CURRICULUM VITAE

LELAND SHAPIRO MD, FACP

PERSONAL INFORMATION

Home Address and Telephone: 8765 East 29th Place, Denver, CO 80238. Tel (720) 339-7207.

Professional Address: Denver Veteran's Affairs Medical Center, Rocky Mountain Regional Veterans Affairs Medical Center, Box111L, 1700 Wheeling Street Aurora, CO 80045-7211.

University of Colorado Anschutz Medical Campus Division of Infectious Diseases, Department of Medicine, 13001 East 17th Place, Aurora, CO 80045 (e-mail address-Leland.shapiro@ucdenver.edu).

PRESENT ACADEMIC RANK AND POSITION

Associate Professor of Medicine, University of Colorado School of Medicine

Staff Physician, Denver Veteran's Affairs Medical Center.

EDUCATION

College/University:

1976-1980 Tufts University, College of Liberal Arts, Medford, MA
- •B.A. with double major in philosophy and psychology. Dean's List.
- •*Magna cum Laude* in both Philosophy and Psychology.

Graduate School:

1980-1981 Tufts University, Graduate School of Arts and Sciences.
- •Graduate Fellow in Philosophy.

Medical School:

1981-1986 University of Massachusetts School of Medicine, Worcester, MA.
- •M.D. - June 1986.

1983-1984 Pre-Doctoral Fellow in Pathology, Department of Pathology, University of Massachusetts School of Medicine, Worcester, MA.
- •Performed functions of junior resident in Pathology, including frequent presentations to house staff; cut, described, and made microscopic diagnoses in over 3,000 surgical specimens: personally conducted 40

autopsies.

Internship/Residency:
1986-1989 University of North Carolina Hospital, Chapel Hill, NC
•Internship and Residency in Internal Medicine.

Chief Residency:
1989-1990 Moses H Cone Memorial Hospital, Greensboro, NC
•Chief Medical Resident.

Fellowship:
1990-1995 New England Medical Center. Division of Internal Medicine, Department of Geographic Medicine and Infectious Diseases. Trained in the laboratory of Dr. Charles A. Dinarello.
•Clinical-Research Fellowship.

HONORS/AWARDS

1988-1989 Awarded Ciba-Geigy prize for outstanding academic medical resident at North Carolina Memorial Hospital, Chapel Hill, NC.

1989-1990 Recipient of the Joseph B. Stephens memorial award for outstanding clinical instructor at Moses H Cone Memorial Hospital, Greensboro, NC.

1994 Recipient of the Maxwell Finland award as outstanding young research investigator in the Infectious Diseases Division of the New England Medical Center.

1996 Recipient of the first prize, Outstanding Young Investigator Award for original research at the Meeting of the International Cytokine Society (10/96).

1997 Editorial Board member, Scientific Review of Alternative Medicine.

1997 Clinical teaching award, Division of Infectious Diseases, University of Colorado Health Sciences Center.

1998 Selected as Fellow of the American College of Physicians (FACP).

2013 Selected as Associate Editor for journal Frontiers in Infectious Diseases

EDUCATION/TEACHING (SELECTED)

Graduate School (Tufts University, Graduate School of Arts and Sciences):
1980-1981 nces.
•Graduate Fellow in Philosophy.

•Teaching Assistantships in courses on "Logic" and "Theories of Human Nature" (one semester each).

Medical School (University of Massachusetts School of Medicine):

1983 •Guest Lecturer, Worcester Medical Society's Forum for the Study of Values, MA. Topic; "The Impact of John Rawls' *A Theory of Justice* on medical ethics".

1983-1984 •Pre-Doctoral Fellow in Pathology, Department of Pathology, University of Massachusetts School of Medicine, Worcester, MA.
•Numerous case and teaching presentations to hospital staff and students. Frequent divisional conference presentations

Chief medical Residency:

1989-1990 •Attended on the teaching services of Internal Medicine and the outpatient clinic for 10 months.

Associate Professor at University of Colorado Heath sciences Center:

1996-2006 Attending Physician, University of Colorado School of Medicine
•Infectious Diseases subspecialty service.
•General Internal Medicine service.
(both at the University of Colorado Health Sciences Center, one month each per annum).

1997-2007 Study group leader in Microbiology pathophysiology course at the University of Colorado School of Medicine

1998-present •Attending physician-Infectious Diseases consultation service, Denver Veterans Affairs Medical Center (3-4 months pre annum).
•Attending physician-General Internal Medicine service, Denver Veterans Affairs Medical Center (2 weeks per annum).
•Continuity clinic- outpatient infectious diseases clinic service (12 months per annum).

PROFESSIONAL AND SOCIETY MEMBERSHIPS

•Fellow - American College of Physicians (5/98).
•American Medical Association.
•Massachusetts Medical Society.
•Member International Cytokine Society (10/93-present)
•Member Infectious Diseases Society of America (5/96)
•Member, New York Academy of Sciences (4/97)

MENTORING EXPERIENCE

Research technologists:

-Jacqueline Larson (6/03-6/05)
-Carrie Sailer (7/02-9/02) A visiting summer intern from Smith College, Northampton MA.

Post-graduate fellows:

-Hee Jung Choi, MD (12/99-03/02). Current position: Assistant Professor, Division of Infectious Diseases, Department of Internal Medicine, Ewha Womans University, Seoul, Republic of Korea.
-Gregory Pott PhD (7/01/04-present). Current position=Instructor in Medicine.

ASSOCIATE EDITOR

Frontiers in Infectious Diseases (2013-present, 1 of 11 Associate Editors worldwide).

AD HOC REFEREE/REVIEWER
American Journal of Reproductive Immunology
Cellular Immunology
COPD
Cytokine
Journal of Clinical Virology
Journal of Infectious Diseases
Journal of Leukocyte Biology
Journal of Virology
Mediators of Inflammation
Virology

RESEARCH INTERESTS

Our group has pioneered the concept that alpha-1-antitrypsin (AAT) is an unexpected mediator of innate immunity. We have shown that AAT is a likely endogenous antipathogen molecule with activity against several viruses and bacteria. In *in vitro* and *in vivo* studies we have demonstrated that AAT suppresses productive infection of HIV and influenza, as well as *Pseudomonas aeruginosa* and several species of mycobacteria. Moreover, we have persuasive data indicating that genetic deficiency of AAT constitutes a risk factor for acquisition of HIV, Influenza, and mycobacteria. A major focus of our group is exploring mechanisms by which AAT functions as an innate immune mediator, with special efforts devoted to isolating the AAT molecular target(s) that explain AAT antipathogen effects. Our studies have also shown that AAT is a potent immunomodulator, in that AAT biases immune responses from rejection to tolerance following allogeneic engraftment. AAT is currently undergoing human clinical studies to halt disease progression in type 1 diabetes, and as a treatment for myocardial; infarction (heart attack).

INTELLECTUAL PROPERTY

Patents issued (N=7) and pending (N=33) at the US Patent and Trademark Office (USPTO). Table shows selected list of current USPTO filings

1 20120225813 Compositions, Methods And Uses For Treatment Of Type 1 Diabetes

2	20120071545	Compositions And Methods For Treatment Of Bacterial And Mycobacterial Infections
3	20120045460	Methods And Compositions For Treatment Of Graft Rejection And Promotion Of Graft Survival
4	20120045417	Methods And Compositions For Islet Cell Preservation
5	20120040913	Methods And Compositions For Treating Diabetes
6	20110319330	Methods For Treating Arthritis, Autoimmune Disease, And Ischemia-Reperfusion Injury
7	20110112017	Compositions, Methods And Uses For Treating Diabetes
8	20110021416	Compositions, Methods And Uses For Treating Bacterial Infections
9	20100210528	Compositions, Methods And Uses For Inhibition And/Or Treatment Of Influenza Infection
10	20100144630	Compositions, Methods And Uses For Inhibition And/Or Treatment Of Influenza Infection
11	20100137192	Compositions And Methods For Treating Or Ameliorating Mycobacterial Infections
12	20090298747	Methods And Compositions For Treatment Of Nitric Oxide-Induced Clinical Conditions
13	20090227518	Compositions And Methods For Treating Actin-Mediated Medical Conditions
14	20090220518	Methods And Compositions For Treatment Of Graft Rejection And Promotion Of Graft Survival
15	20090203580	Compositions And Methods Of Use For Alpha-1 Antitrypsin Having No Significant Serine Protease Inhibitor Activity
16	20090118162	Inhibitors Of Serine Protease Activity And Their Use In Methods And Compositions For Treatment Of Graft Rejection And Promotion Of Graft Survival
17	20080261869	Compositions And Methods Of Use For Alpha-1 Antitrypsin Having No Significant Serine Protease Inhibitor Activity
18	20080261868	Methods And Compositions For Treating Diabetes
19	20080051330	Inhibitors Of Serine Protease Activity, Methods And Compositions For Treatment Of Herpes Viruses
20	20070224671	Inhibitors Of Serine Protease Activity Methods And Compositions For Treatment Of Nitric Oxide-Induced Clinical Conditions
21	20070155681	Methods And Compositions For Treatment Of Viral Infections
22	20060040867	Inhibitors Of Serine Protease Activity And Their Use In Methods And Compositions For Treatment Of Bacterial Infections
23	20050106151	Inhibitors Of Serine Protease Activity And Their Use In Methods And Compositions For Treatment Of Bacterial Infections
24	20040220242	Inhibitors Of Serine Protease Activity, Methods And Compositions For Treatment Of Nitric Oxide Induced Clinical Conditions
25	20040220239	Inhibitors Of Serine Protease Activity Methods And Compositions For Treatment Of Nitric Oxide-Induced Clinical Conditions
26	20040220113	Inhibitors Of Serine Protease Activity Methods And Compositions For Treatment Of Nitric Oxide-Induced Clinical Conditions

PUBLICATIONS

Original Publications in Peer Reviewed Journals

1. Kashef Hamadani BH, Franco-Paredes C, McCollister B, Shapiro L, Beckham JD, and Henao-Martinez AF, Cryptococcus and cryptococcal meningitis: New predictors and clinical outcomes at a United States academic medical center. Mycoses, **vol 61(5)**, pages 314-210, 2018.

2. Henao-Martines AF, Gross L, McNair B, McCollister B, DeSanto K, Montoya JG, Shapiro L, and Beckham JD, Risk factors for cryptococcal meningitis: a single united states center experience. Micropahalogia, **vol 181(11-12)**, pages 807-814, 2016.

3. Yogo N, Shapiro L, and Erlandson KM, Sepedonium intra-abdominal infection: a case report and review of an emerging fungal infection. J Antimicrobial Chemotherapy, 30 April, pages 1-2, 2014.

4. Zipris D, Shapiro L, Dinarello C, Michaels A and Gottlieb P, Alpha-1-Antitrypsin Therapy Down-Regulates Toll-Like Receptor-Induced IL-1β Responses in Monocytes and Myeloid Dendritic Cells and Improves Islet Function in Recently Diagnosed Patients with Type 1 Diabetes. J Clin Endocrinology and Metab, **vol 99(8)**; pages E1418-E1426, 2014.

5. Pott G, Beard S, Bryan C, Merick D and Shapiro L, Alpha-1 antitrypsin reduces severity of Pseudomonas pneumonia in mice and inhibits epithelial barrier disruption and Pseudomonas invasion of respiratory epithelial cells. Frontiers in Infectious Diseases, **vol 1**; pages 1-13; 2013.

6. Ferreira TC, Sampaio EP, Arganaraz GA, Gondim MV, Shapiro L and Arganaraz ER, Increased prevalence of the alpha-1-antitrypsin (A1AT) deficiency-related S gene in patients infected with human immunodeficiency virus type 1. J Med Virol, **vol 86**; pages 23-9; 2013.

7. Kartalija M, Ovrutsky A, Bryan CL, Pott GB, Fantuzzi G, Thomas J, Strand M, Bai X, Ramamoorthiy P, Rothman M, Nagabhushanam V, MsDermott M, Levin A, Frazer-Abel A, Giclas P, Korner J, Iseman M, Shapiro L and Chan ED, Pateints with non-tuberculous mucobacterial lung disease exhibit unique body and immune phenotypes. Am J Resp Crit Care Med, **vol 187**; pages 197-205; 2012.

8. Chan ED, Pott GB, Silkoff PE, Ralston AH, Bryan CL and Shapiro L, Alpha-1-antitrypsin inhibits nitric oxide production. J Leukoc Biol, **vol 92**; pages 1251-1260; 2012.

9. Lee JH, Hanaoka M, Kitaguchi Y, Kraskauskas D, Shapiro L, Voelkel NF and Taraseviciene-Stewart L, Imbalance of apoptosis and cell proliferation contributes to the development and persistence of emphysema. Lung, **vol 190**; pages 69-82; 2011.

10. Zhou X, Shapiro L, Fellingham G, Willardson BM and Burton GF, HIV replication in CD4+ T lymphocytes in the presence and absence of follicular dendritic cells: inhibition of replication

mediated by alpha-1-antitrypsin through altered IkappaBalpha ubiquitination. J Immunol, **vol 186**; pages 3148-55; 2010.

11. Hiremath J, Thanikachalam S, Parikh K, Shanmugasundaram S, Bangera S, Shapiro L, Pott GB, Vnencak-Jones CL, Arneson C, Wade M and White RJ, Exercise improvement and plasma biomarker changes with intravenous treprostinil therapy for pulmonary arterial hypertension: a placebo-controlled trial. J Heart Lung Transplant, **vol 29**; pages 137-49; 2010.

12. Bryan CL, Beard KS, Pott GB, Rahkola J, Gardner EM, Janoff EN and Shapiro L, HIV infection is associated with reduced serum alpha-1-antitrypsin concentrations. Clin Invest Med, **vol 33**; pages E384-9; 2010.

13. Lewis EC, Mizrahi M, Toledano M, Defelice N, Wright JL, Churg A, Shapiro L and Dinarello CA, alpha1-Antitrypsin monotherapy induces immune tolerance during islet allograft transplantation in mice. Proc Natl Acad Sci U S A, **vol 105**; pages 16236-41; 2008.

14. Sailer CA and Shapiro L, Reply to Torre. J Infect Dis, **vol 196(5)**; pages 804-5; 2007.

15. Sailer CA, Pott GB, Dinarello CA, MaWhinney S, Forster J, Larson-Duran JK, Landay A, Al-Harthi L, Schooley RT, Benson CA, Judson FN, Thompson M, Palella FJ and Shapiro L, Whole blood interleukin-18 level during early HIV-1 infection is associated with reduced CXCR4 coreceptor expression and interferon-γ levels. J Infect Dis, **vol 195**; pages 734-738; 2007.

16. Pott GB, Sailer CA, Porat R, Peskind RL, Fuchs AC, Angel JB, LeBeaut A, Grint PC, Dinarello CA and Shapiro L, Effect of a four-week course of interleukin-10 on cytokine production in a placebo-controlled study of HIV-1 infected patients. Eur Cytokine Netw, **vol 18**; pages 49-58; 2007.

17. Chan ED, Kaminska AM, GIl W, Chmura K, Feldman NE, Bai X, Floyd CM, Fulton KE, Huitt GA, Strand MJ, Iseman MD and Shapiro L, Alpha-1-antitrypsin (AAT) anomalies are associated with lung disease due to rapidly-progressing mycobacteria and AAT inhibits Mycobacterium abscessus infection of macrophages. Scand J Infect Dis, **vol 39**; pages 690-696; 2007.

18. Petrache I, Fijalkowska I, Zhen L, Medler TR, Brown E, Cruz P, Choe KH, Taraseviciene-Stewart L, Scerbavicius R, Shapiro L, Zhang B, Song S, Hicklin D, Voelkel NF, Flotte T and Tuder RM, A novel antiapoptotic role for alpha1-antitrypsin in the prevention of pulmonary emphysema. Am J Respir Crit Care Med, **vol 173**; pages 1222-8; 2006.

19. Lewis EC, Shapiro L, Bowers OJ and Dinarello CA, α1-antitrypsin monotherapy prolongs islet allograft survival in mice. Proc. Natl. Acad. Sci. U. S. A., **vol 102**; pages 12153-12158; 2005.

20. Choi HJ, Dinarello CA and Shapiro L, Reply to the Editor; interleukin-18 inhibits human immunodeficiency virus type 1 production in peripheral bllood monoculear cells. J Infect Dis, **vol 185**; pages 998-999; 2002.

21. Shapiro L, Pott GB and Ralston AH, Alpha-1-antitrypsin inhibits human immunodeficiency virus type-1. FASEB J., **vol 15**; pages 115-122; 2001.

22. Choi HJ, Dinarello CA and Shapiro L, Interleukin-18 inhibits human immunodeficiency virus type 1 production in peripheral blood mononuclear cells. J Infect Dis, **vol 184**; pages 560-8; 2001.

23. Chan E, Ralston AH and Shapiro L, Does reduced alpha-1-antitrypsin activity account for the link between cigarette smoking and idiopathic pulmonary fibrosis? Chest, **vol 129**; pages 72S-74S; 2001.

24. Angel JB, Jacobson MA, Skolnik PR, Giordano M, Shapiro L, LeBeaut A, Greaves W and Fuchs AC, A multicenter, randomized, double-blind, placebo-controlled trial of recombinant human interleukin-10 in HIV-infected subjects. AIDS, **vol 14**; pages 2503-8; 2000.

25. Shapiro L, Puren AJ, Barton HA, Novick D, Peskind RL, Shenkar R, Gu Y, Su MS and Dinarello CA, Interleukin 18 stimulates human immunodeficiency virus type 1 in monocytic cells. Proc Natl Acad Sci U S A, **vol 95**; pages 12550-5; 1998.

26. Shapiro L, Heidenreich KA, Meintzer MK and Dinarello CA, Role of p38 mitogen activated protein kinase in human immunodefiency virus type 1 in vitro. Proc. Natl. Acad. Sci. U. S. A., **vol 95**; pages 7422-7426; 1998.

27. Reznikov LL, Puren AJ, Fantuzzi G, Muhl H, Shapiro L, Yoon DY, Cutler DL and Dinarello CA, Spontaneous and inducible cytokine responses in healthy humans receiving a single dose of IFN-alpha2b: increased production of interleukin-1 receptor antagonist and suppression of IL-1-induced IL-8. J Interferon Cytokine Res, **vol 18**; pages 897-903; 1998.

28. Larsen CM, Wadt KA, Juhl LF, Andersen HU, Karlsen AE, Su MS, Seedorf K, Shapiro L, Dinarello CA and Mandrup-Poulsen T, Interleukin-1beta-induced rat pancreatic islet nitric oxide synthesis requires both the p38 and extracellular signal-regulated kinase 1/2 mitogen-activated protein kinases. J Biol Chem, **vol 273**; pages 15294-300; 1998.

29. Dinarello CA, Novick D, Puren AJ, Fantuzzi G, Shapiro L, Muhl H, Yoon DY, Reznikov LL, Kim SH and Rubinstein M, Overview of interleukin-18: more than an interferon-gamma inducing factor. J Leukoc Biol, **vol 63**; pages 658-64; 1998.

30. Shapiro L and Dinarello CA, Hyperosmotic stress as a stimulant for pro-inflammatory cytokine

production. Exp. Cell Res., **vol 231**; pages 354-362; 1997.

31. Dubois JS, Trehu E, Mier JW, Shapiro L, Epstein M, Klempner MS, Dinarello CA, Kappler K, Ronayne L, Rand W and Atkins MB, Randomized placebo-controlled clinical trial of high-dose interleukin-2 in combination with a soluble p75 Tumor necrosis factor receptor immunoglobulin G chimera in patients with advanced melanoma and renal cell carcinoma. J Clin Oncol, **vol 15**; pages 1052-1062; 1997.

32. Trehu E, Mier JW, Dubois JS, Sorce D, Klempner MS, Epstein M, Dinarello CA, Shapiro L, Kappler K, Ronayne L and Atkins MB, Phase 1 trial of interleukin 2 in combination with the soluble tumor necrosis factor p75 IgG chimera. Clin Cancer Res, **vol** pages 1341-1351; 1996.

33. Shapiro L and Dinarello CA, Specific inhibition of p38 mitogen activated protein kinase inhibits in vitro HIV replication in U1 cells induced by interleukin (IL)-1, tumor necrosis factor (TNF) or phorbol ester (PMA). Eur. Cytokine Netw., **vol 7(3)**; pages 557; 1996.

34. Fuchs AC, Granowitz EV, Shapiro L, Vannier E, Lonnemann G, Angel JB, Kennedy JS, Rabson AR, Radwanski E, Affrime MB, Cutler DL, Grint PC and Dinarello CA, Clinical, hematologic, and immunologic effects of interleukin-10 in humans. J Clin Immunol, **vol 16**; pages 291-303; 1996.

35. Shapiro L and Dinarello CA, Osmotic regualtion of cytokine synthesis *in vitro*. Proc. Natl. Acad. Sci. U. S. A., **vol 92**; pages 12230-12234; 1995.

36. Lonnemann G, Shapiro L, Engler-Blum G, Muller GA, Koch KM and Dinarello CA, Cytokines in human renal interstitial fibrosis. I. Interleukin-1 is a paracrine growth factor for cultured fibrosis-derived kidney fibroblasts. Kidney Int, **vol 47**; pages 837-44; 1995.

37. Fantuzzi G, Benigni F, Sironi M, Conni M, Careli M, Cantoni L, Shapiro L, Dinarello CA, Sipe JD and Ghezzi P, Ciliary neurotrophic factor (CNTF) induces serum amyloid A, hypoglycemia and anorexia, and potentiates IL-1 induced corticosterone and IL-6 production in mice. Cytokine, **vol 7**; pages 150-156; 1995.

38. Chernoff AE, Granowitz EV, Shapiro L, Vannier E, Lonnemann G, Angel JB, Kennedy JS, Rabson AR, Wolff SM and Dinarello CA, A randomized, controlled trial of IL-10 in humans. Inhibition of inflammatory cytokine production and immune responses. J Immunol, **vol 154**; pages 5492-9; 1995.

39. Tilg H, Trehu E, Shapiro L, Pape D, Atkins MB, Dinarello CA and Mier JW, Induction of circulating soluble tumour necrosis factor receptor and interleukin 1 receptor antagonist following interleukin 1 alpha infusion in humans. Cytokine, **vol 6**; pages 215-9; 1994.

40. Shapiro L, Panayotatos N, Meydani SN, Wu D and Dinarello CA, Ciliary neurotrophic factor

combined with soluble receptor inhibits synthesis of pro-inflammatory cytokines and prostaglandin-E2 *in vitro*. Exp. Cell Res., **vol 215**; pages 51-56; 1994.

41. Shapiro L, Beeson PB and Dinarello CA, Potassium iodide (KI) as a specific inducer and modulator of cytokine production in human peripheral blood mononuclear cells (PBMC) or human fibroblasts. Cytokine, **vol 6**; pages 549 (abs); 1994.

42. Pereira BJG, Shapiro L, King AJ, Falagus ME, Strom JA and Dinarello CA, Plasma levels of IL-1β, TNFα, and their specific inhibitors in undialyzed chronic renal failure, CAPD, and hemodialysis patients. Kidney International, **vol 45**; pages 890-896; 1994.

43. Mandrup-Poulsen T, Pociot F, Molvig J, Shapiro L, Nilsson P, Emdal T, Roder M, Kjems LL, Dinarello CA and Nerup J, Monokine antagonism is reduced in patients with IDDM. Diabetes, **vol 43**; pages 1242-7; 1994.

44. Latini R, Bianchi M, Correale E, Dinarello CA, Fantuzzi G, Fresco C, Maggioni AP, Mengozzi M, Romano S, Shapiro L, Sironi M, Tognoni G, Turato R and Ghezzi P, Cytokines in acute myocardial infarction: selective increase of circulating tumor necrosis factor, its soluble recepror, and interleukin-1 receptor antagonist. J Cardiovasc Pharmacol, **vol 23**; pages 1-6; 1994.

45. Kaplanski G, Farnarier C, Kaplanski S, Porat R, Shapiro L, Bongrand P and Dinarello CA, Interleukin-1 induces interleukin-8 secretion from endothelial cells by a juxtacrine mechanism. Blood, **vol 84**; pages 4242-8; 1994.

46. Tilg H, Vogel W, Wiedermann CJ, Shapiro L, Herold M, Judmaier G and Dinarello CA, Circulating interleukin-1 and tumor necrosis factor antagonists in liver disease. Hepatology, **vol 18**; pages 1132-8; 1993.

47. Tilg H, Shapiro L, Atkins MB, Dinarello CA and Mier JW, Induction of circulating and erythrocyte-bound IL-8 by IL-2 immunotherapy and suppression of its in vitro production by IL-1 receptor antagonist and soluble tumor necrosis factor receptor (p75) chimera. J Immunol, **vol 151**; pages 3299-307; 1993.

48. Tilg H, Pape D, Trehu E, Shapiro L, Atkins MB, Dinarello CA and Mier JW, A method for the detection of erythrocyte-bound interleukin-8 in humans during interleukin-1 immunotherapy. J Immunol Methods, **vol 163**; pages 253-8; 1993.

49. Shapiro L, Zhang X-X, Rupp RG, Wolff SM and Dinarello CA, Ciliary neurotrophic factor is an endogenous pyrogen. Proc. Natl. Acad. Sci. U. S. A., **vol 90**; pages 8614-8618; 1993.

50. Shapiro L and Gelfand JA, Cytokines and sepsis: pathophysiology and therapy. New Horizons, **vol 1**; pages 13-22; 1993.

51. Shapiro L, Clark BD, Orencole SF, Poutsiaka DD, Granowitz EV and Dinarello CA, Detection of tumor necrosis factor soluble receptor p55 in blood samples from healthy and endotoxemic humans. J Infect Dis, **vol 167**; pages 1344-50; 1993.

52. Santos AA, Shapiro L, Lynch EA, Brown EF, Chambers E, Jacobs DO, Dinarello CA, Mannick J and Wilmore DW, Tumor necrosis factor soluble receptor p55: endogenous counterregulatory glyciprotein. Surgical Forum, **vol 44**; pages 119-121; 1993.

53. Granowitz EV, Porat R, Mier JW, Orencole SF, Callahan MV, Cannon JG, Lynch EA, Ye K, Poutsiaka DD, Vannier E, Shapiro L, Pribble JP, Stiles DM, Catalano MA, Wolff SM and Dinarello CA, Hematologic and immunologic effects of an interleukin-1 recptor antagonist coinfusion during low-dose endotoxemia in healthy humans. Blood, **vol 82**; pages 2985-2990; 1993.

Reviews and Book Chapters

1. Shapiro L, Gelfand JA. Cytokines. In: Textbook of Critical Care Medicine*, 3rd Edition*, Grenvik A, Holbrook PR, Shoemaker, WC, (eds) WB Saunders Company, Philadelphia. 1999.

2. Chernoff AE, Granowitz EV, Shapiro L, Vannier E, Lonnemann G, Angel JB, Orencole SF, Kennedy JS, Zhang XX, Wen HD, Donaldson EC, Radwanski E, Cutler DL, Wolff SM, and Dinarello CA. A Phase I Study of Intetrleukin10 in Healthy Humans: Safety and Effects on Cytokine Production. Interleukin10. deVries, JE, and de Waal Malefyt, R (Editors) R./G. Landes Company, 95, pages 592-5499; 1995

3. Shapiro L, Gelfand JA. Cytokines and sepsis, pathophysiology and therapy. New Horizons, **vol 1**; pages 13-22; 1993.