Introduction to ChromaDex Spherix Consulting

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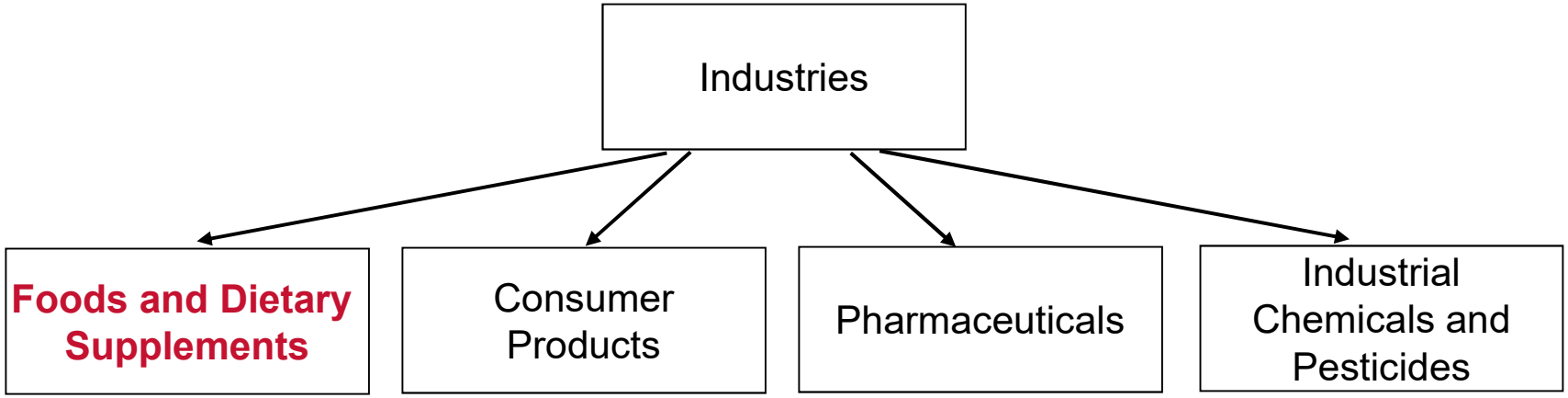
A Full Complement of Services to Support the Food and Drug Industry

- **Regulatory Support**
  - Safety evaluation
  - Product approval
  - Claim evaluation and substantiation
- **Pre-Clinical/Clinical Study**
  - Design, placement, and oversight
  - Report writing and publication
- **Product Stewardship**
  - Risk assessment, management and communication

Industry Sectors We Serve



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Food Industry Services

- **Foods**
  - Generally Recognized As Safe (GRAS)
  - New Dietary Ingredient Notifications (NDIN)
  - Food Additive Petitions
  - Novel Food Dossier
  - Health Claim and Structure/Function Claim Substantiation
  - USDA Petitions
- **Food Contact Substances (Notification)**
- **Animal Feed (GRAS Notifications, Food Additive Petitions, and AAFCO Submissions)**

Our Staff Can Assist with Safety Assessments and Regulatory Submissions Worldwide

- **United States**:
  - GRAS Notifications to FDA (www.accessdata.fda.gov/scripts/fcn/fcnNavigation.cfm?rpt=grasListing):
    - GRN# 44, 67, 77, 78, 94, 118, 119, 130, 140, 164, 196, 233, 236, 268, 275, 326, 334, 453, 454, 455, 464, 465, 496, 576, 635, 652, 721
  - GRAS Self-Determinations ► 70+
  - Citizen Petition (GRAS dossier for plant stanol esters)
  - USDA submissions for antimicrobial use: lauramide arginine ethyl ester (LAE; also GRAS 164) and lactoferrin (also GRAS 130)
  - Food Additive approval for glycerol ester of gum rosin (21 CFR 172.735)
  - New Dietary Ingredients: probiotics, polyphenolic extracts, aids used to increase high-intensity athletic performance, vitamins

Our Staff Can Assist with Safety Assessments and Regulatory Submissions Worldwide

- **International**:
  - Food Additive submissions to Canada, European Union, Asia, Latin America, and Africa
  - Novel Food submissions and Substantial Equivalence notifications to the European Union and Canada
  - Submission to JECFA

Diverse Product Experience

- **We have experience with ingredients having complex chemistries, including:**
  - Complex carbohydrates and sweeteners
    - Galacto-oligosaccharides
    - Tagatose
    - Stevia
    - Dietary fibers
  - Lipophilic compounds
    - Docosahexaenoic acid (DHA) and Arachidonic acid (ARA) (GRAS and Novel Food)
    - Emulsifiers

Diverse Product Experience (continued)

- Proteins
  - Milk-derived proteins and fractions
  - Enzymes
  - Fermentation products
  - Bioactive peptides
- Prebiotics and Probiotics
  - Inulin
  - *Bifidobacterium longum* BB536
- Botanicals and Natural Products
  - Edible species-derived extracts
- Recombinant Products
  - Flavr-Savr tomato

Diverse Product Experience (continued)

- Antimicrobials
  - Bovine milk-derived lactoferrin raw carcass spray
  - Lauramide arginine ethyl ester (LAE)
  - Global (EU, Latin America, Africa, Canada) food additive petition submissions for 4 antimicrobial products for use in beverages
- Bacteriophages
  - For antimicrobial use in poultry processing
- Products for Animal Use
  - *Feed Additives*
  - Companion animal use (joint health)
    - Feed use in animals (enhancing feed efficiency)
  - *Veterinary medical device*
    - Plug for prevention of mastitis in cows

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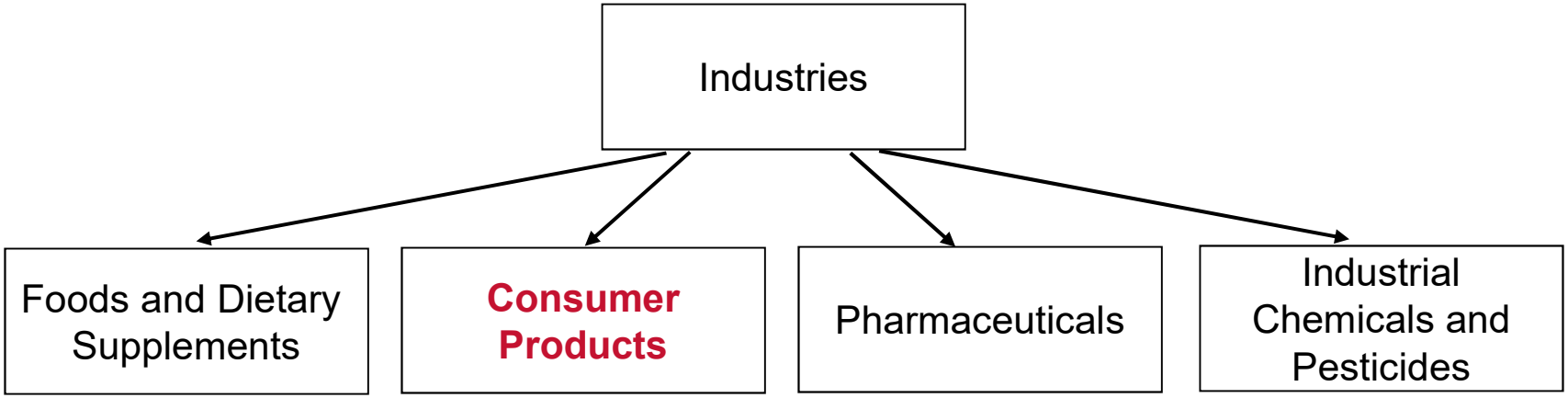

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Consumer Products Services

- **Regulatory Review**
  - We help helps client assess their product compliance with current and emerging scientific and regulatory guidance (FDA; EPA; Proposition 65; EU, including the 7th amendment to the cosmetic directive)
- **Product Liability Assessment**
  - We help develop a Product Stewardship program to insure appropriate guidance for sourcing of ingredients and for manufacturing of the product. We are available to help defend the safety of a product in litigation

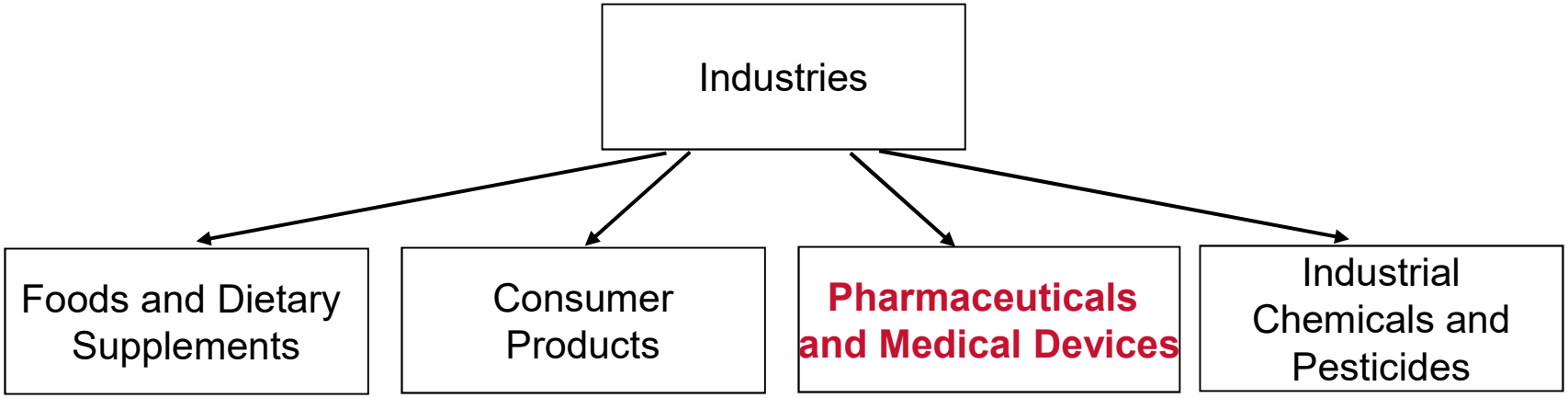
Consumer Products Services (continued)

- **Safety Evaluation**
  - Screening for adverse health effects:
    - Potential health risks related to employee and/or consumer exposure to consumer products are evaluated
  - Safety evaluation:
    - Unresolved issues and uncertainties in the available data are identified, and a recommendation is developed about the safety of the ingredient and the potential risk of the product during various points in its life cycle (use, misuse, disposal/recycling) is determined
  - Analytical, pre-clinical, and clinical study support:
    - Design, placement, and monitoring of studies
    - Results analysis and finalizing study reports

Consumer Products Services (continued)

- **Global Cosmetic Ingredient Services:**
  - Cosmetic health risk, safety and exposure assessments
  - Preparation and assessment of cosmetic ingredient data
  - Safety reports for ingredients including safety testing procedures, study placement and monitoring of necessary safety studies (*in vitro* and *in vivo*)
  - Production and supply chain strategies
  - INCI ingredient labeling needs
  - US, California (SB484), Canadian and EU Cosmetics Regulation Compliance Services

Industry Sectors We Serve



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Pharmaceutical Industry Support

- **Our scientific and regulatory consultants assist clients involved in drug development within the pharmaceutical industry with risk-based strategies**
- **We complete due diligence assessments in the drug development process to identify gaps in scientific and regulatory compliance**
- **Our extensive experience in Regulatory Submissions ensures that filings are submitted with the highest level of detail and quality**
- **In addition, we have the strong capabilities in Validation and Qualification Services**

A Full Complement of Services to Support The Food and Drug Industry

- **Product Stewardship**
  - Risk assessment, management and communication
- **Pre-Clinical/Clinical Study**
  - Design, placement, and oversight
  - Report writing and publication
- **Regulatory Support**
  - Safety evaluation
  - Product approval
  - Claim evaluation and substantiation
- **Due Diligence Assessments**

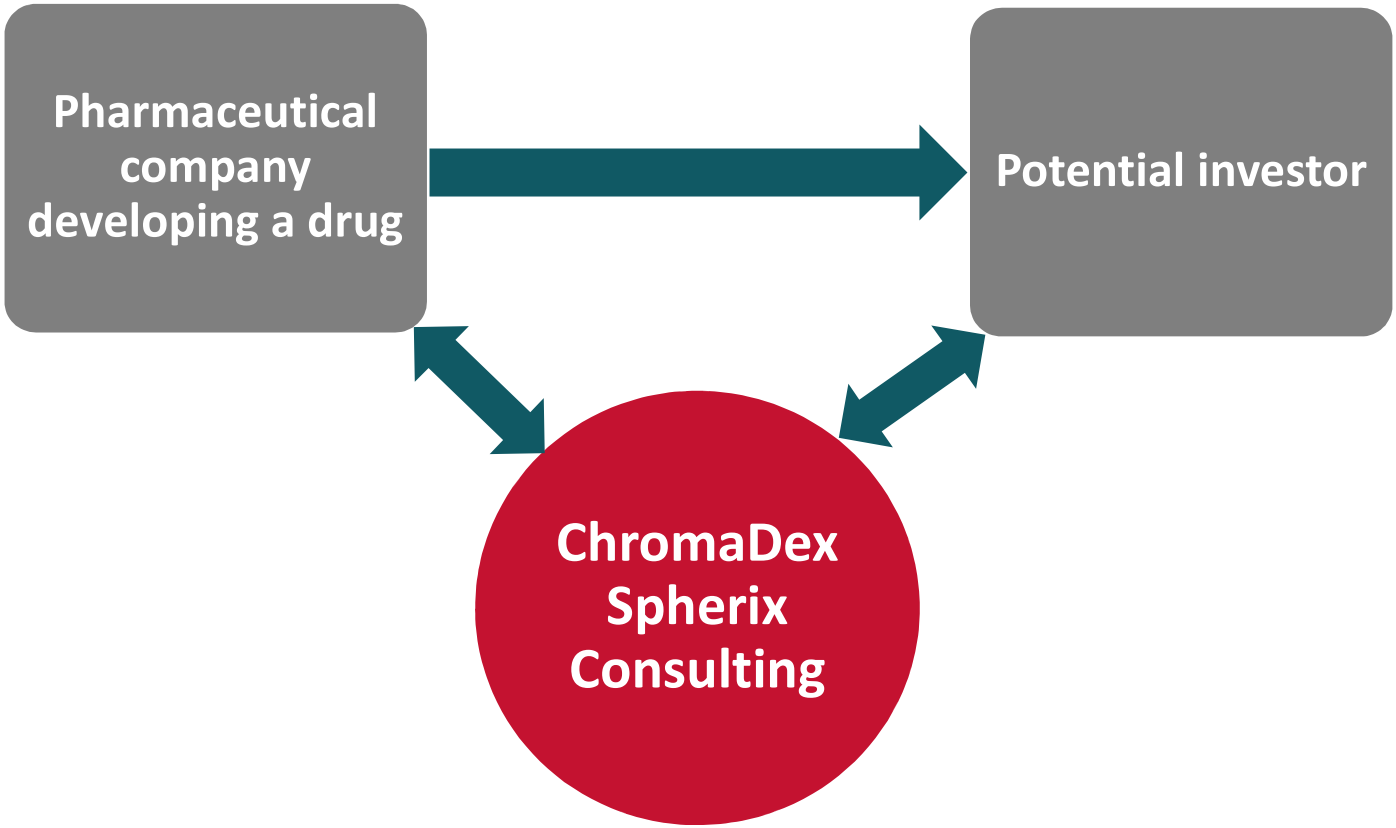
Pharmaceutical Industry Support

- **Study Design and Oversight**
  - Toxicology and Pharmacology
  - Chemistry, Manufacturing and Controls
  - Process Analytical Technologies
  - Clinical Trials (Phase I-IV)
- **Regulatory Filings**
  - Investigational New Drug Application (IND)
  - New Drug Application (NDA) and Abbreviated New Drug Application (ANDA)
  - Combination Products
  - Drug Master Files
- **Compliance Planning and Strategy**
- **Manuscript and Report Writing**
- **Scientific and Regulatory Due Diligence Assessments in support of Merger and Acquisition**

Medical Device Industry Support

- **Regulatory Filings**
  - 510(k)
  - Investigational Device Exemption (IDE)
  - Premarket Approval (PMA)
- **Scientific and regulatory due diligence**
- **Class I, II, and III devices**
- **Substantial equivalence determinations**
- **Material specifications**
- **Standard test methods and guides**
- **Biocompatibility**
- **Risk analysis**
- **FDA CDRH compliance master planning and strategy**
- **Quality review and design review**

Our Role in Due Diligence



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Our Capabilities

- **Due Diligence Assessments**
  - Regulatory Filings
    - IND
    - NDA/ANDA
    - 510(k)
    - PMA
  - Compliance Master Planning and Strategy
  - Regulatory Actions
  - Quality Review and Design Review
  - Validation

Due Diligence Assessments

- **For IP, Product, and Business Acquisitions**
  - Scientific Status and Risks
  - Regulatory Status and Risks

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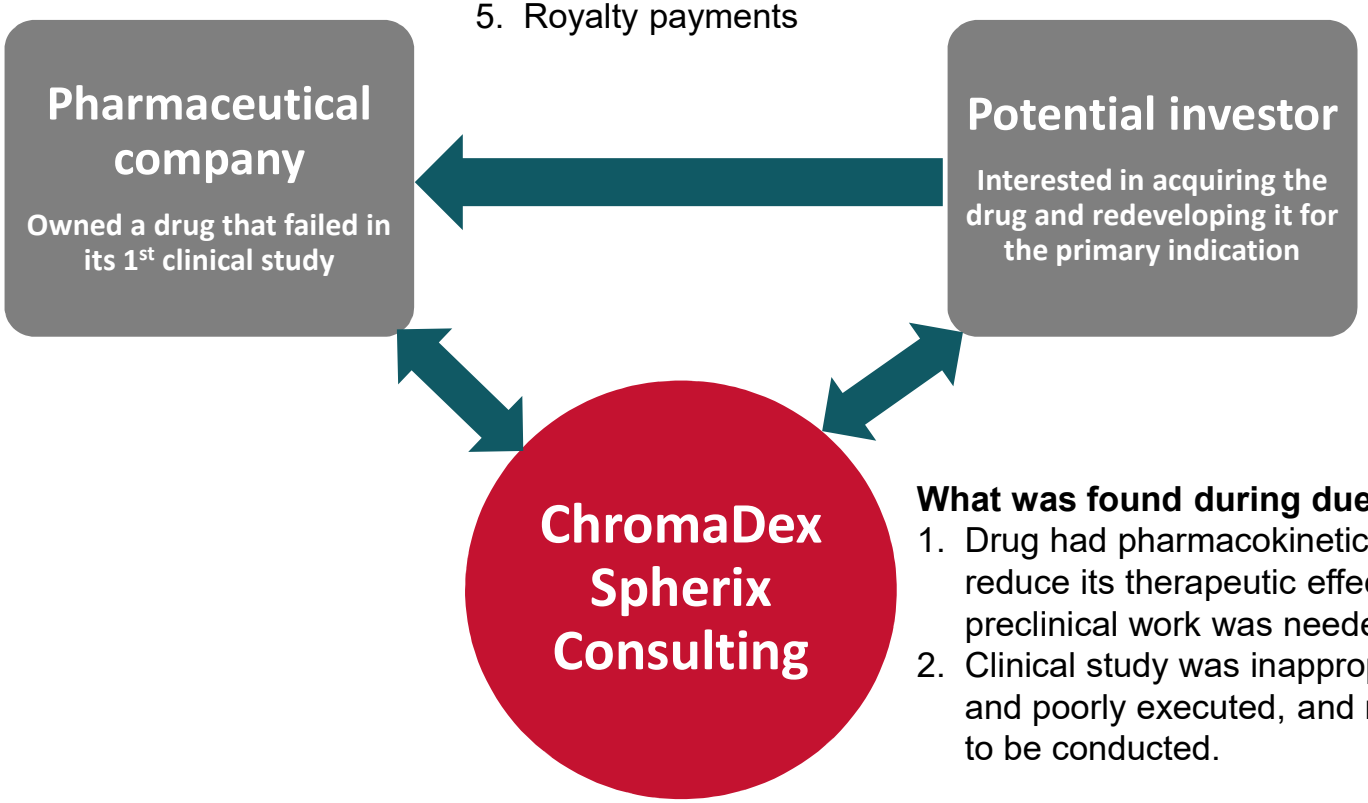
Example 1: In-licensing Opportunities

License Terms:

1. $1 M up-front
2. 50% of the share in the investors company.
3. $44 M total R & D payments
4. Payment for commercial milestones
5. Royalty payments



What was found during due diligence:

1. Drug had pharmacokinetic issues that would reduce its therapeutic effect. Subsequent preclinical work was needed.
2. Clinical study was inappropriately designed and poorly executed, and new study needed to be conducted.

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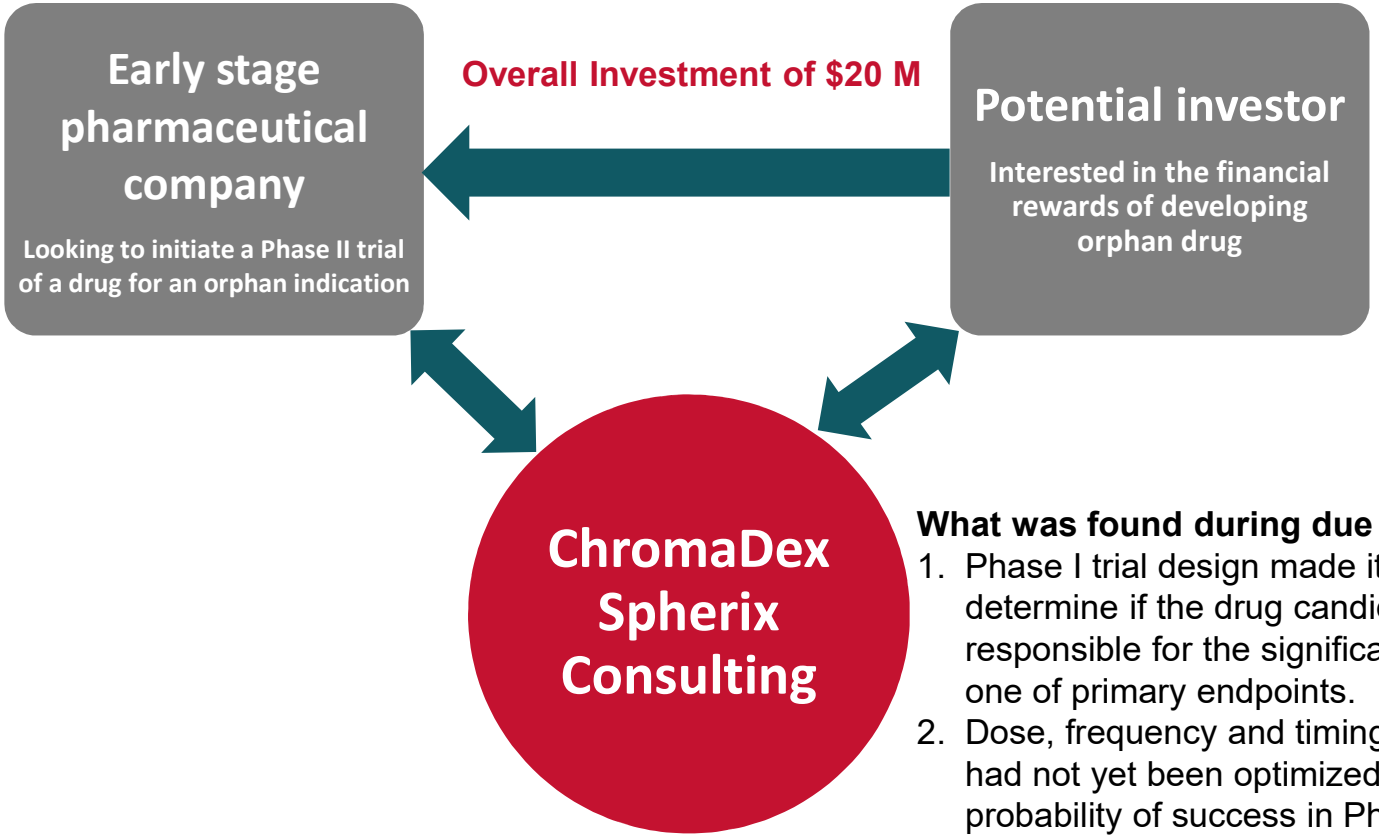
Example 2: Investment Opportunities



What was found during due diligence:

1. Phase I trial design made it very difficult to determine if the drug candidate was responsible for the significant effect seen in one of primary endpoints.
2. Dose, frequency and timing of administration, had not yet been optimized to increase probability of success in Phase II trial needed to qualify the drug for Fast Track approval or Breakthrough Therapy designation.

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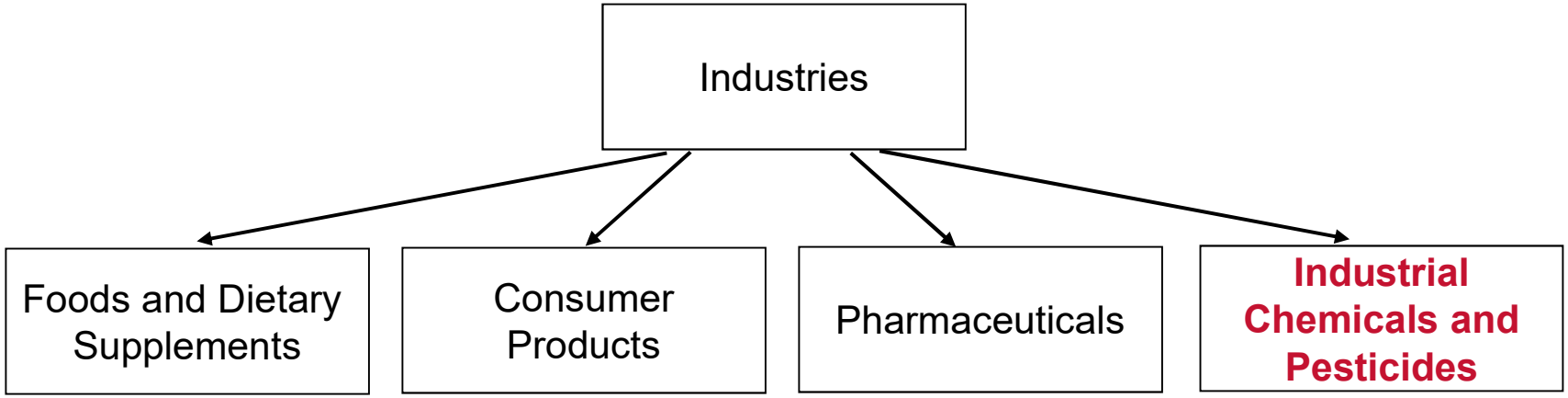

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Industrial Chemicals and Pesticides Services

- **We assist clients with fulfilling data needs and submitting application packages to the EPA for all categories of pesticides: antimicrobials, biopesticides and conventional, including bactericides, baits, fungicides, genetically modified organisms (GMOs) or biological pesticides, herbicides, insecticides, lures, rodenticides and repellents**

- **We advise clients on the appropriate regulatory path and submission requirements, due to differing data requirements**

Key Staff

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The ChromaDex Spherix Consulting Team

- **US Based**:
  - Claire Kruger, PhD, DABT
  - Dietrich Conze, PhD
  - Jennifer Symonds, PhD
  - Fred Lozy, PhD
  - Sarah Morgan, PhD
  - A. Wallace Hayes, PhD, DABT
  - Troy Rhonemus, MS
  - Amy Boileau, PhD, RD
  - Robert Lodder, PhD
  - Roger Clemens, PhD, CNS
  - Thomas Sox, PhD, JD
  - Peter Pressman, MD, MS, FACN
- **International**:
  - John Howlett, BSc – EU
  - Dieter Schrenk, MD, PhD – EU
  - Silvia Berlanga de Moraes Barros, PhD – Latin America
  - Govinder Flora, PhD – India
  - Joe Zhou, PhD – China
  - Tetsuo Satoh, PhD – Japan

Staff Expertise

- Toxicology/risk assessment
- Food safety
- Process engineering and biotechnology
- Organic and analytical chemistry
- Natural products chemistry
- Nutrition sciences
- Botanical/dietary supplements
- Immunology
- Cell and molecular biology
- Pharmacology

Worldwide Locations

ChromaDex
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Claire L. Kruger, PhD, DABT
President

Dr. Claire Kruger is a toxicologist with more than 30 years of consulting experience. Her primary area of expertise is in foods, consumer products and pharmaceuticals, where she provides scientific, regulatory, and strategic support to clients in both the US and international regulatory arenas. She has conducted toxicity evaluations of food contaminants, as well as health risk assessments and exposure assessments of drugs, cosmetics, and pesticides. Her clients include food, drug, and dietary supplement manufacturers, agricultural producers, biotechnology companies, trade associations, and law firms.

Dietrich Conze, PhD
Director of Pharmaceutical Development

Dr. Conze received his Ph.D. from the Cell and Molecular Biology Program at the University of Vermont where he discovered the isoform specific roles of a family of serine/threonine kinases in T cell differentiation and adaptive immunity, and identified that cytokines can induce multi-drug resistance in cancer cells. He then continued his scientific pursuits as a Postdoctoral Fellow in the Laboratory of Immune Cell Biology at the National Cancer Institute. At NCI, he discovered the roles of linkage-specific polyubuiquitin chains in innate immune receptor-induced activation of the transcription factor NF-κB and the physiological role of a family of enzymes involved in protein ubiquitination in B cell homeostasis. He has more than 15 years of experience conducting scientific research and has authored and contributed to a wide variety of peer-reviewed publications.

Jennifer Symonds, PhD
Staff Science Consultant

Dr. Symonds received her B.S. in Biomedical Engineering from the University of Iowa, and her Ph.D. in Cancer Biology from the University of Colorado Denver. There, she participated in a translational sciences program designed to stimulate interactions between clinicians and scientists. During this program, she observed the process for drug approval and the complexity of regulatory reports and their value for human clinical trial studies. Dr. Symonds then continued her scientific pursuits as a Postdoctoral Fellow at the National Institute of Craniofacial and Dental Research (NIDCR), National Institutes of Health. At NIDCR, Dr. Symonds reviewed manuscripts for peer-review journals; and designed and executed two research projects featuring extensive use of genetically engineered mouse models and ex vivo culture.

Fred Lozy, PhD
Staff Science Consultant

Dr. Lozy received his B.S. in Biotechnology and his Ph.D. in Cell and Development Biology from Rutgers University. During his doctoral research, he worked at the Rutgers Cancer Institute of New Jersey studying the interaction of autophagy and HER2+ breast cancer and conducted preclinical studies on autophagy inhibitors to improve efficacy of HER2+ breast cancer targeted therapy. Dr. Lozy continued his postdoctoral training at the National Human Genome Research Institute (NHGRI) of the National Institutes of Health (NIH) studying the biochemical effects of mutations in the ubiquitin proteasome pathway in aggressive endometrial cancer. He has been a peer reviewer for scientific journals and has contributed to many scientific papers, reviews, and book chapters. Dr. Lozy was also selected to take part in the Translational Science Training Program at NIH, which encompassed preclinical and clinical studies, drug development, and IND applications.

Sarah Morgan, PhD
Staff Science Consultant

Dr. Morgan received her B.S. in Chemistry from Lehigh University and her Ph.D. in Molecular Medicine from the University of Maryland Baltimore. During her doctoral research, she studied the molecular mechanisms responsible for the efficacy and adverse effects associated with current asthma therapies. Dr. Morgan continued her scientific training as a Postdoctoral Fellow in the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institutes of Health (NIH), where she studied the regulation of normal thyroid function and its alteration in cancer and autoimmune diseases. This work included contributing to the development and characterization of novel small molecule drugs directed at the thyroid-stimulating hormone receptor. While at the NIH, Dr. Morgan also participated in extensive training on pharmacology and toxicology, including the design and evaluation of preclinical and clinical studies, drug development, and IND/NDA applications.

A. Wallace Hayes, PhD, DABT, FATS, ERT, CNS, FACN
Senior Science Advisor

Dr. Hayes is a toxicologist with over 40 years of experience in industry and academics. He provides strategic, scientific and regulatory guidance. Dr. Hayes also holds an appointment with Harvard School of Public Health as a Visiting Scientist and with the School of Public Health, University of Massachusetts, Amherst as a Research Professor. Previously, Dr. Hayes held the position of Vice President and Corporate Toxicologist for RJR Nabisco with responsibility for all regulatory and toxicology issues related to the safety of ingredients and food contact substances for food and drink products worldwide and as the director, Toxicology Laboratory and Global pesticide Regulatory Affairs, Rohm Haas. Dr. Hayes has served on the CTFA Research Council, addressing issues related to flavors and fragrances. Dr. Hayes has interacted with regulatory bodies worldwide including Canada, Japan, South Korea, EU and Latin America as well as the US FDA. the US EPA and the US DOD.

Troy Rhonemus
Executive Vice President, ChromaDex

Mr. Troy Rhonemus has extensive experience in managing operations and supply chain, business strategies, and the roll-out of new processes, technologies and products. Mr. Rhonemus provides ongoing strategic and scientific guidance to our clients to improve the supply chain management of raw materials to meet FDA regulation by developing supply chain strategies, auditing manufacturers, and assisting in the management of suppliers from countries outside the US.

Amy Boileau, PhD, RD
Vice President, R&D, ChromaDex

Dr. Boileau, a registered dietitian, received her Ph.D. in Nutrition Sciences from the University of Illinois, Urbana-Champaign. She has more than 15 years of food industry and healthcare experience, and her primary areas of expertise include infant formula and medical foods regulatory affairs, low-calorie sweeteners, and nutritional biochemistry. Dr. Boileau provides scientific leadership to accelerate market advancement of ChromaDex's products in the US and internationally through the creation, facilitation and communication of scientific information and studies, education and the development and engagement of key opinion leader relationships. She will also support the development of regulatory dossiers as well as coordinate preclinical and clinical research.

Robert A. Lodder, PhD
Professor, University of Kentucky

Dr. Lodder serves as a consultant to ChromaDex Spherix Consulting and is also a professor of Pharmaceutical Sciences at the College of Pharmacy, University of Kentucky Medical Center. Dr. Lodder has served on several NIH study sections and in NSF, NIH and DARPA workshops. He was appointed by the Food and Drug Administration to serve on their Process Analytical Technologies (PAT) subcommittee, which aims to revolutionize the pharmaceutical industry by replacing the GMP standards under which drugs have been released for the past 40 years with new, science-based PAT methods. Dr. Lodder has conducted mathematical studies aimed at solving the "false-sample" problem in thought-like operations on parallel processors. The results of these studies have been applied to a number of different analytical problems, including near-infrared imaging, pharmaceutical quality control, and the detection of product tampering in foods and pharmaceuticals.

Roger A. Clemens, DrPH, CFS, CNS, FACN, FIFT, FIAFST
Senior Consultant

Dr. Roger A. Clemens is a consultant with ChromaDex Spherix Consulting, providing strategic, scientific and regulatory guidance for clients. He was the Director of Analytical Research at USC for 5 years, and the Scientific Advisor for Nestlé USA for more than 21 years. He is also currently Associate Director of the Regulatory Science program and Adjunct Professor of Pharmacology and Pharmaceutical Sciences within the USC School of Pharmacy, and was the consulting Scientific Advisor for ET Horn. He has published more than 50 original manuscripts in nutrition and food science, participated in more than 200 invited domestic and international lectures, and served as an expert panel member for the food industry, scientific organizations, trade associations and regulatory agencies in the U.S. and Canada.

Thomas Sox, Ph.D., JD
Senior Consultant

Dr. Thomas Sox is a consultant with ChromaDex Spherix Consulting, providing strategic, scientific and regulatory guidance for clients. He was the Director of New Technology for McNeil Nutritionals LLC where he lead technology development in the weight control/metabolic health area. He managed the R&D group with responsibility for identifying new opportunities, carrying projects through testing and claims substantiation. Prior to that, Dr. Sox served as Director of Bioactive Development at McNeil Consumer Healthcare, and Group Leader of Oral and GI Microbiology at Procter and Gamble.

Peter Pressman, M.D., M.S., FACN
Senior Consultant

Dr. Pressman is Vice President, Medicine Public Health & Nutrition at The Daedalus Foundation, Alexandria, Virginia, and Director of Medical Operations at Polyscience Consulting in Chatsworth, California. He is a graduate of Bowdoin College, the University of Chicago, and Northwestern University Medical School, and was trained at the University of Wisconsin and Rush-Presbyterian St. Luke's Medical Center. After serving as Assistant Professor of Medicine, Director of Educational Programs of the Pacific Center for Health Policy & Ethics, and Associate Director of the Internal Medicine Residency Program, all at University of Southern California/Keck School of Medicine, he attended at Cedars-Sinai Medical Center in Los Angeles, and later deployed in the Developing World as a Naval Medical Officer.

International Consultants

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John Howlett, BSc, PhD
International Resource Consultant—EU

Mr. Howlett is a consultant in the United Kingdom with more than 37 years of experience in food regulatory and scientific affairs. He is an independent international resource consultant working with ChromaDex Spherix Consulting to provide strategic, scientific and regulatory guidance for clients. Mr. Howlett completed his BSc in 1970 in Molecular Biology at King's College, University of London. He served as a consultant to the Food and Agricultural Organization of the United Nations (FAO) from 1982-1985, in the preparation of working papers for the Joint FAO/WHO Expert Committee on Food Additives (JECFA). He provided support for the JECFA Secretariat from 2004-2005, served as a member of JECFA from 1986-1990, and participated in meetings of JECFA as WHO temporary advisor from 1991-1995. In addition, Mr. Howlett has previously served as chairman of a WHO task group in 1988, and chairman of a workshop convened in 1998 by the European Training and Assessment Foundation (ETAF). Mr. Howlett has written more than 45 peer-reviewed publications.

Dieter Schrenk, MD, PhD
International Resource Consultant—EU

Prof. Dieter Schrenk is a full professor and head of Department of Food Chemistry & Toxicology, University of Kaiserslautern, Germany. He has made relevant scientific contributions to the toxicology of dioxins and related persistent contaminants, worked on mechanisms of tumor promotion and nutrition and colorectal cancer. He served and is still serving in several toxicological committees at the national and the European level dealing with risk assessment of food contaminants and environmental pollutants, in particular in panels and working groups of EFSA. Prof. Schrenk is a well-recognized member of the European Toxicological scene having contributed to the advancement of basic and applied science in the field of toxicology.

Silvia Berlanga de Moraes Barros, MSc, PhD
International Resource Consultant—Latin America

Dr. Barros is a toxicologist with over 30 years of experience in academia. She is an independent international resource consultant working with ChromaDex Spherix Consulting to provide strategic, scientific and regulatory guidance for clients in the area of risk assessment and ADME for the chemical and pesticide industry.

Govinder Flora, PhD
International Resource Consultant–India

Dr. Flora is a Toxicologist with more than 15 years of experience in the area of biochemical toxicology his primary area of expertise is in food toxicology, heavy metal toxicology, drugs of abuse and biodefense vaccine and therapeutics development. He has been involved in evaluating the safety of foods, novel foods, food additives, Generally Recognized as Safe (GRAS) substances, and dietary supplements. He is also involved in the development and review of protocols, critical review of scientific literature and preparation of safety evaluations in support of food ingredients used in dietary supplements and consumer products.

Joe Zhou, PhD
International Resource Consultant–China

Joe Zhou is an analytical chemist with more than 20 years of expertise in food safety, quality assurance and quality control (QA/QC), GMP protocols and audits, and analytical method validation. Dr. Zhou currently serves as an independent consultant providing food safety and quality assurance services to food ingredient companies mainly based China. He conducts food safety and GMP audits of Chinese suppliers for US-based multi-national food companies using internationally recognized standards. He also assists ChromaDex Spherix Consulting in providing regulatory services to Chinese clients for US and EU ingredient submissions.

Tetsuo Satoh, PhD
International Resource Consultant—Japan

Dr. Satoh is an independent international resource consultant, with more than 40 years of experience, working with ChromaDex Spherix Consulting to provide strategic, scientific and regulatory guidance for clients. His primary research interest is the molecular mechanisms of metabolic activation of pharmacologically active chemicals.

Further Information

For more information on our mission, values, quality, consultants, or if you would like a quote, please contact Dr. Kruger.

Claire L. Kruger, PhD, DABT, CFS
President

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