

Part I:
CURRICULUM VITAE

DATE PREPARED: April, 2004

Name: Rohit N. Kulkarni
Office Address: Rm 602, Joslin Diabetes Center, One Joslin Place, Boston, MA 02215
Email: rohit.kulkarni@joslin.harvard.edu
Tel: (617)-713-3460 **FAX:** (617)-713-3476

Education:

M.D. St. John's Medical College, Bangalore University
PhD. Royal Postgraduate Medical School, University of London
(Biochemistry)

Postdoctoral Training:

1986- 1990 Resident Intern & Research Officer, Victoria Hospital; Vani Vilas Children's Hospital; Nutrition Research Center, St John's Med College, Bangalore
1991- 1996 Clinical Registrar & Research Fellow, Francis Fraser Labs, Division of Endocrinology, Hammersmith Hospital, London
1997- 1998 Research Fellow, Joslin Diabetes Center, Boston
1999- 2000 Research Associate, Joslin Diabetes Center, Boston
2000- Principle Investigator, Joslin Diabetes Center, Boston

Licensure and Certification:

Karnataka Board of Medical Registration
GMC Registration, London, UK

Academic Appointments:

1987-1989 Honorary Tutor, Dept. of Physiology/Clinical Nutrition, St. John's Medical College
1989-1990 Tutor, Dept. of Physiology/Clinical Nutrition, St. John's Medical College
1990-1991 Lecturer, Dept. of Physiology/Clinical Nutrition, St. John's Medical College,
1999- 2003 Instructor in Medicine, Harvard Medical School, Boston
2004- Assistant Professor, Harvard Medical School, Boston

Hospital or Affiliated Institution Appointments:

1991-1996 Clinical Registrar, Dept. of Metabolic Medicine, Hammersmith Hospital, London, England

Professional Societies:

1992 Member, The British Endocrine Society
1992 Member, The Biochemical Society
1993 Member, The British Diabetic Association
1996 Member, The New York Academy of Sciences
1997 Professional Section Member, American Diabetes Association
1999 Member, The Endocrine Society
2001 Member, EASD

Awards and Honors:

1986	Distinction in Biochemistry
1987-1989	Research Officer, United Nations University
1990	Young Scientist Award
1991-1994	Overseas Research Students (ORS) Award,
1991-1994	Weston Scholarship
1998-2000	National Research Service Award (National Institutes of Health)
2000-2005	Clinician Scientist Award K08 (National Institutes of Health)

Part II: Research, Teaching, and Clinical Contributions:

A. Narrative report of Research, Teaching, and Clinical Contributions.

Major Research Interests:

- 1) IGF-I, insulin and glucose signalling mechanisms in pancreatic β - and α -cells
- 2) Mechanisms of islet growth in animal models of insulin resistance
- 3) Interactions between leptin and insulin/IGF-I signalling in β -cell function

B. Funding Information:

Research Grants:

- 1991-1992 Co-PI
Role of NPY and CGRP in the control of islet cell function. (NO. RC/197)
Awarded by the special trustees of Queen Charlotte's and Hammersmith
Special Health Authority.
- 1998-2000 PI, National Research Service Award, Individual Fellowship, NIH/NIDDK
Islet Growth in Animal Models of Insulin Resistance.
- 1999-2001 Co-PI, JDRF Center for Islet Transplantation at Harvard Medical School;
project # 13; Search for Islet Growth Factors in Mouse Models of Insulin
Resistance
- 2000-2005 PI, K08 Clinician Scientist Development Award, NIH/NIDDK
Insulin- and Glucose-signaling in Islet β -cells.
- 2002-2003 PI, Pilot & Feasibility Grant, DERC (NIH), Joslin Diabetes Center
Insulin/IGF-I signalling in the alpha cells.
- 2002-2007 PI, Sp. Assay Core, DERC Program Grant #5 R01 DK36836-15, NIH
- 2002-2003 PI,
Interactions between the insulin receptor substrate (IRS) proteins and
transcription factors in islet cell growth and differentiation. Project #13,
JDRF Center for Islet Transplantation at Harvard Medical School
- 2003-2005 PI, Pilot & Feasibility Grant, BCBC, NIH/NIDDK
Search for hepatic-derived islet cell growth factor.
- 2004-2005 PI, R03 DK66207-01, NIH/NIDDK
Leptin modulation of insulin action in the islet β -cell
- 2004-2009 PI, R01 DK67536-01, NIH/NIDDK
Role of IGF-1 and insulin receptors in β -cell survival

C. Report of Current Research Activities:

D. Report of Teaching:

1. Local contributions:
2. Regional, national, or international contributions:
3. Description of teaching award received:
4. Description of major curriculum offerings

- 1987-1990 Tutor. Involved in tutoring 1st and 2nd year medical students, nursing students and laboratory technicians practical demonstrations in Animal and Human Physiology, Dept. of Physiology/Clinical Nutrition
- 1990-1991 Lecturer. Lecturing 1st and 2nd year medical students and nursing students on Animal and Human Physiology, Dept. of Physiology/Clinical Nutrition
- 1991-1996 Supervising postgraduate students: cell culture, receptor-ligand interactions and peptide assays, Francis Fraser Labs, London
- 1995-1996 Lecturing Internal Medicine Diploma students
Hammersmith Hospital, London
- 1997- Teaching and supervision of Research Assistants,
Joslin Diabetes Center, Boston
- 1998 - Supervision of Summer Students and Research Assistants,
Joslin Diabetes Center, Boston
- 1999 -2003 Instructor in Medicine, Harvard Medical School, Boston
- 2004- Assistant Professor, Harvard Medical School, Boston

***Ad hoc* Reviewer of Scientific Journals:**

Nature, EMBO Journal, JCI, MCB, JBC, Diabetes, Endocrinology, JCB, Circulation Research, Am. J Physiol. Endocrinol. Metab.

NIH Study Sections:

2004- Special Emphasis Panel ZDK1

Invited Speaker:

- 1) Work performance and chronic undernutrition. Seminar on Nutrition and Work Performance Dept. of Human Nutrition, Univ. Southampton, Southampton, UK 1989.
- 2) Amylin and insulin in an *in vitro* β -cell model. Biochemistry, Genetics and Development Groups, Division of Biological Sciences, University of Sussex at Brighton, UK 1990.
- 3) Can insulin resistance of the pancreatic β -cell cause diabetes. Biannual Meeting Finnish Diabetes Research Foundation, Tampere, Finland, 1999.
- 4) Implications of dysfunctional insulin signaling in the pancreatic β -cell. Japanese Society for Diabetic Complications, Otsu, Japan, Oct 1999.
- 5) Role of insulin signaling in the endocrine pancreas. Wakayama University of Medical Science, Wakayama, Japan, Oct 1999.
- 6) Contrasting results from insulin receptor knockout models in mice – lessons in type 2 diabetes. Symposium on *New Insights in Diabetes Research – Turn of the Millenium*. Shiga University of Medical Science, Shiga, Japan, Oct 1999

- 7) Lessons from liver and β -cell specific insulin receptor knockout and double knockout studies. Symposium on *New insights into the role of the liver in type 2 diabetes*, Hagedorn Research Institute, Gentofte, Denmark, May 2001
- 8) Role of insulin- and IGF-1-receptors in islet function. Symposium on “*Islets and type 2 diabetes*”. The Biochemical Society, Bristol, UK, Oct 2001
- 9) Lessons in islet function from gene knockout studies. MRC Clinical Sciences Center, ICSM, Hammersmith Hospital, London, UK, Oct 2001
- 10) Search for islet growth factors in animal models of insulin resistance. AstraZeneca, Alderley Park, Macclesfield, UK, Oct 2001
- 11) Insulin and IGF-I signalling in islet β -cells – lessons from tissue-specific knockouts. Endocrine Seminar, Nashville, TN, Jan 2002
- 12) Insulin and IGF-I signaling in the β -cell: lessons from tissue-specific knockout studies. Endocrine Seminar. University of Pittsburgh, Pittsburgh, May 2002
- 13) Islet dysfunction in diabetes: a critical role for insulin/IGF-I signalling in the β -cells. Endocrine Grand Rounds, Baylor College of Medicine, Houston, Sep 2002
- 14) Endocrine Grand Rounds, University of Miami School of Medicine, Miami, Apr 2003
- 15) Implications of dysfunctional insulin/IGF-I signaling in the islets for the development of type 2 diabetes. Seminars in Clinical Research. The Rockefeller University, New York, May 2003
- 16) Insulin signaling is important in β -cell function. Symposium on Current Issues, ADA Meeting, New Orleans, June 2003
- 17) A role for insulin signaling in β -cell function and growth. FASEB Summer Conference, Snowmass, Colorado, Aug 2003.
- 18) Phenotypic and functional consequences in insulin receptor knockout animals. Symposium on ‘Diabetes Mellitus and its Complications’, Buffalo, New York, Oct 2003
- 19) Novel insights into IGF-1 signaling in β -cells using a knockout mouse model. Endocrine Grand Rounds, Indianapolis School of Medicine, Indianapolis, Nov 2003
- 20) The islet β -cell: a critical target for insulin/IGF-I action. Research Seminar, Eli Lilly Co., Indianapolis, Nov 2003
- 21) The insulin/IGF axis and islet function: implications for diabetes. Endocrine Grand Rounds, University of Louisville, Kentucky, Nov 2003

- 22) The insulin/IGF axis and islet function: implications for type 2 diabetes. Endocrine Grand Rounds, Mass. General Hospital, Boston, Jan 2004
- 23) Significance of insulin/IGF-I signalling for the development of type 2 diabetes. Research Seminar. Doug Melton Lab. Harvard University Feb 2004
- 24) Islets and insulin/IGF-I signalling: significance for type 2 diabetes. Seminar. Novartis, Cambridge, Feb 2004

Part III: Bibliography

Original Articles:

1. Sheela ML, Kurpad AV, Kulkarni RN, Shetty PS. Prediction of steady state oxygen consumption during norepinephrine infusion in man. *Metabolism* 10:907-909, 1988.
2. Kurpad AV, Kulkarni RN, Shetty PS. Potentiation of thermogenic responses during norepinephrine infusions in human subjects. *Med Sci Res* 16:997-998 1988.
3. Kulkarni RN, Kurpad AV, Shetty PS. Vascular adrenoceptor sensitivity to graded doses of norepinephrine infusions in undernourished subjects. *Ind J Med Res* 88:427-433, 1988.
4. Soares MJ, Sheela ML, Kurpad AV, Kulkarni RN, Shetty PS. The influence of different methods on basal metabolic rate measurements in human subjects. *Am J Clin Nutr* 50:731-736, 1989.
5. Kurpad AV, Kulkarni RN, Vaz M, Shetty PS. Repeated infusions of identical doses of norepinephrine show potentiation of metabolic responses in human subjects. *Metabolism* 38:979-982, 1989.
6. Kurpad AV, Kulkarni RN, Sheela ML, Shetty PS. Thermogenic responses to graded doses of noradrenaline in undernourished subjects. *Br J Nutr* 61:201-208, 1989.
7. Kurpad AV, Kulkarni RN, Shetty, PS. Reduced thermoregulatory thermogenesis in undernutrition. *Eur J Clin Nutr* 43:27-33, 1989.
8. Vaz M, Kumar MVS, Rodrigues D, Kulkarni RN, Shetty PS. Variability in cardiovascular and plasma norepinephrine responses to head-up-tilt in healthy human subjects. *J Auton Ner Sys* 36:201-208, 1991.
9. Vaz M, Kulkarni RN, Soares MJ, Kurpad AV, Shetty PS. Thermogenic responses to norepinephrine are unaltered following energy supplementation in chronically energy deficient human subjects. *Eur J Clin Inv* 21:27-32, 1991.
10. Kulkarni RN, Vaz M, Shetty PS. Absence of enhanced post-exercise metabolic rate in chronically undernourished human subjects. *Med Sci Res* 19:601-602, 1991.
11. Vaz M, Jayarajan MP, Kulkarni RN, Balasubramanyam A, Shetty PS. Parasympathetic tone in chronic energy deficient human subjects. *Nutr Res* 12 (4-5):613-620, 1992.

12. Piers LS, Soares MJ, Kulkarni RN, Shetty PS. Thermic effect of a meal 3. Effect of dietary supplementation in chronically undernourished subjects. *Br J Nutr* 67:187-194, 1992.
13. Kurpad AV, Kulkarni RN, Rodriguez GD, Shetty PS. Characteristics of norepinephrine stimulated thermogenesis in undernourished subjects. *J Biosciences* 17:293-303, 1992.
14. Soares MJ, Kulkarni RN, Piers LS, Vaz M, Shetty PS. Energy supplementation reverses changes in basal metabolic rates in chronically undernourished human subjects. *Br J Nutr* 68:593-602, 1992.
15. Kulkarni RN, Shetty PS. Net mechanical efficiency during stepping in chronically energy-deficient human subjects. *Ann Hum Biol* 19:421-425, 1992.
16. Vaz M, Kulkarni RN, Rodriguez D, Shetty PS. Immediate heart rate responses to head-up tilt in healthy human subjects: response characteristics and variability. *Ind J Physiol Pharmacol* 37:323-327, 1993.
17. Vaz M, Kumar MVS, Kulkarni RN, Rodriguez D, Shetty PS. Variability of cardiovascular and plasma noradrenaline responses to sustained isometric contraction in normal human subjects. *Clin Sci* 85:45-49, 1993.
18. Kulkarni RN, Kurpad AV, Shetty PS. Reduced post-exercise recovery O₂ consumptions : an adaptive response in chronic energy deficiency ? *Metabolism* 42:544-547, 1993.
19. Kulkarni RN, Ghatei MA, Byfield P, Bloom SR. The effect of GLP-1 (7-36)NH₂ and its fragments on insulin release. *Digestion* 54:380-382, 1993.
20. Vaz M, Kulkarni RN, Leo L, Shetty PS. Plasma norepinephrine kinetics are unaltered in chronically undernourished adult subjects. *Eur J Clin Nutr* 48:30-37, 1994.
21. Olmos G, Kulkarni RN, Haque M, MacDermot J. Imidazolines stimulate release of insulin from RIN 5AH cells independently from I₁ and I₂ imidazoline receptors. *Eur J Pharmacol* 262:41-48, 1994.
22. Kulkarni RN, Smith DM, Ghatei MA, Bloom SR. A 67 kDa protein mediates pituitary adenylate cyclase activating polypeptide and vasoactive intestinal peptide stimulated secretion of insulin in a hamster clonal β -cell line. *J Endocrinol* 147:121-130, 1995.
23. Kulkarni RN, Wang Z, Akinsanya KO, Bennet WM, Wang R, Smith DM, Ghatei MA, Byfield PGH, Bloom SR. Pyroglutamyl-phenylalanyl-proline amide attenuates thyrotropin-releasing hormone-stimulated insulin secretion in perfused rat islets and insulin secreting clonal β -cell lines. *Endocrinology* 136:5155-5164, 1995.
24. Kulkarni RN, Smith DM, Ghatei MA, Jones PM, Bloom SR. Investigation of the effects of antisense oligodeoxynucleotides to islet amyloid polypeptide mRNA on insulin release, content and expression. *J Endocrinol* 151:341-348, 1996.

25. Kulkarni RN*, Wang ZL*, Wang RM, Smith DM, Ghatei MA, Byfield PGH, Bennet WM & Bloom SR. Possible evidence for endogenous production of a novel galanin-like peptide. *J Clin Invest* 100: 189-196, 1997. (* first authors)
26. Kulkarni RN, Wang ZL, Wang RM, Hurley JD, Smith DM, Ghatei MA, Withers DJ, Gardiner JG, Bailey CJ, Bloom SR. Leptin rapidly suppresses insulin secretion from insulinoma cells, rat and human islets and, *in vivo*, in mice. *J Clin Invest* 100:2729-2736, 1997.
27. Morgan DG, Kulkarni RN, Hurley JD, Wang ZL, Wang RM, Karlsen AE, Bloom SR & Smith DM. Inhibition of glucose stimulated insulin secretion by neuropeptide Y is mediated via the Y1 receptor and inhibition of adenylyl cyclase in RIN 5AH rat insulinoma cells. *Diabetologia* 41:1482-1491, 1998.
28. Kulkarni RN*, Bruning JC*, Winnay JN, Postic C, Magnuson MA, Kahn CR. Tissue-specific knockout of the insulin receptor in the pancreatic β -cell creates an insulin secretory defect similar to that in type-2 diabetes. *Cell* 96:329-339, 1999. (* first authors)
29. Kulkarni RN, Winnay JN, Daniels M, Bruning JC, Flier SN, Hanahan D, Kahn CR. Altered function of IRS-1 deficient mouse islets and cultured β -cell lines. *J Clin Invest* 104:R69-R75, 1999.
30. Kulkarni RN, Wang Z-L, Wang R-L, Smith DM, Ghatei MA, Bloom SR. Glibenclamide but not other sulphonylureas stimulates release of neuropeptide Y from perfused rat islets and hamster insulinoma cells. *J Endocrinol* 165(2):509-518, 2000
31. Aspinwall CA, Qian W-J, Roper MG, Kulkarni RN, Kahn CR, Kennedy RT. Roles of insulin receptor substrate-1, phosphatidylinositol 3-kinase and release of intracellular Ca^{2+} stores in insulin-stimulated insulin secretion in β -cells. *J Biol Chem* 275(29):22331-22338, 2000
32. Michael MD, Kulkarni RN, Postic C, Previs S, Shulman GI, Magnuson MA, Kahn CR. Loss of insulin signaling in the hepatocyte leads to severe primary insulin resistance and progressive hepatic dysfunction. *Mol Cell* 6:87-97, 2000.
33. Mauvais-Jarvis F, Virkamakii A, Michael MD, Winnay JN, Zisman A, Kulkarni RN, Kahn CR. A model to explore the interaction between muscle insulin resistance and β -cell dysfunction in the development of type 2 diabetes. *Diabetes* 49(12): 2126-2134, 2000.
34. Ludwig DS, Tritos NA, Mastaitis JW, Kulkarni RN, Kokkotou E, Elmquist J, Lowell B, Flier JS, Maratos-Flier E. Melanin concentrating hormone overexpression in transgenic mice leads to obesity and insulin resistance. *J Clin Invest* 107:379-386, 2001.
35. Leibiger B, Leibiger IB, Moede T, Kemper S, Kulkarni RN, Kahn CR, Berggren P-O. Insulin signaling through A and B type insulin receptors selectively up-regulates transcription of the insulin- and glucokinase-genes in pancreatic beta cells. *Mol Cell* 7: 559-570, 2001.

36. Kulkarni RN^{*}, Flier SN^{*}, Kahn CR. Evidence for a circulating islet cell growth factor in insulin resistance states. (* first authors) *Proc Natl Acad Sci* 98:7475-7480, 2001.
37. Roper MG, Qian W-J, Zhang B, Kulkarni RN, Kahn CR, Kennedy RT. Effect of the insulin mimetic L-783,281 on intracellular [Ca²⁺] and insulin secretion from pancreatic β -cells. *Diabetes* 51 Suppl 1:S43-S49, 2002.
38. Kulkarni RN^{*}, Holzenberger M, Shih D, Ozcan U, Stoffel M, Magnuson MA, Kahn CR. β -cell-specific deletion of the Igf1 receptor leads to hyperinsulinemia and glucose intolerance but does not alter β -cell mass. *Nat Genet* 31(1):111-115, 2002
(*corresponding author)
39. Laustsen PG, Michael MD, Crute BE, Cohen SE, Ueki K, Kulkarni RN, Keller SR, Lienhard GE, Kahn CR. Lipoatrophic diabetes in Irs1^{-/-}/Irs3^{-/-} double knockout mice. *Genes & Dev* 16(24), 3213-3221, 2002.
40. Kulkarni RN, Almind K, Winnay JN, Goren HJ, Ueki K, Okada T, Kahn CR. Impact of genetic background on the development of hyperinsulinemia and diabetes in IR/IRS-1 double heterozygous mice. *Diabetes* 52:1528-1534, 2003
41. Almind K, Kulkarni RN, Lannon S, Kahn CR. Identification of interactive loci with linkage to insulin and leptin in mice with genetic insulin resistance. *Diabetes* 52:1535-1543, 2003
42. Du K, Herzig S, Kulkarni RN, Montminy M. TRB-3: A *tribbles* homolog that inhibits Akt/PKB activation by insulin in liver. *Science* 300:1574-1577, 2003
43. Jhala US, Canettieri G, Sreaton R, Kulkarni RN, Krajewski S, Reed J, Walker J, Lin X, White M, Montminy M. cAMP promotes pancreatic beta cell survival via CREB mediated induction of IRS-2. *Genes & Dev* 17:1575-1580, 2003
44. Opland DM, Way KJ, Zhiheng H, Kulkarni RN, Wang B, Liao R, Ueki K, Kang P, Izumo S, Kahn CR, King GL. Characterization of insulin's multiple signaling pathways in the regulation of vascular endothelial growth factor expression in vascular cells and angiogenesis. *J Biol Chem* 278:31964-31971, 2003
45. Rosen ED, Kulkarni RN, Costa J, Sarraf P, Ozcan U, Okata T, Hsu C-H, Eisenman D, Magnuson MA, Gonzalez FJ, Kahn CR, Spiegelman BM. Targeted elimination of peroxisome proliferator-activated receptor γ in β cells leads to abnormalities in islet mass without compromising glucose homeostasis *Mol Cell Biol* 20:7222-7229, 2003
46. Hennige AM, Burks DJ, Ozcan U, Kulkarni RN, Ye J, Park S, Schubert M, Fisher TL, Dow MA, Leshan R, Zakaria M, Mossa-Basha M, White MF. Up-regulation of insulin receptor substrate-2 in pancreatic β -cells prevents diabetes. *J Clin Invest* 112:1521-1532, 2003
47. Kulkarni RN^{*}, Otani K^{*}, Baldwin AC, Kruetefeldt J, Ueki K, Stoffel M, Kahn CR, Polonsky KS. Reduced β -cell mass and altered glucose sensing impair insulin secretory function in mice with pancreatic β -cell knockout of the insulin receptor. (* first authors) *Am J Physiol Endocrinol Metab* 286:E41-E49, 2004

48. Goren HJ, Kulkarni RN, Kahn CR. Glucose homeostasis and tissue transcript content of insulin signaling intermediates in four inbred strains of mice: C57Bl/6, C57BLKS/6, DBA/2, and 129X1. *Endocrinology*, 2004
49. Kulkarni RN*, Roper MG, Dahlgren G, Shih DQ, Kauri LM, Peters JL, Stoffel M, Kennedy RT. Insulin secretory defect in insulin receptor substrate 1 null mice is linked with reduced calcium signaling and expression of sarco(endo)plasmic reticulum Ca²⁺-ATPase (SERCA)-2b and -3. *Diabetes* 53: June 2004 (*corresponding author) (In Press)
50. Koo S-H, Herzig S, Lee C-H, Hedrick S, Kulkarni RN, Evans R, Olefsky J, Montminy M. PGC-1 promotes insulin resistance in liver via PPAR α dependent induction of TRB3. *Nat Med* April 25, 2004 (In Press)

Reviews, Chapters and Editorials:

1. Shetty PS, Kurpad AV, Kulkarni RN & Vaz M. Thermogenic responses to norepinephrine in chronic energy deficiency. Nestle Report: Basel, 33-42, 1988, pp 33-42.
2. Shetty PS, Kulkarni RN, Soares MJ, Kurpad AV, Piers LS, Vaz M & Jayachandra M. Effects of short term food supplementation on total energy expenditure and energy cost of physical activity of undernourished subjects. United Nations University Report: Tokyo, 1989.
3. Shetty PS, Kulkarni RN, Piers LS, Kurpad AV, Vaz M, Soares MJ. Thermogenesis in chronic undernutrition. In: Gopalan V, ed. *Recent Trends in Nutrition*. New Delhi: Oxford University Press; 1993, Chapter 3, pp 35-48.
4. Toohey's Medicine. Bloom SR, ed. 15th edition, Churchill Livingstone:UK, 1995, pp 1-377.
5. Olmos G, Kulkarni RN, Haque M, MacDermot J. Imidazolines stimulate release of insulin from RIN 5AH cells independently from imidazoline-I₁ and -I₂ receptors. *Ann N Y Acad Sci* 763:374-376, 1995.
6. Kulkarni RN, Michael MD, Kahn CR. Tissue-specific knockout of insulin receptor tyrosine kinase. In: Accili D. ed. *Genetic manipulation of receptor expression and function*. New York, Wiley-Liss, 2000, pp129-154.
7. Kahn CR, Bruning JC, Michael MD, Kulkarni RN. Knockout mice challenge our concepts of glucose homeostasis and the pathogenesis of diabetes mellitus. *J Pediatr Endocrinol Metab* 13 Suppl 6:1377-84, 2000
8. Kulkarni RN, Kahn CR. Genetic Models of Insulin Resistance: Alterations in β -cell Biology. In Habener JF, Hussain MA eds. *Molecular Basis of Endocrine Pancreas Development and Function*. Amsterdam, Kluwer Scientific, Vol. 11, 2001, pp 299-323.
9. Mauvais-Jarvis F, Kulkarni RN, Kahn CR. Knockout models are useful tools to dissect the pathophysiology and genetics of diabetes and insulin resistance. *Clin Endocrinol* 57:1-9, 2002
10. Kulkarni RN. Receptors for insulin and insulin-like growth factor-1 and insulin receptor substrate-1 mediate pathways that regulate islet function. *Biochem Soc Trans* 30(2):317-322, 2002
11. Kulkarni RN, Okada T. Tissue-specific targeting of the insulin receptor gene. *Endocrine* 19:257-266, 2002
12. Kulkarni RN, Zisman A. Lessons for human diabetes from experimental mouse models. *Curr Diab Rep* 2(3):168-175, 2003
13. Kulkarni RN. Cells in focus: The islet β -cell. *Int J Biochem Cell Biol* 36(3):365-371, 2004
14. Kulkarni RN, Kahn CR. HNFs: linking the liver and pancreatic islets in diabetes. *Science*, 303:1311-1312, 2004