

WILLIAM SHAW, Ph.D.
DIRECTOR,
The Great Plains Laboratory, Inc. 1996-present
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Director of The Great Plains Laboratory for Health, Nutrition, and Metabolism, a laboratory specializing in the diagnosis and treatment of metabolic disorders of adults and children with diseases such as autism, PDD, hyperactivity, inborn errors of metabolism, and adult disorders such as depression and chronic fatigue. Dr. Shaw has presented information about his research throughout the world. Dr. Shaw has been the keynote speaker at the National Autism Society of America National Meeting, the National Meeting of the American Association for Environmental Medicine, the National Meeting of the American College for Advancement of Medicine, and has spoken to international groups about autism in the United Kingdom and the Netherlands, and Canada. Dr. Shaw has been actively involved with both the Defeat Autism Now and Cure Autism Now groups and is a board member of the National Academy for Child Development. In 1998, he published the book: **Biological Treatments for Autism and PDD.**

Children's Mercy Hospital, Kansas City, MO 64108 1991-1996

Director Clinical Chemistry, Endocrinology, Toxicology

RESPONSIBILITIES INCLUDE:

- Technical supervision of General Clinical Chemistry, Endocrinology, Toxicology Laboratories, and near patient testing activities.
- Development of a GC/MS screening method for organic acids excreted in a large number of inborn errors of metabolism.
- Maintenance of quality assurance program, new test development, consultation with medical staff concerning test selection and interpretation.
- Review of performance of supervisory personnel.
- Selection of equipment and planning of facilities for laboratory testing.
- Represent the laboratory on the Pharmacy and Therapeutics Committee, the Clinical Pharmacology Committee, and the Radiation Safety Committee of the hospital.

SIGNIFICANT ACCOMPLISHMENTS

- Development of a metabolic testing service for organic acids in which over 100 compounds are quantitated and a computerized spectral search is done in which 40 largest peaks are identified.
- Development of a new metabolic profile for the diagnosis of autism using newly discovered compounds in the urine of autistic children. (Clin. Chem. 41(8): 1094-1104).
- Our initial results indicate that these abnormal compounds are of fungal origin and that the clinical symptoms of autism can be improved by antifungal drug therapy. Findings were presented at the 1995 and 1996 National Meetings of the Autism society of America.
- Worked with several different departments to obtain CAP certification for the laboratory.
- Has been invited to present the research on autism to groups in numerous cities in the United States, Canada and Australia.
- Completed organic acid testing on 70 different strains of anaerobic bacteria in order to be able to determine contribution of microbial metabolites to pediatric diseases.

**SMITHKLINE BEECHAM CLINICAL LABORATORIES
Atlanta, Georgia**

1979 - 1991

Director, Forensic Toxicology and NIDA Director

1990 - 1991

Responsible for the management of a staff of 53 including 22 technical personnel and 30 administrative personnel involved in accessioning, client response, and security activities. Performed approximately 2000 drug tests per day with a 1990 budget of \$5.4 million.

Started laboratory and within the first year obtained profits of \$100,000. Projected profits for second year were \$4.5 million.

Led the staff through two rigorous NIDA inspections and through four Nuclear Regulatory Commission (NRC) audits which received high commendations from inspectors.

Increased productivity and efficiency through changing one set of confirmation tests from non-GC/MS to the GC/MS method.

Technical Manager, Immunology Department

1989 - 1990

Responsible for the development of a new immunology department and management of a staff of approximately 40, including 3 supervisors, and the development and control of a \$2.9 million budget.

The department consisted of 6 major service areas (Immunochemistry, Immunoserology, Immunohematology, Flow Cytometry, Steroid Receptors, and HLA/Paternity) and served as the referral center for esoteric immunology testing for sister laboratories. The department performed approximately 2,500 tests per day.

Implemented flow cytometry for lymphocytes for AIDS testing and DNA analysis of tumors as well as a research program for the use of DNA probe technology for paternity testing.

Started new department as a result of acquisition and made improvements in efficiency, which increased profits by 25%.

Developed and tested a new drug for the treatment of AIDS that was highly effective in in vitro tests.

Initiated and implemented the development of flow cytometry for AIDS testing including CD3, CD4, and CD8 cells which produced an added profit of \$1 million per year.

Developed a combination ERA/PRA/DNA analysis for patients with breast cancer and increased business through creating and writing promotional literature.

Started and implemented a project to add DNA probe technology to the standard paternity test.

Converted all blood-banking to microtiter trays to greatly reduce reagent costs and converted all immunoelectrophoresis over to the more efficient immunofixation.

Converted all specific protein tests to Beckman methodology to cut costs.

Technical Manager, Special Chemistry

and Immunoserology Departments

1982 - 1989

Responsible for the performance of a wide range of RIA tests (e.g., testosterone, androstenedione, LH, FSH, ACTH), specialized urine analyses (e.g., 17-OH glucocorticoids, VMA, metanephrines, catecholamines, pregnanediol, porphyrins), and estrogen and progesterone receptor analyses in breast tumors.

Additionally, tests for fetal well-being, such as estriol and L/S determination and genetic screening were performed. Managed a staff of 70 and was responsible for the development and control of a \$10 million budget.

Was responsible for viral and microbial serology as well as autoimmune testing such as ANA, anti ds-DNA, thyroid autoantibodies, anti-SM and RNP, and others.

Streamlined software for lipoprotein testing so that electrophoresis was not needed on 95% of samples. Developed a computer software program for ERA samples that automatically edited bad data points so that finished results were printed out.

Developed automated testing for HDL cholesterol.

Developed expertise and consulted with physicians on every type of problem and clinical disease conditions, as well as on which tests were needed.

Wrote service manual on the use of specialty endocrine tests and on specialty tests for psychiatric diseases for use by the entire company.

Wrote a paper on the biochemical basis of Reye's syndrome and crib death described by experts in the field as one of the most creative papers ever published in Clinical Chemistry.

Wrote and published an article indicating that elevated phospholipase was implicated in the etiology of schizophrenia. Subsequent research in Germany confirmed predictions. The discovery could lead to new treatment for schizophrenia and new drug therapies.

Assistant Director
Toxicology Department

1978 - 1982

Supervised the toxicology department which employed 70 medical technologists and chemists in a 24-hour-a-day, seven-days-a-week toxicology service for both therapeutic drug monitoring and drug screening including emergency toxicology.

The size of the staff, laboratory space, number of tests offered, and equipment made it the largest commercial toxicology service in the Southeast. The department performed 200 different tests and had a sample load of approximately 50,000 tests per month.

Responsible for supervision and training of personnel, trouble-shooting methods, instrument maintenance, implementation of quality control procedures, conferring with physicians and other medical personnel on interpretation and selection of appropriate tests for emergency toxicology and therapeutic drug monitoring, providing expert witness testimony, and development of new methods.

Laboratory instrumentation experience includes gas chromatography mass spectrometry-computer,

several high-performance liquid chromatographs, atomic absorption spectrophotometers, flame ionization and nitrogen detector gas chromatographs, anodic stripping instrumentation, fluorometers, spectrophotometers, two different centrifugal analyzers, and scintillation counters.

Adapted EMIT (enzyme immunoassay) procedures to centrifugal analyzers using special adaptations to reduce cost and improve efficiency, trained and educated the staff to improve accuracy and precision in drug screening, and helped organize work schedules and work stations to maximize efficiency and to distribute the work load evenly over all shifts.

**CENTERS FOR DISEASE CONTROL
Atlanta, Georgia**

1971 - 1978

**Supervisory Research Chemist
Nutritional Biochemistry and Endocrinology**

Served as chief of the radioimmunoassay laboratory and directed development of reference methods for radioimmunoassays, such as thyroxine and digoxin. Techniques used include radiolabeling, preparation of antigenic conjugates, and titering of antisera. Important theoretical work was the development of the mathematical basis for the treatment of RIA data. The digoxin method developed was used as the national reference method for digoxin.

Purified thyroid binding proteins using protein purification techniques such as column chromatography, polyacrylamide gel electrophoreses, equilibrium dialysis, and immunonephelometry.

In the nutritional biochemistry section, directed research on nutritional and clinical biochemistry methods and service work on folic acid, vitamin B12, iron, magnesium, iodine, thiamine, and proteins in the body fluids using both automated and manual instrumentation.

Gained experience in clinical chemistry instrumentation such as autoanalyzers, spectrophotometers, fluorometers, atomic absorption, electrophoresis, gas chromatography, and scintillation counters.

**MERCER UNIVERSITY
Atlanta, Georgia**

1978 - 1979

Assistant Professor, School of Pharmacy

OTHER RELATED EXPERIENCE

Served as a member of the Toxicological Chemistry Certification Examination Committee of the American Board of Clinical Chemistry to prepare examinations for board certification in toxicology.

Served as an expert witness for the City of Atlanta in a wrongful death case involving alleged pesticide poisoning and in a large number of cases for both prosecution and defense cases involving illegal drug abuse.

Served as a forensic expert in court cases involving paternity testing using blood typing, HLA, and DNA gene probes.

William Shaw PhD

Performed court-directed tests for illegal drugs at the Georgia State Crime Laboratory as a recognized expert for defense counsel.

Acted as a laboratory director or as a consultant for 4 other client laboratories for approximately 5 years.

Have served as an expert witness in numerous cases involving drug and/or alcohol related issues in both civil and criminal cases for both defense and prosecution.

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

American Association of Clinical Chemistry
Atlanta Chromatography Discussion Group
Clinical Chemists of Georgia
Cure Autism Now
Defeat Autism Now
Autism Society of America

HONORS

N.D.E.A. Fellowship (Medical University of South Carolina)
N.D.E.A. Fellowship (Montana State University)
Seton Hall University Scholarship
South Carolina State Traineeship

EDUCATIONAL BACKGROUND

Medical University of South Carolina, Charleston, South Carolina Ph.D. Biochemistry, Genetics and Physiology	1971
University of Georgia, Athens, Georgia B. S., Biology and Chemistry	1967

Ph.D. DISSERTATION

The evaluation of the teratogenic effects of folic deficiency on pregnant mice and the evaluation of the biochemical effect of maternal folate deficiency on postnatal development of DNA metabolism in the central nervous system.

OTHER EDUCATION PREPARATION

Attended training courses in pesticide chemistry, industrial hygiene chemistry, environmental medicine, radiation safety, gas chromatography, and mass spectra interpretation. Recently completed graduate course in health care systems.

CERTIFICATIONS/CREDENTIALS

American Board of Clinical Chemistry - Toxicological Chemistry
(Board Certified) -#36
American Board of Clinical Chemistry - Clinical Chemistry

(Board Certified) - #634

PATENTS

1. Shaw, William. US Patent No. 5,686,311. Diagnosis of autism and treatment therefor. Awarded November 11, 1997.

GRANTS AWARDED

1. Shaw, W., Luxem, M., Chaves, E. Autism and yeast infection: the role of urine organic acids in the diagnosis and treatment of autism. Funded January 1995 by a grant from the Katherine B. Richardson Foundation (\$9,700), Pfizer Pharmaceuticals (\$30,000), and a \$10,000 donation from the parents of an autistic child.
2. Shaw, W. Development of a biochemical profile to assess disorders of fat metabolism in sudden infant death syndrome. Katherine B. Richardson Grant. Fall 1992. \$4,700.
3. Klem, S., and Shaw, W. Serum phospholipase A activity in children. Katherine B. Richardson Grant. Fall 1992. \$4,000.
4. Kilbride, H., and Shaw, W. Evaluation of threshold levels for determination of fetal cocaine exposure. Katherine B. Richardson Grant. Fall 1992. \$3,375.

PUBLICATIONS

Abstracts and papers presented at meetings

1. Shaw W. Role for certain yeast and bacteria byproducts discovered by organic acid testing in the etiology of a wide variety of human diseases. American College for Advancement of Medicine Fall Convention. Anaheim, CA. November 1997.
2. Shaw W. Exciting evidence to support a potential role for certain yeasts and bacteria in the etiology of autism and other neurological disorders. 31st Annual Meeting of the American Academy of Environmental Medicine. Boston, MA, October 1996.
3. Shaw, W and Chaves, E. Experience with organic acid testing to evaluate abnormal microbial metabolites in the urine of children with autism. Keynote address. Published in The Proceedings of the Autism Society of American National Conference on Autism. Milwaukee, WI, 1996.
4. Shaw, W., Chaves, E., and Luxem, M. Abnormal urine organic acids associated with fungal metabolism in urine samples of children with autism: preliminary results of a clinical trial with antifungal drugs. Published in The Proceedings of the Autism Society of America National Conference on Autism. Greensboro, NC, July 1995.
5. Shaw, W. Organic acid testing: abnormal metabolites in the urine of children may assist in the diagnosis of, and therapies for autism. Presented at the Autism Society of America National Conference on Autism, Las Vegas, NV, July 1994.
6. Kilbride, H., Castor, C., and Shaw, W. Perinatal history does not adequately identify fetal drug exposure. Accepted for presentation at the Midwest Pediatric Research meeting, January 1994.
7. Kilbride, H., Castor, C., and Shaw, W. Diagnostic Products Corporation Radioimmunoassay is more sensitive than enzyme multiplied assay technique for screening meconium for fetal cocaine exposure. Accepted for presentation at the Midwest Pediatric Research Meeting. January 1994.
8. Shaw, W., Kassen, E., and Overman, J. Metabolic testing of Sudden Infant Death Syndrome Cases: Evidence for Fumaric Acidemia as a New Cause of SIDS. Presented at the National Meeting of the Society of Forensic Toxicologists, Phoenix, Arizona, October 1993.
9. Kilbride, H., Castor, C., and Shaw, W. Threshold for Identifying Cocaine Metabolites in Infant Meconium. Presented at the Midwest Pediatric Research Meeting. November 1992.
10. Shaw, W., Powell, M., and Bayse, D. The influence of serum albumin concentration on fatty acid

- interference in the radioimmunoassay for serum digoxin. Presented at the 29th National Meeting of the American Association of Clinical Chemistry, Chicago, Illinois (1977).
11. Shaw, W., Hubert, I. L., Powell, M., and Spierto, F. W.. Interference of fatty acids in the competitive protein binding assay for serum thyroxine. Presented at the 28th National Meeting of the American Association of Clinical chemistry, Houston, Texas (1976).
 12. Shaw, W., Smith, J., and Spierto, F. W.. Interpretation and RIA quality control use of parameters with six different data reduction methods. Presented at the 28th National Meeting of the American Association of Clinical Chemistry, Houston, Texas (1976).
 13. Spierto, F. W., Knight, M., Smith, J., and Shaw, W. A comparison of inter and intralaboratory performance of four common radioimmunoassay procedures. Presented at the 28th National Meeting of the American Association of Clinical Chemistry, Houston, Texas (1976).
 14. Smith, J., Shaw, W., and Spierto, F. W. A comparison of several transformations for thyroxine radioassay data. Presented at the 28th National Meeting of the American Association of Clinical Chemistry, Houston, Texas (1976).
 15. Shaw, W. The importance of the order of addition of reagents to the T4 radioassay. Presented at the Florida Section meeting of the American Association of Clinical Chemistry, Tampa, Florida (November, 1974).
 16. Shaw, W., Hubert, I. L. and Spierto, F. W. Thyroxine competitive binding radioassay (CBR): Marked advantages of the new "Case A" CBR system over conventional "Case C" CBR systems. Presented at the 26th National Meeting of the American Association of Clinical Chemistry, Las Vegas, Nevada (August, 1974).
 17. Slade, B., Harrison, J., and Shaw, W. The assay of folic acid in serum by *L. casei* assay and by competitive protein-binding radio-assay. Presented at the 25th National Meeting of the American Association of Clinical Chemistry, New York, New York (1973).
 18. Shaw, W., Harrison, J., and Slade, B. Factors involved in the assay of folic acid in serum by microbiological assay. Presented at the Southeast Meeting of the American Association of Clinical Chemistry (October, 1972).
 19. Shaw, W., and Zemp, J.W. 1971 Effects of maternal folate deficiency on some aspects of neonatal brain development. Federation Proceedings 30(2): Abstract No. 260.

Books

1. Spierto, F. W., Knight, M., and Shaw, W. 1977. The role of federal testing programs in external and internal quality control of clinical radioassay. *In* Quality Control in Nuclear Medicine. Mosby Co., St. Louis, Missouri.
2. Nino, H.W., and Shaw, W. 1976. "Nutritional Biochemistry". *In* Fundamentals of Chemistry, Second Edition. W.B. Saunders Co., Philadelphia, Pennsylvania.
3. Shaw, W., Rimland, B., Seemon, B., Scott, P., and Seroussi, K. 1998. Biological Treatments for Autism and PDD. Sunflower Press. 9335 W 75 Overland Park, KS. 913 341-8949.

Articles

1. Shaw, W., Kassen, E., and Chaves, E. Assessment of antifungal drug therapy in autism by measurement of suspected microbial metabolites in urine with gas chromatography-mass spectrometry. *Clinical Practice of Alternative Medicine*: 15-26,2000.
2. Shaw, W., Kassen, E., and Chaves, E. 1995. Increased urinary excretion of analogs of Krebs cycle metabolites and arabinose in two brothers with autistic features. *Clin. Chem.* 41(8): 1094-1104.
3. Shaw, W. 1988. Possible synergistic effects of nonesterified fatty acids and lysolecithins, a toxic methionine metabolite, and ammonia in the production of hepatic encephalopathy and schizophrenia.

- Orthomolecular Medicine 3: 87.
4. Shaw, W. 1985. Possible role of lysolecithins and nonesterified fatty acids in the pathogenesis of Reye's syndrome, sudden infant death syndrome, acute pancreatitis, and diabetic ketoacidosis. Clin. Chem. 31:1109.
 5. Shaw, W., Long, G., and McHan, J. 1983. High performance liquid chromatography method for clonazepam in serum. J. Anal Tox 7:119.
 6. Shaw, W. 1982. Theoretical and mathematical conditions of use of linearization methods for saturation-type radioassay data. Clin. Chem. 28(5): 1196.
 7. Shaw, W. And McHan, J. 1981. Adaptation of EMIT procedures for maximum cost effectiveness of two different centrifugal analyzer systems. Therapeutic Drug Monitoring 3:185.
 8. Hubert, I.L., Shaw, W., and Spierto, F.W. 1977. Factors affecting T3 and T4 proficiency testing. Amer. J. Med. Tech. 43:329.
 9. Shaw, W., Smith, J., and Spierto, F.W. 1977. Linearization of data for saturation-type competitive protein binding assay and radioimmunoassay. Clin. Chim. Acta 76:15.
 10. Spierto, F.W., and Shaw, W. 1977. Problems affecting radioimmunoassay procedures. CRC Critical Reviews in Clinical Laboratory Science 7:365.
 11. Shaw, W., Powell, M.K., Hubert, I. L., and Spierto, F. W. 1976. A comparison of the interference of fatty acids in the competitive protein binding radioassay and radioimmunoassay for serum T4. Clin. Chim. Acta 73:25.
 12. Shaw, W., Hubert, I. L., and Spierto, F. W. 1976. Optimization of T4 assay: A model study. Clin. Chim. Acta 76:15.
 13. Shaw, W., Hubert, .L., Skelley, D., and Spierto, F. W. 1975. Improvement of serum thyroxine competitive binding radioassay by kinetic analysis. Centers for Disease Control. Proficiency Testing Branch Publication.
 14. Spierto, F. W., Hubert, I. L., and Shaw, W. 1974. An interlaboratory and intralaboratory comparison of T4 methodologies. Clin. Chim. Acta. 56:28.
 15. Slade, B., Harrison, J., and Shaw, W. 1974. Effect of incubation time on folate values. Amer. J. Clin. Path. 61:74.
 16. Shaw, W., and Bailey, G. 1974. Evaluation of two vitamin B12 assay kits and L. Leishmanni bioassay. Clin. Biochem. 7:320.
 17. Shaw, W., Slade, B., Harrison, J., and Nino, H. 1974. Assay of serum folate: Differences in serum folate values obtained by L. casei bioassay and competitive protein-binding assay. Clin. Biochem. 7:165.
 18. Harrison, J., Slade, B., and Shaw, W. 1973. Relationships among the urinary aminoimidazole-carboxamide in urine and folate, and vitamin B12 concentrations in serum. Clin. Chem. 19:1049.
 19. Shaw, W., Schreiber, R., and Zemp, J. 1973. Perinatal folate deficiency:effects on developing brain in C57 BL/6J mice. Nutr. Reports Int. 8:229.
 20. Schreiber, R., Shaw, W., and Zemp, J. 1973. The effects of folic acid deficiency on some aspects of development in DBA/2J and C57BL/6J mice. Nutr. Reports Int. 8:229.

Letters

1. Friesen, C., Bauer, M., Shaw, W., Burry, V., and Roberts, C. 1994. Urinary 5-HIAA unrelated to cystic fibrosis. Chest 106:1309.
2. Shaw, W. 1975. Albumin interference on digoxin radioimmunoassay. Clin. Chem. 21:636.
3. Shaw, W. 1974. Blood 43:312.
4. Shaw, W., 1974. Folate radioassay. Clin. Chem. 20:87.
5. Shaw, W., 1973. Radioassay of serum folate: some criticisms. Clin. Chem. 19: 281.

