

## **George M. Shopp, PhD, DABT**

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### **SUMMARY OF EXPERIENCE**

Dr. George Shopp, PhD DABT, is a private consultant assisting clients in the nonclinical discovery and development of small molecule and biological therapeutics. He has 28 years experience in the fields of toxicology, pharmacology, pharmacokinetics and drug development. This includes two years at toxicology contract research organizations (CROs), 12 years in grant and contract supported basic and applied research (Medical College of Virginia and Lovelace Medical Foundation). Fourteen years in industrial drug development including: 3 years at Synergen responsible for all regulatory and research/investigational toxicology; 2 years at Genentech directing the research toxicology group, and responsible for nonclinical development of growth factors and monoclonal antibodies; and Elan Pharmaceuticals for 9 years responsible for global nonclinical development and research toxicology of small molecule drugs and biopharmaceutics. Therapeutic areas include: Alzheimer's disease, Parkinson's disease, pain, migraine, oncology, diabetes, epilepsy, stroke, rheumatoid arthritis, inflammatory bowel disease, and sepsis. Drug classes include: enzyme inhibitors, ion channel blockers, anti-angiogenesis factors, growth factors, monoclonal antibodies, human proteins, and polyethylene glycol conjugated molecules. Areas of expertise include: building and managing skilled and efficient nonclinical safety groups in the pharmaceutical industry, global nonclinical development of small molecule and protein drugs, regulatory toxicology (FDA, EU and Japan), performing due diligence on potential inlicensed programs, conducting inhouse and contract GLP pharmacology/toxicology/ADME/PK studies, *in vitro* toxicity testing and screening, *in vivo* disease models, research and investigational toxicology, assessment of immunotoxicologic/host resistance/hematopoietic effects of drugs and chemicals, flow cytometry, and pulmonary toxicology/immunology. Dr. Shopp was President of the Board of Directors for the American Board of Toxicology in 2003.

### **EDUCATION**

- |             |                            |   |
|-------------|----------------------------|---|
| 8/73 - 5/77 | B.S.                       | Biology/Chemistry<br>Bucknell University<br>Lewisburg, Pennsylvania   |
| 8/80 - 5/84 | Ph.D.                      | Pharmacology/Toxicology/Immunotoxicology<br>Medical College of Virginia, Albert Munson (mentor)<br>Richmond, Virginia       |
| 5/84 - 5/86 | Postdoctoral<br>Fellowship | Pulmonary Immunology/Toxicology<br>Inhalation Toxicology Research Institute, David Bice (mentor)<br>Albuquerque, New Mexico |

**EMPLOYMENT**

3/06 – pres **Shopp Nonclinical Consulting LLC**

Single-member LLC providing nonclinical drug discovery and development assistance to companies developing small molecule and biologic therapeutics.

11/97 –3/06 **Vice President, Safety Evaluation** (12/04 – 03/06)

**Senior Director, Safety Evaluation** (6/01-12/04)

**Senior Scientist, Safety Evaluation** (11/97-6/01)

**Elan Pharmaceuticals, Inc.**

South San Francisco, CA

Responsibilities include directing all global Research Toxicology, Investigational Toxicology, and Safety Evaluation (including toxicology, ADME/PK and pharmacology). Report to the Senior Vice President of Global Research. 75% of time spent directly on activities such as research/investigational toxicology, research formulation, representation on development project teams, regulatory submissions, and representing Elan at regulatory agency meetings. The remaining 25% spent on managing the Research Toxicology group and the Safety Evaluation group. My direct reports include 5 PhD Toxicologists. Direct responsibility for a \$10 million budget.

Responsibility for nonclinical development of 4 protein drugs (botulinum toxin B, monoclonal antibody to alpha-4 integrin, a peptide analgesic, and a peptide vaccine for Alzheimer's disease). Areas in research toxicology include Alzheimer's drugs and vaccines, analgesics, anti-inflammatory drugs, and monoclonal antibodies for a variety of targets. Other activities include: (1) overseeing the transition of programs from Discovery to Development. This includes the transition from Research Project Management to Development Project Management and Research Chemistry to Pharmaceutical Development, (2) directing due diligence on potential inlicensed products at both the discovery and development stages, (3) establishing electronic submission capabilities, and (4) establishing compliance with 21 CFR Part 11 validation of electronic records. Involved with collaborations with other pharmaceutical companies: Wyeth, Pharmacia/Pfizer, and Biogen Idec. I am responsible for the operations of the Research Animal Facility, and I am Chairman of the IACUC.

8/95 – 11/97 **Senior Scientist, Department of Toxicology**

**Genentech, Inc.**

South San Francisco, CA

Directed all Research Toxicology for products in late-discovery and development. Supervised 5 laboratory associates. Served as the nonclinical development representative on project teams for insulin-like growth factor-1 (IGF-1), and antibodies to vascular-endothelial growth factor (Avastin) and B cell marker CD-20 (Rituxan). Served as Nonclinical Subteam leader for the Avastin program. Researched effects of inhibition of VEGF on wound healing and female cycling. Performed research and development studies on the carcinogenic potential of growth factors. Wrote the nonclinical sections of IND and BLA submissions.

**1/92 - 1/95 Toxicology Group Leader, Preclinical Development**

**Synergen, Inc**  
Boulder, CO

Responsible for all Nonclinical Safety Evaluation and Research Toxicology. Managed 1 PhD toxicologist and 2-4 technicians.

Nonclinical development of cytokine inhibitors (interleukin-1 receptor antagonist (IL-1ra) and tumor necrosis factor binding protein); including immunotoxicologic and host resistance evaluation. Led the effort to characterize immune-mediated skin reactions observed in the clinic after subcutaneous administration of IL-1ra. Nonclinical development of growth factors (glial-derived neurotrophic factor (GDNF) for Parkinson's disease, nerve-growth factor (NGF) for Alzheimer's disease, and fibroblast growth factor (bFGF) for stroke). Experience with intracerebroventricular nonclinical toxicology studies, *in vitro* assessment of immune function, assessment of immune complex disease after delivery of foreign protein drugs. Primary author on 2 INDs, 1 BLA, 1 European (EA) MAA, and 1 EU Expert Report.

**5/86 - 12/91 Associate Scientist II, Immunotoxicology Group**

**Lovelace Medical Foundation**  
Albuquerque, NM

Government grant and contract supported toxicology research. Principle investigator on \$1 million NIEHS contract testing the immunotoxicity (including bone marrow toxicity) of anti-AIDS drugs. Managed 1 post-doc and 2-5 technicians.

Assessed immune function (*ex vivo*) of humans exposed to Agent Orange (NIOSH contract). Performed basic research on lung immunology. Assessed effects of inhaled nickel compounds on pulmonary immune function in mice. Studied immune function in seals exposed to halogenated hydrocarbons. Assessed immune function in kidney transplant patients treated with OKT3. Associate director of the Flow Cytometry lab. Lectured in toxicology courses at the University of New Mexico. Chairman of the Safety Committee.

**11/78 - 8/80 Supervisor of Acute Toxicology Studies**

Borrison Research Laboratories (toxicology CRO)  
Temple Hills, MD

**4/78 - 11/78 Necropsy Laboratory Supervisor**

Litton Bionetics (toxicology CRO)  
Kensington, MD

**5/77 - 4/78 Assistant Toxicology Laboratory Supervisor**

Pharmacopathics Research Laboratories (toxicology CRO)  
Laurel, MD

**ADJUNCT ACADEMIC POSITIONS**

- 5/86 - 12/91      Adjunct Clinical Assistant Professor  
College of Pharmacy  
University of New Mexico  
Albuquerque, NM
- 8/88 - 12/91      Adjunct Assistant Professor  
Department of Biology  
University of New Mexico  
Albuquerque, NM
- 1/91 - 12/91      Adjunct Research Scientist  
Marine Environmental Research Institute  
Blue Hill, ME

**MEMBERSHIPS**

- Society of Toxicology  
Immunotoxicology specialty section  
Regulatory and Safety Evaluation specialty section  
Drug Discovery specialty section  
American College of Toxicology  
American Association of Immunologists

**CERTIFICATION**

- 1991-pres      Diplomate of the American Board of Toxicology  
1999-2003      Member of the Board of Directors for the American Board of Toxicology  
2003            President of the Board of Directors for the American Board of Toxicology

**RESEARCH SUPPORT**

- 1989-1992      Principle Investigator, "Immunotoxicology of AIDS Therapeutics", \$480,638,  
NIEHS Contract.

**CONSULTING AND ADVISORY POSITIONS**

- 1986            Invited reviewer for *Inter J Immunopharm*  
1990            Ad hoc reviewer for the Health Effects Institute  
1991            Ad hoc reviewer for the National Oceanic and Atmospheric Admin.

**TEACHING**

- 1987-1991      Lecturer, Immunotoxicology Course, University of New Mexico  
2000-2001      Lecturer, PERI bi-annual Biologics Drug Development course

**INVITED PRESENTATIONS**

- 2/89 "Alterations in immune function following cigarette smoke exposure", Mountain West Chapter of the Society of Toxicology, Albuquerque, NM
- 8/91 "Biomarkers of toxic PCB exposure in marine mammals (immunotoxicological studies)", California Marine Mammal Center, Sausalito, CA
- 4/93 "The toxicology and pharmacology of fibroblast growth factors", FDA/CBER Workshop, entitled Clinical Trial Issues of Topical Wound Healing Biologics, Bethesda, MD
- 6/94 "A comparison of IND-enabling studies with two different cytokine inhibitors", First Annual Biotechnology Symposium, South San Francisco, CA
- 6/97 B-lymphocyte depletion in cynomolgus monkeys treated with an anti-CD20 chimeric antibody (IDEC-C2B8), Sierra Biomedical Symposium, Bedford, NH
- 5/99 Using in vivo laboratory animal bioassays to demonstrate bioequivalence of a protein drug product manufactured at two manufacturing facilities, IBC Biological Assays conference, Washington DC
- 11/99 Utilizing laboratory animal bioassays to establish bioequivalence of a protein drug product, Second Annual U.S. Biotechnology Symposium, Washington DC

**ADMINISTRATIVE / PROFESSIONAL POSITIONS**

- 1985-1991 Chairman, Safety Committee, Lovelace Medical Foundation
- 1991 Member, Board of Directors, Marine Environmental Research Institute
- 8/93 Chairman of the Organizing Committee for the Fall 1993 Immunology Discussion Group meeting, entitled "Immunological Issues in the Safety Evaluation of Protein Therapeutics", held at Cornell University
- 1998-pres Chairman, Elan Pharmaceuticals IACUC

**PUBLICATIONS Peer Reviewed:**

1. Floody, OR, DA Merkle, TJ Cahill, GM Shopp: Gonadal hormones stimulate ultrasound production by female hamsters. *Horm Behav* 12:172-184, 1979.
2. Olajos, EJ, GM Shopp, I Rosenblum: Effect of acute organophosphorus exposure on 2',3'-cyclic nucleotide 3'-phosphohydrolase activity in hen neural tissue. *Neurotoxicology* 3:146-150, 1982.
3. Shopp, GM, KL White, MP Holsapple, DW Barnes, SS Duke, AC Anderson, LW Condie, JR Hayes, JF Borzelleca. Naphthalene toxicity in CD-1 mice: General toxicity and immunotoxicity. *Fundam Appl Toxicol* 4:406-419, 1984.
4. Holsapple, MP, DG Page, PH Bick, GM Shopp: Characterization of delayed hypersensitivity response to a protein antigen in the mouse. I. Kinetics of reactivity and sensitivity to classical immunosuppressants. *Int J Immunopharmacology* 6:399-405, 1984.
5. Shopp, GM, AE Munson: Suppression of the *in vitro* specific antibody response by 12-O-tetradecanoylphorbol-13-acetate (TPA) in the mouse. *J Leukocyte Biol* 36:51-61, 1984.
6. Shopp, GM, JA Munson, MP Holsapple: Suppression of the antibody response by a formamidine pesticide: Dependence on the route of exposure. *J Toxicol Environ Health* 15:293-304, 1985.
7. White, KL, VM Sanders, DM Barnes, GM Shopp, AE Munson: Immunotoxicological investigations in the mouse: General approach and methods. *Drug Chem Toxicol* 8:299-331, 1985.
8. White, KL, VM Sanders, DW Barnes, GM Shopp, AE Munson: Toxicology of 1,1,2-trichloromethane in the mouse. *Drug Chem Toxicol* 8:333-335, 1985.
9. Sanders, VM, KL White, GM Shopp, AE Munson: Humoral and cell-mediated immune status of mice exposed to 1,1,2-trichloromethane. *Drug Chem Toxicol* 8:357-372, 1985.
10. Barnes, DW, VM Sanders, KL White, GM Shopp, AE Munson: Toxicology of *trans*-1,2-dichloroethylene in the mouse. *Drug Chem Toxicol* 8:373-392, 1985.
11. Shopp, GM, VM Sanders, KL White, AE Munson: Humoral and cell-mediated immune status of mice exposed to *trans*-1,2-dichloroethylene. *Drug Chem Toxicol* 8:393-407, 1985.
12. Shopp, GM, AE Munson: Suppression of the antibody response by phorbol esters in the mouse is due to an effect on the nylon wool adherent cell population. *Agents Action* 16:535-541, 1985.
13. Shopp, GM, NA Gillette, YS Cheng, MA Medinsky, CH Hobbs, JL Mauderly: Acute inhalation exposure of azodicarbonamide in the guinea pig. *Am Ind Hyg Assoc J* 48:127-132, 1987.
14. Shopp, GM, DE Bice: The pulmonary antibody-forming cell response in the guinea pig after intratracheal immunization. *Exp Lung Res* 13:193-203, 1987.
15. Bechtold, WE, GM Shopp, YS Cheng: The determination of biurea in azodicarbonamide by HPLC. *J Analyt Toxicol* 12:89-93, 1988.

16. Edwards, BS, GM Shopp: Efficient use of monoclonal antibodies for immunofluorescence. *Cytometry* 10:94-97, 1989.
17. Sopori, ML, S Cherian, R Chilukuri, GM Shopp: Cigarette smoke causes inhibition of the immune response to intratracheally administered antigens. *Toxicol Appl Pharmacol* 97:489-499, 1989.
18. Ashmore, LM, GM Shopp, BS Edwards: Lymphocyte subset analysis by flow cytometry: Comparison of three different staining techniques and effects of storage. *J Immunol Methods* 118:209-215, 1989.
19. Johnson, NF, JS Wilson, RC Habbersett, GM Shopp, DM Smith: Separation and characterization of basal and secretory cells from the rat trachea by flow cytometry. *Cytometry* 11:395-405, 1990.
20. Haley, PJ, BA Muggenburg, AH Rebar, GM Shopp, DE Bice: Bronchoalveolar lavage cytology in cynomolgus monkeys and identification of cytologic alterations following sequential saline lavage. *Vet Pathol* 26:265-273, 1989.
21. Schuyler, M, K Gott, G Shopp, L Crooks: Experimental hypersensitivity pneumonitis: Influence of donor sensitivity. *J Lab Clin Med* 115:621-628, 1990.
22. Haley, PJ, GM Shopp, JM Benson, Y-S Cheng, DE Bice, MI Luster, JK Dunnick, CH Hobbs: The immunotoxicity of three nickel compounds following 13-week inhalation exposure in the mouse. *Fund Appl Toxicol* 15:476-487, 1990.
23. Schuyler, M, K Gott, G Shopp, L Crooks: Experimental hypersensitivity pneumonitis: Suppressor cell influence. *Exp Lung Res* 17:903-922, 1991.
24. Weissman, D, D Bice, B Muggenburg, P Haley, G Shopp, M Schuyler: Primary immunization in the canine lung: Soluble antigen induces a localized response. *Am Rev Respir Dis* 145:6-12, 1992.
25. Schuyler, MR, K Gott, G Shopp, T Merlin: CD5-negative cell mediated experimental hypersensitivity pneumonitis. *Am Rev Respir Dis* 145:1185-90, 1992.
26. Brozek, CM, GM Shopp, SL Ryan, PM Gillespie, DF Kuzewitt, MS Rajagopalan, KD Ley, RD Ley: *In vivo* exposure to ultraviolet radiation enhances pathogenic effects of murine leukemia virus, LP-BM5, in MAIDS. *Photochem Photobiol* 56:287-295, 1992.
27. Schuyler, M, K Gott, G Shopp, L Crooks: CD3+ and CD4+ cells adoptively transfer experimental hypersensitivity pneumonitis. *Am Rev Respir Dis* 146:1582-1588, 1992.
28. Colagiovanni, DB, GM Shopp: Evaluation of interleukin-1 receptor antagonist (IL-1ra) and tumor necrosis factor binding protein (TNF-BP) in a rodent abscess model of host resistance. *Immunopharm Immunotox* 18:397-419, 1996.
29. Halperin, W, R Vogt, MH Sweeney, G Shopp, M Fingerhut, M Peterson: Immunological markers among workers exposed to 2,3,7,8-tetrachlorodibenzo-*p*-dioxin. *Occupation Environ Med* 55:742-749, 1998.

30. Bendele, A, J Selly, C Richy, G Sennello, G Shopp: Short communication: renal tubular vacuolation in animals treated with polyethylene-glycol-conjugated proteins. *Toxicol Sci* 42:152-157, 1998.
31. Schenk, D, R Barbour, W Dunn, G Gordon, G Shopp, et al: Immunization with amyloid- $\beta$  attenuates Alzheimer-disease-like pathology in the PDAPP mouse. *Nature* 400:173-177, 1999.
32. Ryan, AM, DB Eppler, KE Hagler, RH Bruner, PJ Thomford, RL Hall, GM Shopp, CA O'Neill: Preclinical safety evaluation of rhuMAbVEGF, an antiangiogenic humanized monoclonal antibody. *Toxicol Pathol* 27:78-86, 1999.
33. Colagiovanni, DB, MA Suniga, JL Frazier, CK Edwards, M Fleshner, JA McCay, KL White, GM Shopp: TNF-alpha blockade by a dimeric TNF type I receptor molecule selectively inhibits adaptive immune responses. *Immunopharm Immunotox* 22:627-651, 2000.
34. Roberds, SL, J Anderson, B Guriqbal, M Bienkowski, G Shopp, et al: BACE knockout mice are healthy despite lacking the primary  $\beta$ -secretase activity in brain: implications for Alzheimer's disease therapeutics. *Hum Mol Gen* 10:1317-1324, 2001.
35. Dovey, HF, JV Anderson, JP Chen, LZ. De Saint, G Shopp et al: Functional gamma-secretase inhibitors reduce beta-amyloid peptide levels in brain. *J Neurochem* 76:173-181, 2001.

#### **PUBLICATIONS Meeting Proceedings:**

1. Shopp, GM, AE Munson: Modification of the pharmacokinetics of MVE-2 to enhance its effects on host resistance. In *Assessment of Chemical Regulation of Immunity in Veterinary Medicine* (JH Gainer ed.), Alan R. Liss, Inc., New York, pp 501-509, 1984.
2. Harford, AM, GM Shopp, LM Ashmore, DM Mosdell, LJ Gibel, WA Sterling: OKT3 treated kidney transplant patients: Monitoring of effects on peripheral blood mononuclear cells using 2-color flow cytometry. *Transplant Proc* 20(suppl 1):245-248, 1988.
3. Shopp, GM, BS Edwards, TA Coons, MH Sweeney, RF Vogt, LM Ashmore, DJ Harper, KA Lane, HA Nolla: Laboratory Assessment of the Immune System in Individuals Occupationally Exposed to 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD): Quality Control in a Cross-Sectional Epidemiological Study. *Chemosphere* 18: 867-874, 1989.
4. Harford, AM, GM Shopp, JS Goodwin, MA Ebbesen, L Gibel, AY Smith, WA Sterling: Murine thymocyte lysis by inhibitors of arachidonic acid metabolism. *Adv Prostaglandin Thromboxane Leukotriene Res*, ed. B Samuelson et al, Vol 21, pp. 489-492, Raven Press, New York, 1991.
5. Soporì, ML, SM Savage, MS Rajagopalan, LA Donaldson, P Gillespie, G Shopp, AK Ratten, GA Tejwani: Effects of chronic ethanol treatment on the immune response and the brain opiates. In *New Leads in Opioid Research* (JM van Ree, AH Mulder, VM Wiegant, TB van Wimersam Greidanus eds.), Excerpta Medica, Amsterdam, pp 332-333, 1990.
6. Luster, MI, GJ Rosenthal, W Cao, MB Thompson, AE Munson, JD Prejean, G Shopp, BA Fuchs, DR Germolec, JF Tomaszewski: Experimental studies of the hematologic and immune system toxicity of nucleoside derivatives against HIV infection. *Int J Immunopharmacol* 13:99-107, 1991.

**PUBLICATIONS Reviews:**

1. Bice, DE, GM Shopp: Antibody responses after lung immunization. A minireview. *Exp Lung Res* 14:133-155, 1988.

**PUBLICATIONS Abstracts:**

1. Shopp, GM, KL White, AE Munson: The effect of 12-O-tetradecanoylphorbol-13 acetate (TPA) on the antibody-producing capabilities of *in vitro* sensitized spleen cells. *The Toxicologist* 2:93, 1982.
2. Shopp, GM, KL White, MP Holsapple, DW Barnes, L Condie, JF Borzelleca: General toxicology and immunotoxicology of mice exposed to naphthalene (NAP). *The Toxicologist* 3:57, 1983.
3. Holsapple, MP, GM Shopp, JA Munson, AN Tucker: Selective immunosuppression by a formamidine pesticide: *The Toxicologist* 3:59, 1983.
4. Shopp, GM, AE Munson: The effect of the phorbol ester, 12-O-tetradecanoylphorbol-13-acetate (TPA), on the antibody response in the mouse. *The Pharmacologist* 25:177, 1983.
5. Ellis, NK, CT Schnizlein, GM Shopp, PH Coleman, AE Munson: MVE-2: Pharmacokinetics and immunological effects in the lung. *Am Rev Respir Dis* 129:A293, 1984.
6. Shopp, GM, DE Bice: The pulmonary plaque-forming cell response in the guinea pig after intratracheal immunization. *Fed Proceed* 44:970, 1985.
7. Bechtold, WE, GM Shopp, YS Cheng: Determination of biurea in the presence of azodicarbonamide by HPLC. *Amer Chem Soc annual meeting*, 1986.
8. Shopp, GM, DE Bice, AG Harmsen, MA Jarpe, RK Wolff. Rat lung immune function following inhalation exposure to 1-nitropyrene in combination with Ga<sub>2</sub>O<sub>3</sub> particles and SO<sub>2</sub>. *The Toxicologist* 6:170, 1986.
9. Shopp, GM, ME Fink, MJ Mason, RF Henderson, DE Bice: The role of leukotriene B4 in lung inflammation. *Am Rev Respir Dis* 133:A315, 1986.
10. Harford, AM, GM Shopp, LM Ashmore, JE Seppelt, DM Mosdell, LJ Gibel and WA Sterling: OKT3 treated kidney transplant patients: Monitoring of effects on peripheral blood mononuclear cells using 2-color flow cytometry. *Trans Proc* 20(1 Suppl. 1):245-248, 1988.
11. Shopp, GM, BS Edwards, TA Coons, MH Sweeney, RF Vogt, LM Ashmore, DJ Harper, KA Lane, and HA Nolla: Laboratory assessment of the immune system in individuals occupationally exposed to 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD): Quality control in a cross-sectional epidemiological study, *DIOXIN87 Meeting, Las Vegas, October 1987*.
12. Harford, AM, GM Shopp, LM Ashmore, L Gibel, W Sterling, J Garcia, J Seppelt: T cell subsets in OKT3 treated renal transplant patients. *American College of Physicians, New Mexico Chapter, Albuquerque, December 1987*.

13. Shopp, GM, AM Harford, LM Ashmore, JE Seppelt, LJ Gibel, WA Sterling, Jr: Peripheral blood (PB) T cell phenotypes in humans after treatment with a T cell monoclonal antibody (OKT3). *The Toxicologist* 8:150, 1988.
14. Shopp, GM, LM Ashmore, BS Edwards: Lymphocyte subset analysis: Comparison of three different staining procedures. *Cytometry (supplement 2)*:75,1988.
15. Harford, A, J Goodwin, B Baack, G Shopp, L Gibel, A Smith, W Sterling: Prolongation of murine skin grafts by selective inhibition of leukotriene production. *Kid Internat* 35(1):506, 1988.
16. Shopp, GM, ML Sopori, R Chilukuri, KA Lane: A comparison of the effects of cigarette smoke on the antibody-forming cell response in rats and mice. *Foundation for Immunotoxicology annual meeting, October 1988*.
17. Schuyler, M, K Gott, G Shopp: Experimental hypersensitivity pneumonitis: influence of donor sensitivity. *Clin Res* 37:515A, 1989.
18. Harford, A, G Shopp, E Romero L Gibel, A Smith, W Sterling. Modulation of the T cell receptor-CD3 (TCR-CD3) complex by the monoclonal antibody, OKT3. *Clin Res* 37(2):410A, 1989.
19. Sopori, M, R Chilukuri, G Shopp, K Lane: Role of beta-endorphin in cigarette smoke-induced analgesia. *FASEB J* 3(3):A586, 1989.
20. Weissman, DN, DE Bice, GM Shopp, BA Muggenburg, MR Schuyler: Class-specific attributes of the primary humoral immune response to lung immunization. *Am Rev Respir Dis* 139:A457, 1989.
21. Harford, AM, GM Shopp, BS Edwards, H Nolla, E Romero, L Gibel: OKT3 increases cytosolic free calcium in CD3 negative cells. *American Society of Nephrology, December 1989*.
22. Lane, KA, ML Sopori, R Chilukuri, GM Shopp: A comparison of the effects of cigarette smoke on the antibody-forming cell response in rats and mice. *1989 annual meeting of the Mountain West Chapter of the Society of Toxicology, Albuquerque, NM*.
23. Shopp, GM, D Clark, K Galbreth, R Goble, G Rosenthal: The immunotoxicity and myelotoxicity of 2'3'-dideoxydideoxythymidine (d4T) in mice. *Sixth International Conference on AIDS, June 1990, San Francisco*.
24. Harford, AM, GM Shopp, JS Goodwin, E Romero: Flow cytometric evaluation of arachidonic acid metabolites' role in thymocyte lysis. *7th International Conference on Prostaglandins, May 1990, Florence*.
25. Schuyler, M, K Gott, G Shopp: Experimental hypersensitivity pneumonitis: Suppressor cell influences. *Am Rev Respir Dis* 141:A311, 1990.
26. Weissman, D, D Bice, P Haley, Muggenburg, G Shopp, M Schuyler: Secondary lung immunization: Compartmentalization of response. *Am Rev Respir Dis* 141:A213, 1990.

27. Harford, AM, GM Shopp, BS Edwards, H Nolla, E Romaro, L Gibel: Normal cytosolic free calcium response after OKT3 treatment. *Annual meeting of the International Society of Nephrology, July 1990, Tokyo.*
28. Shopp, G, D Clark, K Galbreth, R Goble, G Rosenthal: The immunotoxicity and myelotoxicity of 2',3'-dideoxydideoxythymidine (d4T) in mice. *Eastern Regional Symposium on Mechanisms of Immunotoxicity, Williamsburg, VA, October, 1990.*
29. Shopp, GM, DA Clark, KA Galbreth, GJ Rosenthal: The immunotoxicity and myelotoxicity of 2',3'-dideoxydideoxythymidine (d4T) in mice. *Annual Society of Toxicology meeting, Dallas, 1991.*
30. Schuyler, M, K Gott, G Shopp: Experimental hypersensitivity pneumonitis: Are T cells responsible? *Am Rev Respir Dis 143:A223, 1991.*
31. Schuyler, M, K Gott, G Shopp: Murine adoptive experimental hypersensitivity pneumonitis. *Am Rev Respir Dis 143:A223, 1991.*
32. Shopp, GM, K Galbreth, J Gerber, S Shaw: A whole blood mitogen assay for the assessment of immune function in the elephant seal. *Ninth Biennial Conference on the Biology of Marine Mammals, Chicago, December 1991.*
33. Shopp, GM, DA Clark, KA Galbreth, PM Gillespie, GJ Rosenthal: The immunotoxicity of succinylated concanavalin A (SCA). *Annual Society of Toxicology meeting, Seattle, 1992.*
34. Schuyler, M, K Gott, G Shopp: CD3-positive CD4-positive adoptively transfer experimental hypersensitivity pneumonitis, *Am Rev Respir Dis. 145(4 Part 2):A234. 1992.*
35. Schuyler, M, K Gott, G Shopp, L Crooks: CD3+, CD4+, CD8-, Ia- T cells adoptively transfer murine experimental hypersensitivity pneumonitis. *Chest 103:143S-145S, 1993.*
36. Hoffman, GM, GM Shopp: Subchronic (2-week) inhalation toxicity study of recombinant human interleukin-1 receptor antagonist (IL-1ra) in rats. *The Toxicologist 13:318, 1993.*
37. Suniga, MA, GM Shopp, D DuBay, DN Kitchen: A comparison of the toxicity of fibroblast growth factor (FGF): IV bolus versus IV continuous infusion. *The Toxicologist 13:318, 1993.*
38. Mercieca, MD, GM Shopp, SH Magness, CA Bellamy, CL Mercieca: Developmental toxicity study of interleukin-1 receptor antagonist (IL-1ra) in rats and rabbits. *The Toxicologist 13:79, 1993.*
39. Shopp, GS, DK DuBay, BS Chang: A model to test the skin reactivity of subcutaneously administered therapeutic proteins. *The Toxicologist 13:57, 1993.*
40. Mercieca, MD, GM Shopp, JP Stutz, SH Magness, CA Bellamy: Reproductive toxicity study in rats of interleukin-1 receptor antagonist. *The Toxicologist 14:161, 1994.*
41. Wyand, MS, ST Cornell, RM Doyle, DC Carraher, GM Shopp: A study to determine the effects of 3-day continuous IV infusion of interleukin-1 receptor antagonist (IL-1ra) on bacterial challenge in the rat. *The Toxicologist 14:358, 1994.*

42. Colagiovanni, DB, GM Shopp, MA Suniga, R Bogard, M Schulz: The effects of tumor necrosis factor binding protein (TNFbp) on host resistance on Sprague-Dawley rats. *The Toxicologist* 15:227, 1995.
43. Shopp, GM, MA Suniga, AM Bendele, WC Hall, AJ Sadler: The immunogenicity of a human protein drug (tumor necrosis factor binding protein; TNFbp) in animal toxicology studies. *The Toxicologist* 15:179, 1995.
44. Shopp, GM, WJ Leach, A Shaheen, N Dybdal, DJ Bates, C Gamba-Vitala, KA Reimann, I Szinai, DR Anderson: B-lymphocyte depletion in cynomolgus monkeys treated with an anti-CD20 antibody (C2B8). *The Toxicologist* 36:268, 1996.
45. Shopp, GM, GA Prawdzik, DC Bloedow, T Senn, RC Baxter, L Bravo, PJ Fielder: The hypoglycemic response and pharmacokinetics of IGF-I after 3 months treatment in normal rats. *Endocrinology Society meeting, Minneapolis, June, 1997.*
46. Shopp, GM, WJ Leach, AM Ryan, G Zorba: Delayed wound healing and altered ovary function in rabbits treated with a monoclonal anti-angiogenic antibody. *The Toxicologist* 42:54, 1998.
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