

## CURRICULUM VITAE

### Stephen E. Borst, Ph.D.

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### Personal

Born 1950, Portchester, NY  
Married to Michele Borst, architect  
Two sons; Zach born 1981, Alex born 1985

### Education

B.S. in Biology, Syracuse University, 1972  
Ph.D. in Pharmacology, UCLA, 1985

### Professional Experience

2005-present Associate Professor with tenure, Department of Applied Physiology & Kinesiology, University of Florida.  
2009-present Research Director, Geriatric Research, Education and Clinical Center, VA Medical Center, Gainesville, FL  
1999-2005 Assistant Professor, Department of Applied Physiology & Kinesiology, University of Florida.  
1988-present Pharmacologist, Geriatric Research, Education and Clinical Center, VA Medical Center, Gainesville, FL  
1994-1999 Assistant Professor, Department of Pharmacology, University of Florida, Gainesville, FL  
1988-1993 Assistant Research Scientist, Department of Pharmacology, University of Florida  
1987-1988 Research Associate, Department of Medicine, Emory University  
1985-1987 Postdoctoral Fellow, Mentor: Bayard D. Catherwood, M.D., UC San Diego, relocated to Emory University, Department of Medicine  
1982-1985 Teaching Assistant, UCLA School of Medicine  
1979-1985 Graduate Student and Research Assistant, UCLA Department of Pharmacology. Graduate Advisor: Matthew E. Conolly, M.D.  
1977-1979 Research Assistant, VA Medical Center, Sepulveda, CA  
1973-1976 Research Assistant, Department of Biology, Yale University

## **Honors**

Academic scholarships at Syracuse University and UCLA  
President, UCLA Pharmacology Graduate Student Assoc., 1982-1983  
Fellow of the Gerontological Society of America

## **Professional Activities**

Gerontological Society of America, Member and Fellow, Fellowship Committee, Student Awards Committee  
Member, American Society for Pharmacology and Therapeutics  
Member, American College of Sports Medicine, Southeast Regional Chapter  
Reviewer for J. Gerontology, J. Am. Geriatr Soc., MSSE, Endocrine Disorders, Diabetes Obes. Metab., Metabolism, Cytokine  
Chair, Institutional Animal Care and Use Committee, VAMC Gainesville  
Organizer, Geriatric Research Education Clinical Center Research Conference

## **Teaching**

I have organized courses in pharmacology and exercise physiology and lectured on a wide variety of subjects in the areas of pharmacology and physiology to the following graduate students: exercise science, medical, graduate, physician assistant and dental.

## **Area of Current Research Interest**

The main interests of our laboratory are the mechanisms of testosterone-induced anabolic effects and the development of safe strategies for treating sarcopenia. One project examines the roles of aromatase and 5-alpha reductase in mediating the anabolic and adverse effects of testosterone. By co-administration of testosterone and 5-alpha reductase inhibitors, we have obtained, in an animal model, the anabolic effects of testosterone without undesired prostate enlargement. A second, clinical project involves testing higher-than-replacement doses of testosterone combined with finasteride as a strategy for treatment of sarcopenia in older hypogonadal men.

We are also investigating the potential pathological roles played by tumor necrosis factor alpha (TNF), resistin, interleukins and visceral fat mass in the development of insulin resistance. Interventions include systemic neutralization of TNF, pharmacological suppression of cytokine synthesis and surgical removal of adipose tissue.

## **Research Support**

2009-2013 VA Rehab R & D Merit Award AR6884R "Bone Content and Metabolism of Sex Steroid Hormones" \$884,622. PI: Stephen Borst  
2006-2010..... VA Clin Merit Award "5-Alpha Reductase and Anabolic Effects of Testosterone" \$654,700. PI: Stephen Borst  
2008.....University of Florida, NIH Short-Term Training Program "5-Alpha Reductase and Anabolic Effects of Testosterone" \$5,875 Awardee: John Hance Mentor: Stephen Borst  
2008.....University of Florida, Pepper Center Pilot "Myogenic and Proteolytic Regulators in Response to Blood Flow Restricted Exercise"\$64,261. PI: Todd Manini, Co-I/mentor: Stephen Borst

- 2008-2009 .....NIH RO1 Supplement “ACE Inhibition and Physical Performance in Aged Rats” \$95,000. PI: Christy Carter, Co-PI: Stephen Borst
- 2006.....VA Research Investment Fund “Testosterone-Induced Cardioprotection” \$40,000. PI: Stephen Borst
- 2002-2005..... VA Merit Award “TNF and Insulin Responses in Aging Muscle” \$309,500. PI: Stephen Borst.
- 1998-2001..... Merit Award “Growth Hormone and Insulin Resistance in Aging Muscle” \$150,000. PI: Stephen Borst
- 1998-2001..... Howard Hughes Research Resources for Medical Schools "IGF-I in Senescence: Role in Maintaining Skeletal Muscle" \$5,800 PI: Stephen Borst
- 1994-1996..... NIH “Brown Fat Thermogenesis: Response to Cold and Age” \$396,000. PI: Philip Scarpace, Co-I: Stephen Borst
- 1991-1992 .....Am. Fed. For Aging Res. "Mechanisms of Reduced Alpha<sub>1</sub>-Adrenergic Response in Aged Rat Heart" \$23,854. PI: Stephen Borst
- 1991-1992 .....Hartford/AFAR Scholarship "Adrenergic Control of Atrial Natriuretic Peptide Secretion in Senescence" \$10,000. PI/mentor: Stephen Borst
- 1990-1993 .....Research and Development Award, University of Florida Division of Sponsored Research "Alpha-Adrenergic Responsiveness in Senescence" \$10,000. PI: Stephen Borst
- 1989-1990 .....VAMC Gainesville Research Service "Alpha-Adrenergic Signal Transduction in Senescence" \$10,000. PI: Stephen Borst
- 1988-1989 .....VAMC Gainesville Research Service "Alpha-Adrenergic Receptor Function in Senescence" \$6,295. PI: Stephen Borst

### **Research papers**

1. Hui, K.K., J. Kittrelle, R.N. Wolfe, S.E. Borst, and M.E. Conolly (1981). Extracellular magnesium is not required for beta-adrenergic drug-receptor interactions in the human lymphocyte. *Life Sciences* 29:523-530.
2. Borst, S.E., K.K. Hui and M.E. Conolly (1985) The effects of some beta-lactam antibiotics on <sup>3</sup>H-methyl-yohimbine binding to intact human platelets. *Res. Comm. Chem. Pathol. Pharmacol.* 48(2):243-254.
3. Borst, S.E. (1985). Studies of the stimulation and desensitization of beta-adrenergic receptors in the human lymphocyte. University of California at Los Angeles, 1985.
4. Hui, K.K., S.E. Borst and M.E. Conolly (1985). Lymphocytes and granulocytes as models of receptor function in asthma. in *Bronchial Asthma: Mechanisms and Theory*. Weiss and Segal eds., Little Brown and Co., pp. 250-254.
5. Hui, K.K., J.L. Yu, E. Tse and S.E. Borst (1987). The effects of tetramethylpyrazine on human platelet alpha<sub>2</sub> adrenergic receptor adenylate cyclase system. *Res. Comm. Chem. Pathol. Pharmacol.* 58(1):3-14.
6. Conolly, M.E., K.K. Hui and S.E. Borst, J.W. Jenne and M.E. Conolly (1987). Beta-adrenergic receptor desensitization and functional antagonism. in *Asthma Drugs: Theory and Practice*. Jenne and Murphey eds., Marcel Dekker Inc., pp. 259-296.

7. Borst, S.E., K.K. Hui and M.E. Conolly (1988). Calcium dependence of beta-adrenergic responses in human lymphocytes. *Life Sciences* 34(13):1021-1029.
8. Borst, S.E. and B.D. Catherwood (1988). Regulation of osteosarcoma EGF receptor affinity by phorbol ester and cyclic AMP. *J. Bone Min. Res.* 4 (2): 185-191.
9. Borst, S.E., K.K. Hui and M.E. Conolly (1990). Beta-adrenergic receptors on human lymphocytes: comparison of down-regulation *in vivo* and *in vitro*. *Pharmacology* 40: 325 - 329.
10. Borst, S.E., and P.J. Scarpace (1990). Reduced high-affinity  $\alpha_1$ -adrenoceptors in liver of senescent rats: implications of assessment at various temperatures. *Br. J. Pharmacol.* 101:650-654.
11. Borst, S.E., N. Narang, F.T. Crews and P.J. Scarpace (1990). Reduced alpha<sub>1</sub>-adrenergic receptor-mediated inositide hydrolysis in cardiac atria of senescent rats. *J. Cardiovasc. Pharmacol* 16: 444-448.
12. Borst, S.E. and P.J. Scarpace (1990). Alpha<sub>1</sub>-adrenergic stimulation of inositide hydrolysis in liver of senescent rats. *Mech. Aging Devel.* 56(3): 275-280.
13. Borst, S.E. and P.J. Scarpace (1991). Agonist-induced desensitization of liver  $\alpha_1$ -receptors; implications for assessment of PI hydrolysis. *Second Messengers and Phosphoproteins* 13(2&3): 131-139.
14. Scarpace, P.J., B.S. Bender and S.E. Borst (1991). *E. coli* peritonitis activates thermogenesis in brown adipose tissue: relationship to fever. *Can. J. Physiol. & Pharmacol.* 69: 761-766.
15. Borst, S.E. and D.T. Lowenthal (1991). Cardiovascular drugs in the elderly. in *Cardiovascular Clinics: Geriatric Pharmacology*. Brest, A. ed, F.A. Davis Co., Philadelphia, PA, pp 161-173.
16. Scarpace, P.J., M. Matheny and S.E. Borst (1992) Thermogenesis and mitochondrial GDP binding with age in response to the novel agonist CGP-12177A. *Am. J. Physiol.* 262: E185-E190.
17. Crass, M.F., S.E. Borst and P.J. Scarpace (1992)  $\beta$ -adrenergic responsiveness in cultured aortic smooth muscle cells. *Biochem. Pharmacology* 43(8): 1811-1815.
18. Scarpace, P.J., M. Matheny, B.S. Bender and S.E. Borst (1992) Impaired febrile response with age: Role of thermogenesis in brown adipose tissue. *Proc. Soc. Exp. Biol. Med.* 200: 353-358.
19. Scarpace, P.J., B.S. Bender and S.E. Borst (1992) The association of *E. coli* peritonitis with an impaired and delayed fever response in aged rats. *J. Gerontol.* 47(4):B142-B145.
20. Borst, S.E., R.J. Oliver and P.J. Scarpace (1994) Alpha-1 adrenergic and arginine vasopressin stimulation of inositide hydrolysis in rat hepatocytes is unaltered in senescence. *J. Gerontol.* 49(1): B18-B21.
21. Scarpace, P.J., M. Matheny, S.E. Borst and N. Tumer (1994) Thermoregulation with age: role of thermogenesis and uncoupling protein expression in brown adipose tissue. *Proc. Soc. Exp. Biol. Med.* 205: 154-161.
22. Borst, S.E., R.J. Oliver and P.J. Scarpace (1994) Alpha<sub>1</sub>-adrenergic receptor mediates thermogenesis in brown adipose tissue of rat. *Gen. Pharmacol.* 25(8):1703-1710.

23. Borst, S.E., W.J. Millard and D.T. Lowenthal (1994) Growth hormone, exercise and aging: the future of therapy for the frail elderly. *J. Am. Geriatrics Soc.* 42:528-535.
24. Borst, S.E. (1995). The Autonomic nervous system in aging, in *The Encyclopedia of Gerontology*, J. Birren, ed., Academic Press, Orlando.
25. Borst, S.E. and D.T. Lowenthal (1997) Role of IGF-I in muscular atrophy of aging. *Endocrine* 7(1):S22-26.
26. Lowenthal, D.T., S.E. Borst and N. Tümer. (1997) The endocrine responses to exercise in healthy elderly humans and aging rats. *Aging Clin. Exp. Res.* 9(suppl. 4): 15-16.
27. Severgnini, S., D.T. Lowenthal, W.J. Millard, F.A. Simmen and S.E. Borst (1999). Altered muscle IGF-I pathway in senescent male and female rats. *J. Gerontol* 54A(3): B111-B115.
28. Borst, S.E. and H.L. Lai (2000) Metformin treatment enhances insulin-stimulated muscle glucose transport in Sprague-Dawley rats. *Life Sciences* 67(2):165-174.
29. Borst, S.E., D. de Hoyos, D.T. Lowenthal, K. Vincent, L. Garzarella, B. Pollock and M.L. Pollock (2001) Effects of resistance training on insulin-like growth factor-I and IGF-I binding proteins. *Med. Sci. Sports Ex.* 33(4):648-653.
30. Borst, S.E. and H.G. Snellen (2001) Metformin, but not exercise training, increases insulin responsiveness in skeletal muscle of Sprague-Dawley rats. *Life Sciences* 69(13):1497-1507.
31. Borst, S.E. and M. Hennessy (2001)  $\beta$ -3 adrenergic agonist restores skeletal muscle insulin-responsiveness in Sprague-Dawley rats. *Biochem. & Biophys. Res. Comm.* 289:1188-1191.
32. Borst, S.E., K.R. Vincent, D.T. Lowenthal and R.W. Braith (2002) Effects of resistance training on IGF-I and its binding proteins in men and women aged 60-85 years. *J. Am. Geriatr. Soc.* 50:884-888.
33. Borst, S.E., H.G. Snellen, H. Ross, P. J. Scarpace, and Y-M. Kim (2002) Metformin restores responses to insulin but not to growth hormone in Sprague-Dawley rats. *Biochem. & Biophys. Res. Comm.* 291:722-726.
34. Borst, S.E. and G.J. Bagby (2002) Neutralization of TNF reverses age-induced impairment of insulin responsiveness in skeletal muscle of Sprague-Dawley rats. *Metabolism* 51(8):1061-1064.
35. Borst, S.E., D.T. Lowenthal and G. Zavros (2004) Androgen biosynthesis inhibitors and androgen receptor antagonists. in *Encyclopedia of Endocrinology and Endocrine Diseases*, L. Martini, ed., Academic Press, San Diego, pp 210-213.
36. Borst, S.E. (2004) The role of TNF- $\alpha$  in insulin resistance. *Endocrine* 23(2-3):177-182.
37. Borst, S.E. and G.J. Bagby (2004) Adipose TNF is reduced during onset of insulin resistance in Sprague-Dawley Rats. *Cytokine* 25(5):217-222.
38. Borst S.E., Y.I. Lee, C.F. Conover, E.W. Shek and G.J. Bagby (2004) Neutralization of tumor necrosis factor reverses insulin resistance in skeletal muscle, but not adipose tissue. *Am. J. Physiol., Endocrinology & Metabolism.* 287(5):E934-E938.
39. Borst S.E. (2004) Interventions for sarcopenia and muscle weakness in older people. *Age & Ageing* 33(6):548-555.

40. Borst S.E. and C.F. Conover (2005) High-fat diet induces increased tissue expression of TNF- $\alpha$ . *Life Sciences* 77:2156-2165.
41. Borst S.E., Lee J.H., and C.F. Conover (2005) Inhibition of 5-alpha reductase blocks the effects of testosterone on prostate without blocking anabolic effects. *Am. J. Physiol., Endocrinology & Metabolism*. 288: E222-E227.
42. Yimlamai, T., S.L. Dodd, S.E. Borst, and S. Park (2005) Clenbuterol attenuates hindlimb unweighting-induced muscle atrophy by reducing the activation of the ubiquitin-proteasome pathway. *J. Appl. Physiol.* 99: 71-80
43. Borst S.E., C.F. Conover and G.J. Bagby (2005) Association of resistin with visceral fat and muscle insulin resistance. *Cytokine* 32:39-44.Borst S.E., C.F. Conover and G.J. Bagby (2005) Association of resistin with visceral fat and muscle insulin resistance. *Cytokine* 32:39-44.
44. Sahni, M, S.E. Borst and T. Mulligan (2006) Should we offer testosterone replacement therapy to men who live in nursing homes? *Ann. Long-Term Care* 14(1):27-33.
45. Borst S.E. and C.F. Conover (2006) Fischer 344 Rats as a model for catabolic effects of orchietomy. *Life Sciences* 79(4):411-5.
46. Borst. S.E. (2007) Adipose tissue and insulin resistance. in *Adipose Tissue and Adipokines*, G. Fantuzzi, ed., Humana Press. 267-276.
47. Borst, S.E., S. Goswami, D.T. Lowenthal and D. Newell (2007) The autonomic nervous system in aging, in *The Encyclopedia of Gerontology*, J. Birren, ed., Elsevier Press, Oxford. (pp. 129-135).
48. Borst, S.E., Conover, C.F., Carter, C., Gregory, C., Marzetti, E. Leeuwenburgh, C., Vandenborne, K. and T. Wronski (2007) Anabolic effects of testosterone are preserved during inhibition of 5-alpha reductase. *Am. J. Physiol. Endocrinol & Metab.* 293(2):E507-14.
49. Yarrow, J.F., Borsa, P.A., Borst, S.E., Sitren, H.F., Stevens, B.R. and L.J. White (2007) Neuroendocrine responses to an acute bout of eccentric-enhanced resistance exercise. *Med. Sci. Sports Ex.* 39(6):941-947.
50. Borst, S.E., and T. Mulligan (2007) Testosterone replacement therapy for older men. *Clinical Interventions in Aging* 2(4):561-566.
51. Powers, M.E., Yarrow, J.F., McCoy, S. and S.E. Borst (2008) The effects of gamma aminobutyric acid on growth hormone secretion at rest and following resistance exercise. *Med. Sci. Sports Ex.* 40(1):104-110.
52. Yarrow, J.F., Borsa, P.A., Borst, S.E., Sitren, H.F., Stevens, B.R. and L.J. White (2008) Early-phase neuroendocrine and strength responses to eccentric-enhanced resistance training. *J. Str. Condition. Res.* 22(4):1205-14.
53. Giovanni, S, Marzetti, E., Borst, S.E. and C. Leewenburgh. (2008) Modulation of the GH/IGF 1 axis: a potential strategy to counteract sarcopenia in older adults. *Mechanisms of Aging and Development* 129:593-601.
54. Yarrow, J.F., Conover C.F., Conrad B., Altman M.K., Franz S.E., Zheng N., T.J. Wronski, Borst S.E. (2008) Supraphysiological Testosterone-Enanthate Administration Prevents Bone Loss and Augments Bone Strength in Gonadectomized Male and Female Rats *Am J Physiol Endocrinol Metab* 295(5):E1213-1222.

55. Borst, S.E., J.C. Quindry, J.F. Yarrow, C.F. Conover, S.K. Powers (2009) Testosterone administration induces protection against global myocardial ischemia. *Hormones and Metabolic Res.* (in press).
56. Liu, M., Stevens, J.E., Jayaraman, A., Ye, F., Walter, G.A. Bose, P., Thompson, F.J., Borst, S.E. and K. Vandenborne. (2009) Impact of treadmill locomotor training on skeletal muscle IGF-I and myogenic regulatory factors in spinal cord injured rats. *Eur. J. Physiol.* (submitted).
57. Stevens, J.E., Ye F., Liu M., Borst, S.E., Yarasheski K.E., Walter, G.A., Sweeney, H.L. and K. Vandenborne. (2009) Impact of viral mediated overexpression of IGF-I on muscle recovery following cast immobilization. *Am J Physiol Endocrinol Metab* (submitted).
58. Yarrow, J.F., McCoy S.C, Borst, S.E. (2009) Trenbolone (17 $\beta$ -hydroxyestra-4,9,11-trien-3-one): Potential clinical applications of a potent anabolic steroid with reduced androgenic and estrogenic activity. *Steroids* (submitted).
59. Yarrow, J.F., White, L.J., McCoy S.C, Borst, S.E. (2009) Resistance training influences circulating brain-derived neurotrophic factor (BDNF) concentrations. *Neuroscience* (submitted).
60. Manini, T.M., Vincent, K.V., Leeuwenburgh CL, Borst, SE, Clark, B.C. Myogenic and proteolytic mRNA expression following blood flow restricted exercise. *J. Appl. Physiol* (in preparation).

### **Abstracts**

1. Borst, S.E., K.K. Hui and M.E. Conolly (1983). The effects of penicillins on (<sup>3</sup>H-methyl-yohimbine binding to intact human platelets. II World Conference on Clinical Pharmacology and Therapeutics.
2. Borst, S.E., K.K. Hui, K.S. Bricknell and M.E. Conolly (1983). Heterologous down-regulation of beta receptors in human lymphocytes. II World Conference on Clinical Pharmacology and Therapeutics.
3. Borst, S.E., K.K. Hui and M.E. Conolly (1985). Verapamil inhibits agonist-induced desensitization of human lymphocyte beta-adrenergic receptors. *Fed. Am. Soc. Exp. Biol.*
4. Ertle, A.D., D. Tashkin, M. Conolly, K. Hui, R. Newcombe, S.E. Borst, E. Lee and B. Dauphinee (1984). Does beta-receptor agonist therapy alter alpha and beta receptor number or function? A pharmacologic-physiologic correlation. *Am. Thoracic Soc.*
5. Borst, S.E. and B.D. Catherwood (1987). Regulation of osteosarcoma epidermal growth factor receptors by protein kinase C. *Am. Fed. Clin. Res.*
6. Borst, S.E. and P.J. Scarpace (1989). Effect of aging on alpha adrenergic receptors in rat brain. *Fed. Am Soc. Exp. Biol*
7. Borst, S.E., N. Narang, F.T. Crews and P.J. Scarpace (1989) Reduced alpha<sub>1</sub>-mediated inositide hydrolysis in cardiac atria of senescent rats. *Suncoast Workshop Neurobiol. Aging.*
8. Borst, S.E. and P.J. Scarpace (1989). Reduced alpha<sub>1</sub>-adrenergic responsiveness in liver of aging rats. *Gerontological Society of America.*
9. Scarpace, P.J. and S.E. Borst (1989). Age related decreases in phosphoinositide hydrolysis and adenylate cyclase activity in the rat myocardium. *Gerontological Society of America.*

10. Borst, S.E. and P.J. Scarpace (1990). Alpha<sub>1</sub>-adrenergic inositide hydrolysis in liver of senescent rats: coupling to low-affinity sites. *FASEB J*, 4: A315, 1990.
11. Scarpace, P.J., B.S. Bender, S.E. Borst (1990). The febrile response to *E. coli* peritonitis is impaired in senescent rats. *The Gerontologist* 30(special issue): 215A, 1990.
12. Scarpace, P.J., B.S. Bender and S.E. Borst. *E coli* peritonitis in rats increases GDP-binding in brown adipose tissue: relationship to fever. *FASEB J*, 4: A784, 1990.
13. Borst, S.E., R.J. Oliver and P.J. Scarpace. (1991) Alpha<sub>1</sub>-adrenergic-stimulated PI hydrolysis in liver: desensitization occurs in cultured hepatocytes, but not in liver slices. *FASEB J.*, 5 A513.
14. Scarpace, P.J., M. Matheny and S.E. Borst (1991) Thermogenesis induced by a unique brown adipose tissue agonist is decreased with age. *FASEB J*, 5: A1654.
15. Scarpace, P.J., M. Matheny and S.E. Borst (1991) Thermogenesis and the increase in mitochondrial GDP binding is reduced with age in response to the novel agonist CGP-12177A. *Pharmacology of Thermogenesis*, 8<sup>th</sup> International Symposium, Kananaskis.
16. Scarpace, P.J., B.S. Bender and S.E. Borst (1991) Impaired febrile response with age is associated with a failure to increase GDP binding to the brown fat uncoupling protein. *The Gerontologist*, Special Issue 31: 172.
17. Scarpace, P.J. and S.E. Borst (1991) Alpha<sub>1</sub>- and beta-adrenergic signal transduction in the aged myocardium. *AGE*, 14: 132.
18. Scarpace, P.J., S.E. Borst and M. Matheny (1992) Brown adipose tissue thermogenesis in response to cold exposure is unchanged with age and may involve multiple receptor pathways. *FASEB J*. 6: A1085.
19. Borst, S.E., R. Seago and P.J. Scarpace (1993) Reduced density of alpha<sub>1</sub>-adrenergic receptors in brown adipose tissue of senescent rats. *FASEB J*, 7: A647.
20. Borst, S.E., E. Simpson, A. Mudrey and W.J. Millard (1994). Effect of chronic exercise training on circulating insulin-like growth factor-I in senescent rats. *Proc. Endocrine Society*, 296.
21. Borst, S.E., E. Simpson, and W.J. Millard (1995). The BN/F344 rat as a model of growth hormone insufficiency in senescence. *FASEB J* 9(3 pt 1):A181.
22. Borst, S.E., O.P. Perera, I. Choi and F.A. Simmen (1995). Reduced IGF-I mRNA in liver of senescent BN/F344 rats. *J. Gerontol.*, 35(special issue):12.
23. Borst, S.E. and D.T. Lowenthal (1997) Role of IGF-I in muscular atrophy of aging. *Assessment of the GH/IGF-I Axis*, NIA Symposium on Assessment of the Growth Hormone/IGF-I Axis in Aging.
24. Severgnini, S., D.T. Lowenthal and S.E. Borst (1997) Effect of octreotide on circulating insulin-like growth factor-I and IGF binding proteins in senescent rats. *Proceedings Endocrine Soc.*
25. Lowenthal, D.T., S.E. Borst and N. Tümer (1997) The endocrine responses to exercise in aging. "International Symposium on Psychoneuroendocrine and Immunological Correlates of Aging. Pavia, Italy.
26. S. Borst, D. De Hoyos, D. Lowenthal, K. Vincent, L. Garzarella, B. Pollock and M. Pollock (1998) Six months high-or low-volume resistance training increases circulating insulin-like growth factor. *Med. Sci. Sports Ex.* 30(5):S274.

27. De Hoyos, D., S. Borst, L. Garzarella, K. Vincent, B. Pollock, D. Lowenthal and M.L. Pollock (1999) Serum [IGF-I] response to resistance training is sex dependent. *Med. Sci. Sports Ex.* 31(5):S266.
28. Borst, S.E. and H.L. Lai (1999) Glucose transport in skeletal muscle of aging Sprague-Dawley rats is enhanced by metformin treatment. *The Gerontologist* 39(special issue): 137.
29. Borst, S.E., J. Chiao, H. Snellen and H.L. Lai (1999) Metformin reverses skeletal muscle insulin-resistance and increases exercise capacity in aging Sprague-Dawley rats. *Serono Symposium on Endocrinology of Aging*, Tempe, AZ.
30. Borst, S.E. and H.G. Snellen (2000) Skeletal muscle insulin response: effects of metformin and exercise. *Gerontological Society of America*, Washington D.C.
31. Borst, S.E., G.J. Bagby, H.A. Ross, J.A. Mcardle and H.G. Snellen (2001) Treatment with TNF-neutralizing antibody reverses insulin resistance in skeletal muscle of Sprague-Dawley rats. *FASEB J* 15(5 pt. 2):A753.
32. Borst, S.E. M. Hennessy (2001) Beta-3 adrenergic agonist reverses skeletal muscle insulin resistance in Sprague-Dawley rats. *Gerontological Society of America*, Chicago.
33. Kepler, K.C., Borst S.E., P.M. Magyari, P.M. and R.W. Braith (2001) Acute growth hormone response to three different resistance training protocols. *Med. Sci. Sports Ex.* 33(5), S71.
34. Borst, S.E. and M. Hennessy (2002) Beta-3 adrenergic agonist reverses skeletal muscle insulin resistance in Sprague-Dawley rats. *Experimental Biology Late Breaking Abstracts*, A13.
35. Borst, S.E., G.J. Bagby and R. Herbert (2003) Age-induced insulin resistance in Sprague-Dawley Rats is associated with decreased tissue concentrations of tumor necrosis factor. *FASEBJ* 17(5 pt. 2):A860.
35. M.E. Powers, S.E. Borst, S. McCoy, R. Conway, J. Yarrow (2003) The effects of gamma aminobutyric acid on growth hormone secretion at rest and following resistance exercise. *Med. Sci. Sports Ex.* 35(5) S271.
36. Borst, S.E., Y.I. Lee, C.F. Conover, E.W. Shek, T.O. Esteban, G.J. Bagby (2003) Neutralization of tumor necrosis factor- $\alpha$  reverses insulin resistance in skeletal muscle, but not fat. *Gerontological Society of America*, San Diego.
37. Borst, S.E., Y.I. Lee, C.F. Conover, E.W. Shek, T.O. Esteban, G.J. Bagby (2004) Anti-tumor necrosis factor treatment reverses insulin resistance in skeletal muscle, but not fat. *FASEB J* 18(5pt2):A1223.
38. Borst, S.E., Lee JH, and C.F. Conover (2005) Inhibition of 5-alpha reductase blocks the effects of testosterone on prostate without blocking anabolic effects. *Experimental Biology*, San Diego.
39. Borst, S.E., Lee JH, and C.F. Conover (2005) 5-alpha reductase inhibitor MK-434 blocks testosterone mediated prostate enlargement without blocking the anabolic effects of testosterone. *J. Am. Geriatrics Soc.* 53(4):S170.
40. Borst, S.E., and C.F. Conover (2005) Resistin is Associated with Visceral Fat and Muscle Insulin Response. *The Gerontologist* 45: (Special Issue II), 59.
41. Borst, S.E. (2005) Separating the Anabolic and Prostate Effects of Testosterone. *The Gerontologist* 45: (Special Issue II), 502.

42. Borst, S.E. (2005) Contribution of Hormonal Abnormalities to the Sarcopenia of Aging. *The Gerontologist* 45 (Special Issue II): 642.
43. Stevens, J.E., Borst, S.E., Li, Y., Conover, C.F., Walter, G.A., Sweeney, H.L. Vandebourne, K. (2006) Insulin-like Growth Factor-1 gene transfer augments muscle IGF protein content despite cast immobilization Am. Coll. Sports Med., Denver.
44. Borst, S.E., C. F. Conover (2006) Fischer 344 Rats as a model for catabolic effects of orchietomy. *Gerontology Soc. Amer.*, Dallas. *The Gerontologist* 46(Special Issue I):452.
45. Borst, S.E., J.C. Quindry, C.F. Conover, S.K. Powers (2007) Testosterone administration induces protection against myocardial stunning. *Southeastern Amer. Coll. Sports Med.*, Charlotte, NC.
46. Yarrow, J.F. Borsa, P.A., Borst, S.E., Sitren, H.S., Stevens, B.R. and L.J. White (2007) Muscular Strength and Endurance Responses to Eccentric-Enhanced Resistance Training. *Amer. Coll. Sports Med.*, New Orleans. *Med. Sci. Sports Exerc.* 39(5 suppl):S295
47. Liu, M., Stevens, J.E., Walter, G.A., Bose, P., Thompson, F.J., Conover, C., Borst, S.E. and K. Vandeborne (2007) Treadmill training effects on the IGF-I expression in soleus muscle and lumbar spinal cord following spinal cord injury. *Amer. Coll. Sports Med.*, New Orleans. *Med. Sci. Sports Exerc.* 39(5 suppl):S313
48. Ye, F., Stevens, J.E., Liu, M., Walter, G.A., Li, Y., Conover, C., Borst, S.E. and K. Vandeborne (2007) Changes in IGF-I protein content in mouse skeletal muscle after 1 week of reambulation following cast immobilization. *Amer. Coll. Sports Med.*, New Orleans. *Med. Sci. Sports Exerc.* 39(5 suppl):S313
49. Yarrow, J.F, Conrad B., Conover C.F., Zheng N. and Borst S.E. (2008) Testosterone administration augments bone strength and mass in hypogonadal rats. *Amer. Coll. Sports Med. Indianapolis IN.*
50. Yarrow, J.F., Conover C.F., Conrad B., Altman M.K., Franz S.E, Zheng N., Wronski T.J., Borst S.E. (2008) Anabolic effects of testosterone in bone of gonadectomized male and female rats. *Experimental Biology*, San Diego.
51. Borst S.E., Quindry J.C., Yarrow J.F., Conover C.F., Powers S.K. (2008) Testosterone administration induces protection against global myocardial ischemia. *Experimental Biology*, San Diego.
52. Yarrow JF, Franz S, Conover CF, Hance JM, Conrad B, Zheng N, Wronski TJ, Borst SE. Supraphysiological Testosterone-Enanthate Augments The Biomechanical Characteristics Of Bone By Altering Cortical Bone Dimensions (2009) *Amer. Coll. Sports Med.*, Seattle.
53. Manini TM, Clark BC, Skidmore FM, Yarrow JF, Borst SE. Acute systemic growth responses to low intensity blood flow restricted resistance exercise. (2009) *Amer. Coll. Sports Med.*, Seattle.
54. Ye F, Liu M, Borst SE, Walter G, Vandeborne K. Impact of viral mediated overexpression of IGF-I (2009) *Amer. Coll. Sports Med.*, Seattle.