clin. Practice* 27 (1995): 11-8.
- Dedov, I. I.; Shestakov, M. V.; Kochemasova, T. V.; Severina, I. S., and Baryshnikov, A. Endothelial dysfunction in the development of vascular complications in diabetes mellitus. *Ross Fiziol Zh Im I M Sechenova.* 87(8) (August 2001): 1073-84.
- Ditzel, L., and Schwartz, M. Abnormally increased glomerular filtration rate in short-term insulin-treated diabetic subjects. *Diabetes* 16 (1967): 264-7.
- Dinneen, S.; Alzaid, A.; Miles, J., and Rizza, R. Effects of the normal nocturnal rise in cortisol on carbohydrate and fat metabolism in IDDM. *Am. J. Physiol.* 268 (4 Pt 1) (April 1995): E595-603.
- Dobashi, K.; Asayama, K.; Hayashibe, H.; Uchida, N.; Kobayashi, M.; Kawaoi, A., and Kato, K. Effect of diabetes mellitus induced by streptozotocin on renal superoxide dismutases in the rat. A radioimmunoassay and immunohistochemical study. *Virchows Arch B Cell Pathol. Incl. Mol. Pathol.* 60(1) (1991): 67-72.
- Du, X.L.; Edelstein, D.; Rossetti, L.; Fantus, I.G.; Goldberg, H.; Ziyadeh, F.; Wu, J., and Brownlee, M. Hyperglycemia-induced mitochondrial superoxide overproduction activates the hexosamine pathway and induces plasminogen activator inhibitor-1 expression by increasing Sp1 glycosylation. *PNAS.* 97 (October 2000): 12222 - 6.

- Du, X.L.; Matsumura, T.; Edelstein, D.; Rossetti, L.; Zsengellér, Z.; Szabó, C., and Brownlee, M. Inhibition of GAPDH activity by poly(ADP-ribose) polymerase activates three major pathways of hyperglycemic damage in endothelial cells. J. Clin. Invest. 112 (Oct 2003): 1049 - 57.
- Dunlop, M. Aldose reductase and the role of the polyol pathway in diabetic nephropathy. Kidney Int. (Suppl.) 77 (2000): S3-12.
- Eddy, A. A. Interstitial fibrosis in hypercholesterolemic rats: Role of oxidation, matrix synthesis, and proteolytic cascades. Kidney Int. 53 (1998): 1182-9.
- Engels, W.; van Bilsen, M.; Wolffentuttel, B.H.; van der Vusse, G. J., and Glatz, J.F.; Cytochrome P450, peroxisome proliferation, and cytoplasmic fatty acid-binding protein content in liver, heart and kidney of the diabetic rat. Mol. Cell Biochem. 192(1-2) (February 1999): 53-61.
- Estrabrook, R. W. Mitochondrial respiratory control and the polarographic measurement of ADP:O ratios. In Method in Enzymology, Vol 10, pp 41-7. New York: Academic Press, 1967.
- Fader, A. Diabetic Microvascular Complications: Common Underlying Pathophysiology and an Emerging Treatment Target [Online]. Available from: <http://www.caringfordiabetes.com/ComplicationsandComorbidities/Microvascular/DMC-patho.cfm> [2005, August 25].
- Fornoni, A.; Lenz, O.; Striker, L. J., and Striker,G.E. Glucose induces clonal selection and reversible dinucleotide repeat expansion in mesangial cells isolated from glomerulosclerosis-prone mice. Diabetes 52 (October 2003): 2594-602.
- Futrakul, N.; Tohsukhowong, P.; Patumraj, S.; Siriviriyakul, P.; Tipprukmas, N., and Futrakul, P. Treatments of hemodynamic maladjustment and oxidative stress prevent renal disease progression in chronically severe glomerulonephritides, Ren. Fail. 25 (2003): 839-44.
- Gerich, J. E.; Lorenzi, M.; Tsalikian, E., and Karam, J.H. Studies on the mechanism of epinephrine-induced hyperglycemia in man. Evidence for participation of pancreatic glucagon secretion. Diabetes 25(1) (1976): 65-71.
- Gilbert, R. G., and Cooper, M.E. The tubulointerstitium in progressive diabetic kidney disease: more than an aftermath of glomerular injury? Kidney Int. 56(5) (November 1999): 1627-37.

- Granstam, E., and Granstam, S. O. Involvement of nitric oxide in the regulation of regional hemodynamics in streptozotocin-diabetic rats. Physiol. Res. 52(2) (2003): 159-69.
- Greene, D. A.; Chakrabarti, S.; Lattimer, S. A., and Sima, A. A.; Role of sorbitol accumulation and myo-inositol depletion in paranodal swelling of large myelinated nerve fibers in the insulin-deficient spontaneously diabetic bio-breeding rat. Reversal by insulin replacement, an aldose reductase inhibitor, and myo-inositol. J. Clin. Invest. 79 (5) (May 1987): 1479-85.
- Greene, D. A.; Lattimer, S. A., and Sima, A. A. Sorbitol, phosphoinositides, and sodium-potassium-ATPase in the pathogenesis of diabetic complications. N. Engl. J. Med. 316 (March 1987): 599 - 606.
- Greggi Antunes, L. M.; Darin, J.D., and Bianchi, M. D.; Protective effects of vitamin C against cisplatin-induced nephrotoxicity and lipid peroxidation in adult rats: A dose-dependent study. Pharmacol. Res. 41(4) (2000): 405-11.
- Ha, H., and Kim, K .H. Pathogenesis of diabetic nephropathy: the role of oxidative stress and protein kinase C. Diabetes Res. Clin. Pract. 45(2-3) (1999): 147-151.
- Ha, H., and Lee, H. B. Reactive oxygen species as glucose signaling molecules in mesangial cells cultured under high glucose. Kidney Int. (Suppl.) 77 (2000): S19-25.
- Ha, H.; Yu, M. R.; Choi, Y. J., and Lee, H. B. Activation of protein kinase c-delta and c-epsilon by oxidative stress in early diabetic rat kidney. Am. J. Kidney Dis. 38(4) (2001): S204-7.
- Haneda, M.; Koya, D., and Kikkawa, R. Cellular mechanisms in the development and progression of diabetic nephropathy: Activation of the DAG-PKC-ERK pathway. Am. J. Kidney Dis. 38(4 Suppl 1) (October 2001): S178-81.
- Haneda, M.; Koya, D.; Isono, M., and Kikkawa, R. Overview of glucose signaling in mesangial cells in diabetic nephropathy. J. Am. Soc. Nephrol. 14 (2003): 1374-82.
- Hediger, M. A.; Mount, D. B.; Rolfs, A., and Romero, M. F. The molecular basis of solute transport. In B.M. Brenner (ed.), Brenner & Rector's The Kidney, pp. 269-71. USA: Elsevier Inc., 2004.

- Heidland, A.; Sebekova, K., and Schinzel, R. Advanced glycation end products and the progressive course of renal disease. Am. J. Kidney Dis. 38(4 Suppl 1) (2001): S100.
- Heilig, C. W.; Kreisberg, J. I.; Freytag, S.; Murakami, T.; Ebina, Y.; Guo, L., and others. Antisense GLUT-1 protects mesangial cells from glucose induction of GLUT-1 and fibronectin expression. Am. J. Physiol. Renal Physiol. 280 (Apr 2001): 657 - 66.
- Heilig, C. W.; Liu, Y.; England, R. L.; Freytag, S.O.; Gilbert, J. D.; Heilig, K. O., and others. D-glucose stimulates mesangial cell GLUT 1 expression and basal and IGF-I-sensitive glucose uptake in rat mesangial cells: implications for diabetic nephropathy. Diabetes 46 (1997): 1030-9.
- Henry, D. N.; Busik, J. V.; Brosius, F. C., and Heilig, C. W. Glucose transporters control gene expression of aldose reductase, PKC , and GLUT1 in mesangial cells *in vitro*. Am. J. Physiol. Renal Physiol. 277 (July 1999): 97-104.
- Hiragushi, K.; Wada, J.; Eguchi, J.; Matsuoka, T.; Yasuhara, A.; Hashimoto, I., and others. The role of adrenomedullin and receptors in glomerular hyperfiltration in streptozotocin-induced diabetic rats. Kidney Int. 65(2) (February 2004): 540-50.
- Hirsch, I. B.; Atchley, D. H.; Tsai, E.; Labbe, R. F., and Chait, A. Ascorbic acid clearance in diabetic nephropathy. J. Diabetes Complication 12(5) (1998): 259-63.
- Hishinuma, T.; Koseki, Y.; Murai, Y.; Yamazaki, T.; Suzuki, K., and Mizugaki, M. Urinary thromboxane A2/prostacyclin balance reflects the pathological state of a diabetic. Prostaglandins Other Lipid Mediat. 58(5-6) (November 1999): 263-71.
- Ho, C. K., and Hashim. S. A. Pyridine nucleotide depletion in pancreatic islets associated with streptozotocin-induced diabetes. Diabetes 21 (1972): 789-93.
- Hollenberg, N. K.; Price, D. A.; Fisher, N. D.; Lansang, M. C.; Perkins, B.; Gordon, M. S.; Williams, G. H., and Laffel, L. M. Glomerular hemodynamics and the renin-angiotensin system in patients with type 1 diabetes mellitus. Kidney Int. 63(1) (January 2003): 172-8.
- Hostetter, T. H.; Rennke, H. G., and Brenner, B. M. The case for intrarenal hypertension in the initiation and progression of diabetic and other glomerulopathies. Am. J. Med. 72 (1982): 375-80.

- Hostetter, T. H.; Troy, J. L., and Brenner, B. M. Glomerular hemodynamics in experimental diabetes. *Kidney Int.* 19 (1981): 410-5.
- Hunt, J. V., and Wolff, S. P. Oxidative glycation and free radical production: a causal mechanism of diabetic complications. *Free Radic. Res. Commun.* 1 (1991): 115-23.
- Huskey, R. J. Diagram of Electron Transport Portion of Energy Metabolism [Online] The University of Virginia, 1999. Available from:
<http://wsrv.clas.virginia.edu/~rjh9u/eltrans.html> [2005, August 15]
- Inoguchi, T.; Xia, P.; Kunisaki, M.; Higashi, S.; Feener, E. P., and King, G. L. Insulin's effect on protein kinase C and diacylglycerol induced by diabetes and glucose in vascular tissues. *Am. J. Physiol. Endocrinol. Metab.* 267 (September 1994): 369 - 79.
- Inoki, K.; Haneda, M.; Ishida, T.; Mori, H.; Maeda, S.; Koya, D.; Sugimoto, T., and Kikkawa, R. Role of mitogen-activated protein kinases as downstream effectors of transforming growth factor- β 1 in mesangial cells. *Kidney Int.* 58(Suppl. 77) (2000): S-76S-80.
- Inoki, K.; Haneda, M.; Maeda, S.; Koya, D., and Kikkawa, R. TGF-beta1 stimulates glucose uptake by enhancing GLUT1 expression in mesangial cells. *Kidney Int.* 55(5) (1999): 1704-12.
- Inukai, T.; Takanashi, K.; Tayama, K.; Aso, Y., and Takemura, Y. High glucose concentrations abolish the superoxide dismutase response of leukocytes to ascorbic acid or troglitazone in type 2 diabetes mellitus. *Life Sci.* 70(20) (2002): 2391-401.
- Ishii, H.; Tada, H., and Isogai, S. An aldose reductase inhibitor prevents glucose-induced increase in transforming growth factor-beta and protein kinase C activity in cultured mesangial cells. *Diabetologia* 41(3) (Mar 1998): 362-4.
- Isshiki, K.; Haneda, M.; Koya, D.; Maeda, S.; Sigimoto, T., and Kikkawa, R. Thiazolidinedione compounds ameliorate glomerular dysfunction independent of their insulin-sensitizing action in diabetic rats. *Diabetes* 49 (2000): 1022-32.
- Ito, A.; Uriu, K.; Inada, Y.; Qie, Y.L.; Takagi, I.; Ikeda, M., and others. Inhibition of neuronal nitric oxide synthase ameliorates renal hyperfiltration in

- streptozotocin-induced diabetic rat. *J. Lab. Clin. Med.* 138 (3) (September 2001): 177-85.
- Jang, Y. Y.; Song, J. H.; Shin, Y. K.; Han, E. S., and Lee, C.S. Protective effect of boldine on oxidative mitochondrial damage in streptozotocin-induced diabetic rats. *Pharmacol Res.* 42(4) (October 2000): 361-71.
- Jariyapongsakul, A.; Patumraj, S.; Yamaguchi, S., and Niimi, H. The effect of long-term supplementation of vitamin C on leukocyte adhesion to the cerebral endothelium in STZ-induced diabetic rats, *Clin. Hemorheol. Microcirc.* 27 (2002), 67-76.
- Je, H. D.; Shin, C. Y.; Park, H. S.; Huh, I. H., and Sohn, U. D. The comparison of vitamin C and vitamin E on the protein oxidation of diabetic rats. *J. Autonomic Pharmacol.* 21 (2001): 231-6.
- Kaizu, K.; Ling, Q. Y.; Uriu, K.; Ikeda, M.; Hashimoto, O.; Komine, N., and Eto, S. The characteristics of renal hemodynamics in diabetic spontaneously hypertensive rats in comparison with diabetic Wistar-Kyoto rats. *J. Diabetes Complications* 9 (1995): 224-6.
- Kamata, K.; Ohuchi, K., and Kirisawa, H. Altered endothelium-dependent and -independent hyperpolarization and endothelium-dependent relaxation in carotid arteries isolated from streptozotocin-induced diabetic rats. *Naunyn Schmiedebergs Arch. Pharmacol.* 362(1) (July 2000): 52-9.
- Kaneda, K.; Iwao, J.; Sakata, N., and Takebayashi, S. Correlation between mitochondrial enlargement in renal proximal tubules and microalbuminuria in rats with early streptozotocin-induced diabetes. *Acta Pathol. Jpn.* 42(12) (December 1992): 855-60.
- Kaneto, H.; Kajimoto, Y.; Miyagawa, J.; Matsuoka, T.; Fujitani, Y.; Umayahara, Y.; Hanafusa, T.; Matsuzawa, Y.; Yamasaki, Y., and Hori, M. Beneficial effects of antioxidants in diabetes: possible protection of pancreatic beta-cells against glucose toxicity. *Diabetes* 48(12) (December 1999): 2398-406.
- Kanwar, Y.S. Biophysiology of glomerular filtration and proteinuria. *Lab. Invest.* 51 (1984): 7.
- Karageuzyan, K. G. Oxidative stress in the molecular mechanism of pathogenesis at different diseased States of organism in clinics and experiment. *Curr. Drug Targets Inflamm. Allergy* 4(1) (Feb 2005): 85-98.

- Kashiwagi, A. Complications of diabetes mellitus and oxidative stress. JMAJ. 44(12) (2001): 521-28.
- Kasiske, B. L.; O'Donnell, M. P.; Schmitz, P. G.; Kim, Y., and Keane, W. F. Renal injury of diet-induced hypercholesterolemia in rats. Kidney Int. 37 (1990): 880-91.
- Kawada, J. New hypotheses for the mechanisms of streptozotocin and alloxan inducing diabetes mellitus. Yakugaku Zasshi 112(11) (November 1992): 773-91.
- Kawai, K.; Ito, H.; Kubota, H.; Takemori, K.; Makino, S., and Horio, F. Changes in catecholamine metabolism by ascorbic acid deficiency in spontaneously hypertensive rats unable to synthesize ascorbic acid. Life Sci. 72(15) (February 2003): 1717-32.
- Kedziora-Kornatowska, K.; Szram, S.; Kornatowski, T.; Szadujkis-Szadurski, L.; Kedziora, J., and Bartosz, G. Effect of vitamin E and vitamin C supplementation on antioxidative state and renal glomerular basement membrane thickness in diabetic kidney. Nephron. Exp. Nephrol. 95 (2003): e134-e143.
- Kelley, D. E.; He, J.; Menshikova, E. V., and Ritov, V. B. Dysfunction of mitochondria in human skeletal muscle in type 2 diabetes. Diabetes 51(10) (October 2002): 2944-50.
- Kil, I. S.; Lee, J. H.; Shin, A.H. and Park, J. W. Glycation-induced inactivation of NADP⁺-dependent isocitrate dehydrogenase: implications for diabetes and aging. Free Radic. Biol. Med. 37(11) (December 2004): 1765-78.
- Klepper, J.; Vera, J. C., and De Vivo, D. C. Deficient transport of dehydroascorbic acid in the glucose transporter protein syndrome. Ann. Neurol. 44 (2) (1998): 286-7.
- Klepper, J.; Wang, D.; Fischbarg, J.; Vera, J.C.; Jarjour, I.T.; O'Driscoll, K.R., and De Vivo, D.C. Defective glucose transport across brain barriers: a newly recognized neurological syndrome. Neurochem. Res. 24(4) (1999): 587-94.
- Klinkhammer, C.; Popowa, P., and Gleichmann, H. Specific immunity to streptozocin. Cellular requirements for induction of lymphoproliferation. Diabetes 37 Issue 1 (1988): 74-80.

- Kodaman, P. H.; Behrman, H. R. Hormone regulated and glucose-sensitive transport of dehydroascorbic acid in immature rat granulosa cells. Endocrinology 140 (8): 3659-65.
- Koeppen, B. M. and Staton, B. A. The kidney. In R.M. Berne and M.N. Levy (eds.), Physiology, pp. 737-39 and pp. 787-90. USA: Mosby-Year Book, Inc., 1993.
- Koh, M. S.; Misch, K. J.; Yuen, C. T., and Rhodes, E. L. Accumulation of sorbitol in endothelial cells--a possible cause of diabetic microangiopathy. Diabetes Res. 3(4) (May 1986): 217-9.
- Koya, D.; Jirousek, M. R.; Lin, Y. W.; Ishii, H.; Kuboki, K., and King, G. L. Characterization of protein kinase C β isoform activation on the gene expression of transforming growth factor- β , extracellular matrix components and prostanoid in the glomeruli of diabetic rats. J. Clin. Invest. 100 (1997): 115-26.
- Koya, D.; Haneda, M.; Nakagawa, H.; Isshiki, K.; Sato, H.; Maeda, S., and others. Amelioration of accelerated diabetic mesangial expansion by treatment with a PKC β inhibitor in diabetic *db/db* mice, a rodent model for type 2 diabetes. FASEB J. 14 (2000): 439-47.
- Koya, D., and King, G. L. Protein kinase C activation and the development of diabetic complications. Diabetes 47 (1998): 859-66.
- Kroustrup, J. P.; Gundersen, H. J., and Osterby, R. Glomerular size and structure in diabetes mellitus, 3: early enlargement of the capillary surface. Diabetologia 13 (1977): 207-10.
- Lally F., and Bone, A. J. Animal models of type 1 diabetes. In J.C. Pickup and G. Williams (eds). Textbook of Diabetes (3rd ed), pp. 19.2-19.4. UK: Blackwell Science Ltd., 2003.
- Lane, P.; Steffes, M. W., and Mauer, S. M. Structural-functional relationships in type I insulin-dependent diabetes mellitus in humans. J. Diabet. Complications 5(2-3) (April-September 1991): 69-71.
- Lehmann, R., and Schleicher, E. D. Molecular mechanism of diabetic nephropathy. Clin. Chem. Acta. 297(1-2) (2000): 135-44.
- Lehninger, A. L. Biochemistry. (2nd ed.), New York: Worth, 1975.

- Like, A. A., and Rossini, A. A. Streptozotocin-induced pancreatic insulitis: a new model of diabetes mellitus. Science 193 (1976): 415-7.
- Lim, H. S.; MacFadyen, R. J., and Lip, G. Y. Diabetes mellitus, the renin-angiotensin-aldosterone system, and the heart. Arch. Intern. Med. 164 (2004): 1737-48.
- Lindsay, R. M.; Jamieson, N. S.; Walker, S. A.; McGuigan, C. C.; Smith, W., and Baird, J. D. Tissue ascorbic acid and polyol pathway metabolism in experimental diabetes. Diabetologia 41 (1998): 516-23.
- Liu, B. C.; Luo, D. D.; Sun, J.; Ma, K. L., and Ruan, X. Z. Influence of irbesartan on renal hypertrophy and thickening of glomerular basement-membrane in streptozotocin-induced diabetic rats. Zhonghua Nei Ke Za Zhi. 42 (5) (May 2003): 320-3.
- Liu, W. S., and Heckman, C. A. The seven fold way of PKC regulation. Cell Signal 10(8) (September 1998): 529-42.
- Lowry, O. H.; Rosebrough, J. N.; Farr, A. L., and Randall, R. J. Protein measurement with the Folin reagent. J. Biol. Chem. 193 (1951): 265-75.
- Makino, H.; Mukoyama, M.; Sugawara, A.; Mori, K.; Suganami, T.; Yahata, K.; Fujinaga, Y.; Yokoi, H.; Tanaka, I., and Nakao, K. Roles of connective tissue growth factor and prostanoids in early streptozotocin-induced diabetic rat kidney: the effect of aspirin treatment. Clin. Exp. Nephrol. 7(1) (March 2003):33-40.
- Malis, C. D., and Bonventre, J. V. Mechanism of calcium potentiation of oxygen free radical injury to renal mitochondria. A model for post-ischemic and toxic mitochondrial damage. J. Biol. Chem. 261 (1986): 14201-8.
- Mattar, A. L.; Fujihara, C. K.; Ribeiro, M. O.; de Nucci, G., and Zatz, R. Renal effects of acute and chronic nitric oxide inhibition in experimental diabetes. Nephron 74(1) (1996): 136-43.
- Mauer, S. M.; Sutherland, D. E., and Steffes, M. W. Relationship of systemic blood pressure to nephropathology in insulin-dependent diabetes mellitus. Kidney Int. 41 (1992): 736-40.
- Mauer, S. M. Structural-functional correlation of diabetic nephropathy. Kidney Int. 45 (1994): 612-22.

- Mauer, S. M.; Steffes, M. W.; Ellis, E. N.; Sutherland, D. E.; Brown, D. M., and Goetz, F.C. Structure-function relationships in diabetic nephropathy. J.Clin. Invest. 74(4) (1984): 1143-55.
- May, J. M. Ascorbate function and metabolism in the human erythrocyte. Front. Biosci. 3 (1998): D1-D10.
- McAuliffe, A. V.; Fisher, E. J.; McLennan, S. V.; Yue, D. K., and Turtle, J. R. High glucose inhibits effect of ascorbic acid on [35S] sulphate incorporation in mesangial cell and matrix proteoglycan. Diabetes Res. Clin. Pract. 37(2) (1997): 101-8.
- McLennan, S. V.; Wang, X. Y.; Moreno, V.; Yue, D. K., and Twigg, S. M. Connective tissue growth factor mediates high glucose effects on matrix degradation through tissue inhibitor of matrix metalloproteinase type 1: implications for diabetic nephropathy. Endocrinology 145(12) (December 2004): 5646-55.
- McLennan, S. V.; Fisher, E. J.; Yue, D. K., and Turtle, J. R. High glucose concentration causes a decrease in mesangium degradation. Diabetes. 43 (1994): 1041-45.
- Mogensen, C. E. Microalbuminuria, blood pressure and diabetic renal disease: origin and development of ideas. Diabetologia 42(3) (Mar 1999): 263-85.
- Mogensen, C. E., and Christensen, C. K. Blood pressure changes and renal function in incipient and overt diabetic nephropathy. Hypertension 7 (6 Pt 2) (Nov 1985): II64-73.
- Mogyorosi, A., and Ziyadeh F. N. GLUT 1 and TGF- β : the link between hyperglycemia and diabetic nephropathy. Nephrol. Dial. Transplant 14 (1999): 2827-29
- Morcos, M.; Sayed, A. A. R.; Bierhaus, A.; Yard, B.; Waldherr, R.; Merz, W., and others. Activation of tubular epithelial cells in diabetic nephropathy. Diabetes 51 (2002): 3532-44.
- Moreira, P. I.; Santos, M. S.; Moreno, A. M.; Proenca, T.; Seica, R.; Oliveira, C. R. Effect of streptozotocin-induced diabetes on rat brain mitochondria. J. Neuroendocrinol. 16(1) (Jan 2004): 32-8.

- Mozaffari, M. S.; Warren, B. K.; Russell, C. M., and Schaffer, S. W. Renal function in the noninsulin-dependent diabetic rat: effects of unilateral nephrectomy. *J. Pharmacol. Toxicol. Methods.* 37(4) (1997): 197-203.
- Mueckler, M. Facilitative glucose transporters. *Eur. J. Biochem.* 219 (1994): 713-725.
- Nagai, R.; Ikeda, K.; Higashi, T.; Sano, H.; Jinnouchi, Y.; Araki, T., and Horiuchi, S. Hydroxyl radical mediates N epsilon-(carboxymethyl)lysine formation from Amadori product. *Biochem. Biophys. Res. Commun.* 234(1) (May 1997): 167-72.
- Nelson, R. G.; Pettitt, D. J.; Baird, H. R.; Charles, M. A.; Liu, Q. Z.; Bennett, P. H., and Knowler, W. C. Pre-diabetic blood pressure predicts urinary albumin excretion after the onset of type 2 (non-insulin-dependent) diabetes mellitus in Pima Indians. *Diabetologia* 36(10) (October 1993): 998-1001.
- Ng, L. L.; Ngkek Wong, F. C.; Quinn, P. A., and Davies, J. E. Uptake mechanisms for ascorbate and dehydroascorbate in lymphoblasts from diabetic nephropathy and hypertensive patients. *Diabetologia* 41 (1998): 435-442.
- Nishikawa, T.; Edelstein, D.; Du, X. L.; Yamagishi, S.; Matsumura, T.; Kaneda, Y., and others. Normalizing mitochondrial superoxide production blocks three pathways of hyperglycaemic damage. *Nature* 404 (April 2000): 787-90.
- Nony, P. A.; Nowak, G., and Schnellmann, R. G. Collagen IV promotes repair of renal cell physiological functions after toxicant injury. *Am. J. Physiol. Renal Physiol.* 281(3) (September 2001): F443-53.
- Nowak, G.; Carter, C. A., and Schnellmann, R. G. Ascorbic acid promotes recovery of cellular functions following toxicant-induced injury. *Toxicol. Appl. Pharmacol.* 167(1) (Aug 2000): 37-45.
- Nukatsuka, M.; Yoshimura, Y.; Nishida, M., and Kawada, J. Importance of the concentration of ATP in rat pancreatic beta cells in the mechanism of streptozotocin-induced cytotoxicity. *J. Endocrinol.* 127(1) (October 1990): 161-5.
- O'Brien, B. A.; Harmon, B. V.; Cameron, D. P., and Allan, D. J. Nicotinamide prevents the development of diabetes in the cyclophosphamide-induced NOD mouse model by reducing beta-cell apoptosis. *J. Pathol.* 191(1) (May 2000): 86-92.

- O'Donnell, M. P.; Kasiske, B. L., and Keane, W. F. Glomerular hemodynamic and structural alterations in experimental diabetes mellitus. FASEB J. 2(8) (May 1988): 2339-47.
- Ohkawa, H.; Ohishi, N., and Yagi, K. Assay for lipid peroxides in animal tissues by thiobarbituric acid reaction. Anal. Biochem. 95 (1979): 351-358.
- Olson, A. L., and Pessin, J. E. Structure, function and regulation of the mammalian facilitative glucose transporter gene family. Ann. Rev. Nutr. 16 (1996): 235-256.
- On, Y. K.; Kim, H. S.; Kim, S. Y.; Chae, I. H.; Oh, B. H.; Lee, M. M., and others. Vitamin C prevents radiation-induced endothelium-dependent vasomotor dysfunction and de-endothelialization by inhibiting oxidative damage in the rat. Clin. Exp. Pharmacol. Physiol. 28(10) (October 2001): 816-21.
- Osterby, R. Glomerular structural changes in type 1 (insulin-dependent) diabetes mellitus: causes, consequences, and prevention. Diabetologia 35 (1992): 803-812.
- Osterby, R. Renal pathology in diabetes mellitus. Curr. Opin. Nephrol. Hypertens. 2(3) (May 1993): 475-83.
- Osterby, R.; Gundersen, H. J.; Horlyck, A.; Nyberg, K. G., and Westberg, G. Diabetic glomerulopathy: structural characteristics of the early and advanced stages. Diabetes 32 (Suppl. 2) (1983): 79-82.
- Park, S. H.; Choi, H. J.; Lee, J. H.; Woo, C. H.; Kim, J. H., and Han, H. J. High glucose inhibits renal proximal tubule cell proliferation and involves PKC, oxidative stress, and TGF- β 1. Kidney Int. 59(5) (2001): 1695.
- Pecoraro, R. E., and Chen, M. S. Ascorbic acid metabolism in diabetes mellitus. Ann. N. Y. Acad. Sci. 498 (January 1987): 248.
- Pelikanova, T.; Pinsker, P.; Smrkova, I.; Stribrna, L., and Dryakova, M. Renal hemodynamics and its regulation in recently diagnosed type 1 diabetes mellitus (insulin-dependent diabetes mellitus). Cas Lek Cesk. 136(17) (September 1997): 533-538.
- Peters, E. M.; Anderson, R.; Nieman, D. C.; Fickl, H., and Jogessar, V. Vitamin C supplementation attenuates the increases in circulating cortisol, adrenaline and anti-inflammatory polypeptides following ultramarathon running. Int. J. Sports Med. 22(7) (October 2001) :537-543.

- Pflueger, A. C.; Larson, T. S.; Hagl, S., and Knox, F. G. Role of nitric oxide in intrarenal hemodynamics in experimental diabetes mellitus in rats. Am. J. Physiol. 277 (3 Pt 2) (September 1999): R 725-733.
- Pugliese, G.; Pricci, F.; Romeo, G.; Pugliese, F.; Mene, P.; Giannini, S., and others. Upregulation of mesangial growth factor and extracellular matrix synthesis by advanced glycation end products via a receptor-mediated mechanism. Diabetes 46 (Nov 1997): 1881 – 1887.
- Rasch, R. Prevention of diabetic glomerulopathy in streptozotocin diabetic rats by insulin treatment: The mesangial regions. Diabetologia 17 (1979): 243-248.
- Ravid, M.; Brosh, D.; Ravid-Safran, D.; Levy, Z., and Rachmani, R. Main risk factors for nephropathy in type 2 diabetes mellitus are plasma cholesterol levels, mean blood pressure, and hyperglycemia. Arch. Int. Med. 158 (May 1998): 998 - 1004.
- Raza, H.; Prabu, S.K.; Robin, M. A., and Avadhani, N. G. Elevated mitochondrial cytochrome P450 2E1 and glutathione S-transferase A4-4 in streptozotocin-induced diabetic rats: tissue-specific variations and roles in oxidative stress. Diabetes 53(1) (January 2004): 185-94.
- Remuzzi, G., and Bertani, T. Pathophysiology of progressive nephropathies. New Engl. J. Med. 339 (1998): 1448-56.
- Reyes, A. A.; Pukerson, M. L.; Karl, I., and Klahr, S. Dietary supplementation with L-arginine ameliorates the progression of renal disease in rats with subtotal nephrectomy. Am. J. Kidney Dis. 20 (1992): 168-72.
- Riedle, B., and Kerjaschki, D. Reactive oxygen species cause direct damage of Engelbreth-Holm-Swarm matrix. Am. J. Pathol. 151 (1997): 215-231.
- Rizza, R.; Verdonk, C.; Miles, J.; Service, F.J., and Gerich, J. Effect of intermittent endogenous hyperglucagonemia on glucose homeostasis in normal and diabetic man. J. Clin. Invest. 63(6) (June 1979): 1119-23.
- Rizza, R. A.; Cryer, P. E.; Haymond, M. W., and Gerich, J. E. Adrenergic mechanisms for the effects of epinephrine on glucose production and clearance in man. J. Clin. Invest. 65(3) (March 1980): 682-9.
- Rogers, K. S.; Friend, W. H., and Higgins, E. S. Metabolic and mitochondrial disturbances in streptozotocin-treated Sprague-Dawley and Sherman rats. Proc. Soc. Exp. Biol. Med. 182(2) (June 1986): 167-75.

- Root-Bernstein, R.; Busik, J. V., and Henry, D. N. Are diabetic neuropathy, retinopathy and nephropathy caused by hyperglycemic exclusion of dehydroascorbate uptake by glucose transporters? *J. Theor. Biol.* 216(3) (2002): 345-59.
- Rosca, M. G.; Monnier, V. M.; Szweda, L. I., and Weiss, M. F. Alterations in renal mitochondrial respiration in response to the reactive oxoaldehyde methylglyoxal. *Am. J. Physiol. Renal Physiol.* 283 (2002): F52-F59.
- Ruggenenti, P.; Perna, A.; Mosconi, L.; Matalone, M.; Pisoni, R.; Gaspari, F., and others. Proteinuria predicts end-stage renal failure in non-diabetic chronic nephropathies. The "Gruppo Italiano di Studi Epidemiologici in Nefrologia" (GISEN). *Kidney Int. Suppl.* 63 (December 1997): S54-7.
- Rumsey, S. C.; Kwon, O.; Xu, G. W.; Burant, C. F.; Simpson, I., and Levine, M. Glucose transporter isoforms GLUT1 and GLUT3 transport dehydroascorbic acid. *J. Biol. Chem.* 272 (30) (1997): 18982-9.
- Salahuddeen, A. K.; Kanji, V.; Reckelhoff, J. F., and Schmidt, A. M. Pathogenesis of diabetic nephropathy: a radical approach. *Nephrol. Dial. Transplant.* 12 (1997): 664-668.
- Sano, T.; Umeda, F.; Hashimoto, T.; Nawata, H., and Utsumi, H. Oxidative stress measurement by *in vivo* electron spin resonance spectroscopy in rats with streptozotocin-induced diabetes. *Diabetologia* 41 (1998): 1355-1360.
- Satav, J. G.; Dave, K. R., and Katyare, S. S. Influence of insulin status on extra-mitochondrial oxygen metabolism in the rat. *Horm. Metab. Res.* 32(2): (February 2000): 57-61.
- Schade, D. S.; Eaton, R. P., and Standefer, J. Modulation of basal ketone body concentration by cortisol in diabetic man. *J. Clin. Endocrinol. & Metab.* 47 (1978): 519-528.
- Schein, P. S.; Cooney, D. A.; McMenamin, M. G., and Anderson, T. Streptozotocin diabetes: further studies on the mechanism of depression of nicotinamide adenine dinucleotide concentrations in mouse pancreatic islets and liver. *Biochem. Pharmacol.* 22 (1973): 2625-31.
- Scheuer, H.; Gwinner, W.; HoHbach, J.; Grone, E. F.; Brandes, R.P.; Malle, E., and others. Oxidant stress in hyperlipidemia-induced renal damage. *Am. J. Physiol. Renal. Phvsiol.* 278 (2000): F63-F74.

- Schieicher, E. D., and Weigert, C. Role of the hexosamine biosynthetic pathway in diabetic nephropathy. Kidney Int. 77 (Suppl.) (2000): S13-S18.
- Schrauwen, P., and Hesselink, M. K. Oxidative capacity, lipotoxicity, and mitochondrial damage in type 2 diabetes. Diabetes 53(6) (June 2004): 1412-7.
- Scivittaro, V.; Ganz, M. B., and Weiss, M. F. AGEs induce oxidative stress and activate protein kinase C- β II in neonatal mesangial cells. Am. J. Physiol. Renal Physiol. 278 (2000): F676-F683.
- Seghieri, G.; Martinoli, L.; Miceli, M.; Ciuti, M.; D'Alessandri, G.; Gironi, A., and others. Renal excretion of ascorbic acid in insulin dependent diabetes mellitus. Int. J. Vitam. Nutr. Res. 64(2) (1994): 119-24.
- Shamrai, E. F.; Stroevaia, L. N., and Beletskaia, T. A. Effect of ascorbic acid and oat polyphenols on respiration and oxidative phosphorylation in liver mitochondria in alloxan diabetic rats. Ukr. Biokhim. Zh. 50(1) (January-February 1978): 50-2.
- Sharma, K.; Jin, Y.; Guo, J., and Ziyadeh, F. N. Neutralization of TGF-beta by anti-TGF-beta antibody attenuates kidney hypertrophy and the enhanced extracellular matrix gene expression in STZ-induced diabetic mice. Diabetes 45(4) (1996): 522-30.
- Sharma, K., and Ziyadeh, F. N. Hyperglycemia and diabetic kidney disease. The case for transforming growth factor-beta as a key mediator. Diabetes 44(10) (1995): 1139-46.
- Sharma, K.; Ziyadeh, F. N.; Alzahabi, B.; McGowan, T. A.; Kapoor, S.; Kurnik, B. R., and others. Increased renal production of transforming growth factor-beta1 in patient with type II diabetes. Diabetes 46(5) (1997): 854-9.
- Sharma, P.; Reddy, K.; Franki, N.; Sanwal, V.; Sankaran, R.; Ahuja, T. S., and others. Native and oxidized low density lipoproteins modulate mesangial cell apoptosis. Kidney Int. 50 (1996): 1604-1611.
- Sheetz, M. J., and King, G. L. Molecular understanding of hyperglycemia's adverse effects for diabetic complications. JAMA 288 (November 2002): 2579-88.
- Shen, X.; Zheng, S.; Thongboonkerd, V.; Xu, M.; Pierce W. M. Jr.; Klein, J. B., and others. Cardiac mitochondrial damage and biogenesis in a chronic model of type 1 diabetes. Am. J. Physiol. Endocrinol. Metab. 287(5) (Nov 2004): E896-905.

- type 1 diabetes. Am. J. Physiol. Endocrinol. Metab. 287(5) (Nov 2004): E896-905.
- Siman, C. M., and Ericksson, U. J. Vitamin C supplementation of the maternal diet reduces the rate of malformation in the offspring of diabetic rats. Diabetologia 40 (1997): 1416-24.
- Slomowitz, L. A.; Deng, A.; Hammes, J. S.; Gabbai, F., and Thomson, S. C. Glomerulotubular balance, dietary protein, and the renal response to glycine in diabetic rats. Am. J. Physiol. Regul. Integr. Comp. Physiol. 282 (2002): R1096-103.
- Smith, H. W. Principle of renal physiology, p 212. UK: London Oxford University Press, 1962.
- Som, S.; Basu, S.; Mukherjee, D.; Deb, S.; Choudhury, P.R.; Mukherjee, S., and others. Ascorbic acid metabolism in diabetes mellitus. Metabolism 30(6) (June 1981):572-7.
- Soper, C. P.; Barron, J. L., and Hyer, S. L. Long-term glycaemic control directly correlates with glomerular filtration rate in early Type 1 diabetes mellitus before the onset of microalbuminuria. Diabet. Med. 15(12) (December 1998): 1010-4.
- Soulis-Liparota, T.; Cooper, M. E.; Dunlop, M., and Jerums, G. The relative roles of advanced glycation, oxidation and aldose reductase inhibition in the development of experimental diabetic nephropathy in the Sprague-Dawley rat. Diabetologia 38(4) (1995): 387-94.
- Sozmen, E. Y.; Sozmen, B.; Delen, Y., and Onat, T. Catalase/superoxide dismutase (SOD) and catalase/paraoxonase (PON) ratios may implicate poor glycemic control. Arch. Med. Res. 32(4) (2001): 283-7.
- Spira, A.; Gowrishankar, M., and Halperin, M. L. Factors contributing to the degree of polyuria in a patient with poorly controlled diabetes mellitus. Am. J. Kidney Dis. 30(6) (December 1997): 829-35.
- Stanton, B. A., and Koeppen, B. M. The kidney In R.M. Berne and M.N. Levy (eds.). Physiology. (3rd ed), p.737. Mosby-Year Book, Inc., USA: 1993;
- Stefek, M.; Tribulova, N.; Gajdosik, A., and Gajdosikova, A. The pyridoindole antioxidant stobadine attenuates histochemical changes in kidney of streptozotocin-induced diabetic rats. Acta Histochem. 104(4) (2002): 413-7.

- Steffes, M. W.; Brown, D. M., and Mauer, S. M. Diabetic glomerulopathy following unilateral nephrectomy in the rat. *Diabetes* 27(1) (1978): 35-41.
- Steffner, R. J.; Wu, L.; Powers, A. C., and May, J. M. Ascorbic acid recycling by cultured beta cells: effects of increased glucose metabolism. *Free Radic. Biol. Med.* 15;37(10) (November 2004): 1612-21.
- Suanarunsawat, T.; Klongpanichchapak, S., and Chaiyabutr, N. Role of nitric oxide in renal function in rats with short and prolonged periods of streptozotocin-induced diabetes. *Diabetes Obes. Metab.* 1 (1999): 339-46.
- Taddei, S.; Virdis, A.; Ghiadoni, L.; Magagna, A., and Salvetti, A. Vitamin C improves endothelium-dependent vasodilation by restoring nitric oxide activity in essential hypertension. *Circulation* 97 (Jun 1998): 2222 - 2229.
- Taddei, S.; Virdis, A.; Ghiadoni, L., and Salvetti, A. Endothelial dysfunction in hypertension: fact or fancy. *J. Cardiovasc. Pharmacol.* 32 (Suppl 3) (1998): S41-7.
- Taddei, S.; Virdis, A.; Ghiadoni, L., and Salvetti, A. Endothelial dysfunction in hypertension. *J. Cardiovasc. Pharmacol.* 38 (Suppl 2) (November 2001): S11-4.
- Taneda, S.; Pippin, J. W.; Sage, E. H.; Hudkins, K. L.; Takeuchi, Y.; Couser, W. G., and Alpers, C. E. Amelioration of diabetic nephropathy in SPARC-null mice. *J. Am. Soc. Nephrol.* 14(4) (April 2003): 968-80.
- Tanji, N.; Markowitz, G. S.; Fu, C.; Kislinger, T.; Taguchi, A.; Pischetsrieder, M., and others. Expression of advanced glycation end products and their cellular receptor RAGE in diabetic nephropathy and nondiabetic renal disease. *J. Am. Soc. Nephrol.* 11 (Sep 2000): 1656 - 1666.
- Terry, T. M. [Animation of electron transport in mitochondria](#) [Online]. The University of Connecticut, 1997. Available from: <http://www.sp.uconn.edu/~terry/images/anim/ETS.html> [2005, August 15]
- Thakran, S.; Siddiqui, M. R., and Baquer, N. Z. Trigonella foenum graecum seed powder protects against histopathological abnormalities in tissues of diabetic rats. *Mol. Cell Biochem.* 266(1-2) (November 2004): 151-9.
- The University of Texas [Structure of the GluT 1 transporter](#) [Online]. Available from: http://www.courses.cm.utexas.edu/.../ch12_struct-GluT1.jpg [2005, July 6]

- University of IOWA, Health Care, Holden Comprehensive Cancer Center. The Adult Blood and Marrow Transplantation Program: Fluid & Electrolyte: Diagnosis & Management. [Online]. Available from: <http://www.healthcare.uiowa.edu/InternalMedicine/Patients/BoneMarrow/Healthpro/FluidElectrolyte/Sodium.htm> [2005, October]
- Usberti, M.; Federico, S.; Cianciaruso, B.; Costanzo, R.; Russo, D., and Andreucci, V. E. Relationship between serum albumin concentration and tubular reabsorption of glucose in renal disease. Kidney Int. 16(5) (November 1979): 546-51.
- Valko, M.; Izakovic, M.; Mazur, M.; Rhodes, C. J., and Telser, J. Role of oxygen radicals in DNA damage and cancer incidence. Mol. Cell Biochem. 266(1-2) (November 2004): 37-56.
- Vallon, V.; Wead, L. M., and Blantz, R. C. Renal hemodynamics and plasma and kidney angiotensin II in established diabetes mellitus in rats: effect of sodium and salt restriction. J. Am. Soc. Nephrol. 5 (10) (April 1995) : 1761-7.
- Vatassery, G. T.; Lai, J. C.; DeMaster, E. G.; Smith, W. E., and Quach, H. T. Oxidation of vitamin E and vitamin C and inhibition of brain mitochondrial oxidative phosphorylation by peroxynitrite. Neurosci. Res. 75(6) (March 2004): 845-53.
- Wang, S.; Denichilo, M.; Brubaker, C., and Hischberg, R. Connective tissue growth factor in tubulointerstitial injury of diabetic nephropathy. Kidney Int. 60 (2001): 96-105.
- Ward, D. T.; Yau, S. K.; Mee, A. P.; Mawer, E. B.; Miller, C. A.; Garland, H. O., and others. Functional, molecular, and biochemical characterization of streptozotocin-induced diabetes. J. Am. Soc. Nephrol. 12 (2001): 779-90.
- Weigert, C.; Brodbeck, K.; Hans, U.; Gambaro, G., and Schleicher, E. D. Low-molecular-weight heparin prevents high glucose- and phorbol ester-induced TGF- β 1 gene activation. Kidney Int. 60 (2001): 935-43.
- Weigert, C.; Sauer, U.; Brodbeck, K.; Pfeiffer, A.; Haring, H. U., and Schleicher, E. D. AP-1 protein mediate hyperglycemia-induced activation of the human TGF- β 1 promoter in mesangial cells. J. Am. Soc. Nephrol. 11 (2000): 2007-2016.
- Welch, R. W.; Wang, Y.; Crossman, A. Jr.; Park, J. B.; Kirk, K. L., and Levine, M. Accumulation of Vitamin C (Ascorbate) and Its Oxidized Metabolite

- Dehydroascorbic Acid Occurs by Separate Mechanisms. J. Biol. Chem. 270 (May 1995): 12584.
- Wenzel, U.; Nickel, A.; Kuntz, S., and Daniel, H. Ascorbic acid suppresses drug-induced apoptosis in human colon cancer cells by scavenging mitochondrial superoxide anions. Carcinogenesis 25(5) (May 2004): 703-12.
- Willem's, D.; Dorchy, H., and Dufrasne, D. Serum antioxidant status and oxidized LDL in well-controlled young type 1 diabetic patients with and without subclinical complications. Atherosclerosis 137 (Suppl) (1998): S61-4.
- Williamson, J. R.; Chang, K.; Frangos, M.; Hasan, K. S.; Ido, Y.; Kawamura, T., and others. Hyperglycemic pseudohypoxia and diabetic complications. Diabetes 42 (June 1993): 801 - 813.
- Winiarska, K.; Drozak, J.; Wegrzynowicz, M.; Fraczyk, T., and Bryla, J. Diabetes-induced changes in glucose synthesis, intracellular glutathione status and hydroxyl free radical generation in rabbit kidney-cortex tubules. Mol Cell Biochem. 261(1-2) (Jun 2004): 91-8.
- Wohaieb, S. A., and Godin, D. V. Alterations in free radical tissue-defense mechanisms in streptozotocin-induced diabetes in rat. Effects of insulin treatment. Diabetes 36 (1987): 1014-1018.
- Wolf, G. The mechanism of uptake of ascorbic acid into osteoblasts and leukocytes. Nutr. Rev. 54 (5) (1996): 150-2.
- Yamada, K.; Nakano, H.; Nakayama, M.; Nozaki, O.; Miura, Y.; Nishimura, M., and others. Endothelium-dependent relaxation in peripheral vasculature and kidney of non-insulin-dependent diabetes mellitus. Diabetes Complications. 9(4) (October-December 1995): 203-7.
- Ye, X., and Li, H. Early expression of TGF-beta1, vimentin and desmin genes in renal cortex of diabetic rats. Zhejiang Da Xue Xue Bao Yi Xue Ban. (Jan 2004): 55-9.
- Zatz, R.; Dunn, B. R.; Meyer, T. W.; Anderson, S.; Rennke, H. G., and Brenner, B. M. Prevention of diabetic glomerulopathy by pharmacological amelioration of glomerular capillary hypertension. J. Clin. Invest. 77(6) (June 1986): 1925-30.
- Zhang, J.; Liu, Z.; Chen, Z.; Li, Y., and Li, L. Effect of rhein on glucose transporter-1 expression and its function in glomerular mesangial cells. Chin. Med. J. (Engl) 112 (12) (1999): 1077-9.

- Zhang, J.; Liu, Z.; Liu, H.; Li, Y., and Li, L. Regulation of the expression and function of glucose transporter-1 by TGF-beta 1 and high glucose in mesangial cells. Chin. Med. J. (Engl) 113 (6) (2000): 508-13.
- Zhang, W.; Khanna, P.; Chan, L. L.; Campbell, G., and Ansari, N. H. Diabetes-induced apoptosis in rat kidney. Biochem. Mol. Med. 61(1) (1997): 58-62.
- Zhou, X.; Xie, M.; Niu, C., and Sun, R. The effects of dietary vitamin C on growth, liver vitamin C and serum cortisol in stressed and unstressed juvenile soft-shelled turtles (*Pelodiscus sinensis*). Comp. Biochem. Physiol. A Mol. Integr. Physiol. 135(2) (June 2003): 263-70.
- Ziyadeh, F. N. Role of transforming growth factor beta in diabetic nephropathy. Exp. Nephrol. 2 (1994): 137.
- Ziyadeh, F. N.; Hoffman, B. D.; Han, D. C.; Iglesias-de la Cruz, M.; Hong, S. W.; Isono, M., and others. Long-term prevention of renal insufficiency, excess matrix gene expression, and glomerular mesangial matrix expansion by treatment with monoclonal antitransforming growth factor- β antibody in *db/db* diabetic mice. PNAS. 97(14) (2000): 8015-20.
- Zuniga, F. A.; Shi, G.; Haller, J. F.; Rubashkin, A.; Flynn, D. R.; Iserovich, P., and others. A three-dimensional model of the human facilitative glucose transporter Glut1. J. Biol. Chem. 276 (48) (2001): 44970-975.
- Zuo, Y.; Gu, Y.; Ma, J., and Lin, S. Effect of selective cyclooxygenase -2 inhibitor on the renal lesion of streptozotocin-induced diabetic rats and its possible mechanism. Zhonghua Nei Ke Za Zhi. 41(12) (December 2002): 825-28.

APPENDIX

PUBLICATIONS

1. Yusuksawad, M. S. and Chaiyabutr, N. Changes in renal hemodynamics in streptozotocin-induced diabetic rats with L-ascorbic acid supplementation. *Clinical Journal of Hemorheology and microcirculation*, 2005 (in press).
2. Yusuksawad, M. and Chaiyabutr, N. L-ascorbic acid supplementation ameliorates the decrease in glomerular filtration rate in chronic diabetic rats. In Proceedings of the ninth Biological Science Graduate Congress on December 16-18, 2004. :
Hosted by Faculty of Science, Chulalongkorn University,
Bangkok Thailand.
In collaboration with Department of Biological Sciences,
The national University of Singapore, Singapore.
3. Yusuksawad, M. and Chaiyabutr, N. Attenuation of glomerular lipid peroxidation and amelioration of glomerular pathophysiology by vitamin C in chronic streptozotocin-induced diabetic rats. In Proceedings of the fifth National Symposium on Graduate Research on Oct 10-11, 2005 at Kasetsart University.



BIOGRAPHY

Mrs. Mariem Sangmal Yusuksawad was born on December 31, 1959 in Bangkok, Thailand. She graduated with a Bachelor of Science in Biology from Faculty of Science and Arts, Kasetsart University in 1982, and a Master of Science in Physiology from Inter-Department of Physiology, Graduate School, Chulalongkorn University in 1986. She has worked at the Department of Physiology, Faculty of Medicine, Chulalongkorn University since 1986. At the present, she is the research scientist specialist of the Department of Physiology, Faculty of Medicine, Chulalongkorn University.