Paul Abato Ph.D.

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SUMMARY

Dr Abato has testified in high stakes litigation cases at the International Trade Commission and federal courts for major players in the pharmaceutical industry. He has experience with ANDA, trade secret, trademark infringement, patent infringement and contract law cases relating to pharmaceuticals.

A Ph. D. Medicinal Chemist with over 25 years of experience in the discovery and development of novel human therapeutics in the areas of cancer, anti-infective, anti-inflammatory and neurodegenerative diseases.

Dr Abato was awarded the Heroes of Chemistry Award by the American Chemical Society in August 2019 for my contribution to a new antibiotic, NUZYRA.

He also contributed to the discovery of five preclinical candidates for Multiple Sclerosis, Arthritis and Spinal Muscular Atrophy.

Dr Abato has been involved in all aspects of drug research and development from synthesis/purification, *in-vitro*, *in-vivo* (efficacy, pharmacokinetics and pharmacodynamics) testing, dosing routs, drug formulation, stability studies and the management of CROs. Dr Abato also co-authored a pre-IND proposal for SMA that had a favorable review by the FDA.

He has consulted for H3-Biomedicine, in efforts to develop drugs for cancer, where I directed the radio-labeled syntheses, of active pharmaceutical ingredients (API) for pharmacokinetic studies as well as the design of stability studies and formulation in support of CMC efforts.

He has also consulted for the Bill and Melinda Gates Medical Research Institute in the development of new drug combinations to be used in clinical trials against resistant TB infections.

EXPERIENCE

Paul Abato Consulting, Providence RI **6/1/14-Present**

Expert Witness Consulting

Ongoing Litigation
[redacted] 9/13/23-present

- Opening Report
- Deposition
- Reply report

Kirkland & Ellis. Client **Ascletis Pharma Inc.** 2/23/23-11/16/23
UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.
Investigation No. 337-TA-1352

- ITC case involving trade secrets.
- Provided opening, rebuttal reports.

- I was deposed for two days.
- I gave 4h of testimony at trial.

Baker and McKenzie International (Wong & Partners Malaysia) Client Novartis 8/30/22-8/1/23

IN THE HIGH COURT OF MALAYA AT KUALA LUMPUR
(COMMERCIAL DIVIDION) SUITE NO.: WA-22IP-36-06/2021

- Court decision was found in favor of my client.
- Patent case. Client is the patent holder.
- Opening and Rebuttal report, helped counsel cross examine opposing expert
- Provided 12h of testimony at trial

The City of Trenton, MI vs. Cassie Delon 8/24/23

- Client Cassie Delon. (Pro-bono)
- Provided an Affidavit explaining the urine pharmacokinetics of a cocaine metabolite, benzoylecgonine, in users upon heavy vs light use of cocaine.
- My testimony resulted in a favorable outcome for the client.

CASE NO. 23-02040 9/5/23

- State of Hawaii. In the matter of Frederick L. Aldama.
- Provided a Declaration explaining the urine pharmacokinetics of Dextromethorphan, an API found in over the counter (OTC) cold medicine, and the plausibility of normal use of the OTC by my client.
- Favorable outcome for the Client

Cook Keith & Davis DC-21-14606 Client- Zurvita 7/13/22- 4/1/23

- Trade secret case. Gave testimony at a hearing and was cross examined.
- Daubert challenge to my testimony was rejected.

DLA Piper Case No. 3:20-CV-03503-MMC Client- Codex DNA 7/1/21-4/11/22

- Trademark infringement case. Provided opening and rebuttal reports for a trademark dispute between major players within the synthetic biology landscape.
- I was deposed, advised counsel in the deposition of the opposing expert.
- Involved in pre-trial preparation prior to the case settling.

Norton Rose Fulbright 5/1/21- 6/7/21
(Case 168684)

- Provided research and expert opinions regarding purported false positive results from Soberlink®, a breathalyzer device.
- My assertions resulted in a favorable outcome for the client

Greenberg Traurig. Client Sandoz 10/2/18- 4/1/19
(MER-L-002363-17) Sandoz inc. v. Cambridge Therapeutics Technologies LLC

- Provide professional consulting and expert witness services (opening report) relating to a contract dispute.
- Corroborated pharmaceutical manufacturing, stability studies, storage and shipping documents with 21 CFR to demonstrate compliance on the part of the client.

Taft Stettinius & Hollister LLP. Client Bionpharma 6/25/18- 10/5/18
(1:16-cv-00876) Silvergate Pharmaceuticals Inc. v. Bionpharma Inc.

- Provided professional consulting and expert witness services relating to an ANDA case.
- Provided a Declaration regarding how a person skilled in the art would define a stability agent

Parsons Behle and Latimer. Client Thorne Research 3/1/16- 5/29/18
(2:13-cv-00784) Thorne Research et al v. Atlantic Pro-Nutrients

- Deposed for 7h.
- Gave testimony and was cross examined in a Federal Court for a trial by jury.
- Advised counsel on 2 in progress depositions.
- Provide professional consulting and expert witness services pertaining to patent infringement.
- Coordinated the search for and vetted other experts for the case.
- Coordinated and oversee the chemical analysis of the defendant's contested formulation.
- Preparing expert reports regarding the infringement of contested products over the asserted claims.

Parker Poe. Client Mylan 4/1/16- 12/19/16
(1:15-cv-00026) Pfizer Inc et al v. Mylan Inc. et al

- Provided professional consulting and expert witness in connection with Hatch-Waxman ANDA patent infringement litigation.
- Prepared expert reports regarding the invalidity of plaintiff's patents concerning the reformulation of one of their products.
- Provided compelling arguments based on examples within the prior art, of why it would have been obvious to a person skilled in the art to at least try the formulation in the contested patents with a reasonable expectation of success.
- Prepared reply reports in response to Plaintiff experts' responsive reports in which I reconfirmed my arguments as well as highlighted plaintiff's experts' contradictions and misrepresentations of the prior art.
- I was deposed by the plaintiff's counsel for 7 hours.
- I was also involved with the pre-trial preparation up until the parties settled.

Pharmaceutical Consulting Services

The Bill and Melinda Gates Medical Research Institute 12/1/19-3/1/22

- Provided support in the development of drug combinations consisting of Bedaquiline, Pretomanid, Sutezolid and Delamanid to treat resistant TB infections.

CraniUS LLC a medical device company 12/6/21 – 4/30/22

- Provided literature research/summary regarding drug stability

H3-Biomedicine, Cambridge, MA 6/1/17- 10/1/19
Pharmaceutical development Consultant

- Coordinated the radiolabeled synthesis of palbociclib, abemaciclib and proprietary derivatives thereof, directed the stability studies and formulation process used in pharmacokinetic studies.
- Assist with CMC in support of clinical trial material

Missouri Board of Pharmacy 5/22/19

- Provided a consulting webinar regarding drug product degradation during mail order pharmacy shipments, current 21 CFR, USP and FDA industry guidance documents related to the subject.

Cemotics LLC, Providence RI 6/01/14- 1/01/16
Pharmaceutical Development Consultant

- Development of Arylsphosphonium Salts (APS) as anti-cancer agents. Responsibilities include design of novel compounds, development of screening cascade and medicinal chemistry lead optimization efforts.
- Interact with vendors to facilitate whole cell screening, toxicity*, in vivo* efficacy and ADME.
- Developing a novel treatment for malaria that circumvents resistance, generation of preliminary data through outsourcing with vendors.

Roger Williams University Bristol RI, 9/1/20-Present
Adjunct Professor

- Responsible for teaching Chemistry Laboratory classes.

Salve University Newport RI, 9/1/14- 5/15/22
Adjunct Professor

- Responsible for teaching Organic Chemistry, Forensic Science and other lecture science classes.

Paratek Pharmaceuticals, Boston, MA **8/1/02-6/1/13**
Biotech developing tetracycline therapeutics for anti-infective, anti-inflammatory and neurodegenerative diseases.

Principal Scientist/ Project Coordinator *(*Project Coordination/Lab work ~ 60%/40%) 01/09 – 06/13

- Project 1: Project Coordinator for Spinal Muscular Atrophy (SMA) program in preclinical development
- Co-authored a pre-IND application for the intrathecal administration of our clinical candidate for Spinal Muscular Atrophy (reviewed by the FDA 1/23/13).
- Responsible for design and development of intrathecal (IT) and intracerebroventricular (ICV) continuous and bolus formulations and dosing protocols for mice, rat and monkey studies.
- Designed and conducted stability studies and formulation studies for continuous dosing efficacy studies to be compatible with Alezet osmotic pumps.
- Worked with cross-functional teams in cell-biology, pharmacology, process chemistry and vendors that supported *in vivo* efficacy studies, DMPK and GLP toxicity studies.
- Responsible for synthesis of new compounds and lead optimization of medicinal chemistry efforts for SMA

- Outsourced and managed preclinical efficacy/PK testing of three compounds at multiple CROs to facilitate pre-clinical toxicity and further PK analysis of our clinical candidate in mice, rat and monkey.
- Contributed to grant writing for NIH and FSMA grants.
- Project 2: Developed a new antibacterial for bacterial resistant respiratory infections in cattle for Elanco. Delivered an efficacious antibacterial compound for subcutaneous bolus dosing which would not tissue stain.
- Worked on additional projects as needed.
- Managed one direct report

Sr Scientist (Project Coordination/Lab work ~ 30%/70%) 01/06 – 01/09

- Worked on areas of anti-inflammation and functioned as the project coordinator for SMA.
- Responsible for synthesis of new derivatives, lead optimization, analysis of results from outsourced and in house *in vitro* studies, whole cell, pharmacology and *in vivo* studies.
- Worked with cross-functional teams in cell-biology, pharmacology, process chemistry as well as vendors that supported *in vitro* and *in vivo* efficacy studies.
- Developed HPLC purification methods for large-scale (6" diameter column) epimer separation of novel tetracycline derivatives previously not possible.
- Managed one direct report.

Scientist II 01/03 – 01/05

- Discovered and developed novel tetracyclines for the treatment of multiple sclerosis (MS) in collaboration with Serono. Delivered three validated pre-clinical tetracycline leads for MS.
- Developed drug formulation procedures that reduced tolerability issues when dosing IP and IV thereby enabling a wider therapeutic window with which to compare compounds using experimental autoimmune encephalomyelitis (EAE) mouse efficacy studies. Also developed improved formulations for sub Q and IM dosing.
- Responsible for synthesis of new derivatives, lead optimization and analysis of results from *in vivo* efficacy
- Worked with cross-functional teams in cell-biology, pharmacology and process chemistry.
- Built a micro reactor to developed an oxidation assay to elucidate the structure activity relationship for tetracycline oxidation/tissue staining, a potentially negative aspect of some tetracyclines. The assay's results correlated with tissue staining *in vivo*.

Scientist I 08/02 – 01/03

- Contributed to the development of pre-clinical candidates for hospital and community acquired severe bacterial infections.
- Optimized synthetic methods and developed purification protocols for two key tetracycline intermediates on a 100g scale. This work removed a huge bottleneck in the production of tetracycline derivatives
- One lead compound is currently in phase III trials (Omadacycline) and a second has completed Phase I.

Eikos Inc., Franklin, MA. **2/1/02 – 8/1/02**

Biotech/material science, developing anti malaria drugs and incorporation of carbon nanotubes into polymers

Scientist I

- Managed all aspects of chemistry at Eikos. Conducted Polymer production reactions using a 50L reactor.
- Developed a solid phase organic synthesis protocol for the production of aminoquinoline antimalarials in support of an SBIR grant.
- Managed three direct reports.

Brown University, Providence RI. **6/01/96 – 2/12/02**

Graduate Researcher, Department of Chemistry; PI Christopher T. Seto

Studied protease inhibitors and developed a novel enzymatic assay for screening catalysts for asymmetric reactions

- Optimized a novel class of protease inhibitors based on a cyclohexanone core
- Developed a protocol for the synthesis of cyclohexanone-based protease inhibitors on solid support.
- Designed and synthesized a 400-member library of these cyclohexanone inhibitors on solid support.
- Developed an enzymatic assay for high-throughput screening of catalysts for asymmetric reactions (see EMDee publication below).

- Developed methodology to conduct assays in a 384 well format to assess inhibition constants for a library of peptidomimetic compounds against various proteases such as cathepsin B, plasmin, papain, trypsin, thrombin and kallikrein
- Monitored reactions by TLC, IR, ^{1}H NMR, ^{13}C NMR, HPLC. Purification by flash chromatography, crystallization, distillation, separation of diastereomers by HPLC and enantiomers by both chiral-GC and chiral-HPLC. Analysis of final compounds ^{1}H NMR, ^{13}C NMR, 2D NMR and MS. Proficient with enzymatic assays and jell electrophoresis.

EDUCATION

Brown University Providence RI. **6/01/96 – 2/12/02**

Ph. D., Chemistry February 2002, Advisor: Prof.Christopher T. Seto

- Thesis Title: The Development of A New Class of Protease Inhibitors and EMDee: A New High-Throughput Enzymatic Method For The Determination of Enantiomeric Excess

Rhode Island College, Providence, RI **9/01/92 - 5/01/96**

BA., Chemistry with a minor in Biology; Awarded Excellence in Organic Chemistry by the American Polymer Society.

AWARDS

Excellence in Organic Chemistry by the American Polymer Society **1996**

Heroes in Chemistry Award by the American Chemical Society **2019**
for contributions to the new antibacterial drug: NUZYRA

SKILLS AND TECHNIQUES

- **Expert Witness Consulting**: Report writing, Deposition experience and pre-trial preparation experience.
- **Medicinal Chemistry**: Discovered multiple clinical candidates (see Paratek Pharm. Experience)
- **Drug Formulation**: Developed stable formulations for hundreds of drugs for preclinical testing.
- **Synthetic Organic Chemistry:** Extensive work with tetracycline natural products pioneering mild reaction conditions suitable for this class of compounds. Cross couplings, transition metal catalysts, formylation, Iodination and peptide coupling reactions to name a few
- **Analytical:** TLC, IR, ^{1}H NMR, ^{13}C NMR, 2D NMR, HPLC and LCMS.
- **Purification:** Analytical and preparative HPLC and Flash chromatography
- **Computer skills:** Microsoft word, Excel, PowerPoint, Photoshop

PATENTS/PUBLICATIONS

Paul Abato and Todd Bowser- **7-Disubstituted-Ph tetracycline compounds for the Treatment of SMA** From PCT Int. Appl (**2013**) WO 2013-US43363, Patent No.WO 2013181391, Priority Appl. No. US 2012-61653262.

"PTK-SMA2, **A novel splice-correcting tetracycline derivative, increases SMN protein expression and significantly improves survival in Type I SMA mice**." Paul Abato, Francine Jodelka, Paul Higgins, Jie-Zhang Hoover, Kevin Klausner, Caroline Dudley, Juan Du, Sujatha Kumar, Michelle Hastings and Todd Bowser. Poster presented at the 2012 Annual Families of Spinal Muscular Atrophy meeting in Bloomington, MN, June 21-23rd **2012**.

Abato, Paul; Bowser, Todd; Higgins, Paul; Verma, Atul; Zhang-Hoover, Jie. **Tetracycline Compounds for the Treatment of Rheumatoid Arthritis and Related Methods of Treatment**. From PCT Int. Appl. (**2010**), WO 2010033939 A1 20100325.

Hastings ML, Berniac J, Liu YH, Abato P, Jodelka FM, Barthel L, Kumar S, Dudley C, Nelson M, Larson K, Edmonds J, Bowser T, Draper M, Higgins P, Krainer AR. **Tetracyclines that promote SMN2 exon 7 splicing as therapeutics for spinal muscular atrophy.** Sci Transl Med. (**2009)** Nov 4;1(5)

Abato, Paul; Assefa, Haregewein; Berniac, Joel; Bhatia, Beena; Bowser, Todd; Grier, Mark; Honeyman, Laura; Ismail, Mohamed; Kim, Oak K.; Nelson, Mark; Pan, Jingwen; Verma, Atul. **Substituted tetracycline compounds for treatment of bacterial infections and neoplasms.** PCT Int. Appl. (**2008**), 224 pp. CODEN: PIXXD2 WO 2008079339 A2 20080703 CAN 149:128685 CAPLUS

Abato, Paul; Assefa, Haregewein; Berniac, Joel; Bowser, Todd; Chen, Jackson; Grier, Mark; Honeyman, Laura **Preparation of 10-substituted tetracycline compounds as antibiotics**. PCT Int. Appl. (**2007**), WO 2007014154 A2 20070201.

Abato, Paul; Assefa, Haregewein; Berniac, Joel; Bhatia, Beena; Bowser, Todd; Chen, Jackson; Grier, Mark; Honeyman, Laura; Ismail, Mohamed Y.; Nelson, Mark; Kwasi, Ohemeng; Pan, Jingwen**. Preparation of substituted tetracycline compounds for the treatment of bacterial infections and neoplasms.** PCT Int. Appl. (**2006**), 126 pp. CODEN: PIXXD2 WO 2006047756 A2 20060504 CAN 144:450548 AN 2006:410014 CAPLUS

Nelson, Mark L.; Honeyman, Laura; Ismail, Mohamed; Bhatia, Beena; Verma, Atul K.; Warchol, Tadeusz; Bowser, Todd; Berniac, Joel; Mechiche, Rachid; Abato, Paul; Assefa, Haregewein. **Synthesis of diverse tetracycline derivatives via Pd-catalyzed reactions: Creation of a large collection of novel 3rd generation tetracyclines.** Abstracts of Papers, 231st ACS National Meeting, Atlanta, GA, United States, March 26-30, 2006 (**2006**), ORGN-454. CODEN: 69HYEC AN 2006:249168 CAPLUS

Nelson, Mark L.; Ohemeng, Kwasi; Amoo, Victor; Kim, Oak; Abato, Paul; Assefa, Haregewein; Berniac, Joel; Bhatia, Beena; Bowser, Todd; Chen, Jackson; Grier, Mark; Hohos, Aaron; Honeyman, Laura; Ismail, Mohamed Y.; Mechiche, Rachid; Nihlawi, Mohammed; Sizensky, Emmanuelle. **Preparation of substituted tetracycline analogs for use in antibiotic pharmaceutical compositions.** PCT Int. Appl. (**2005**), 81 pp. CODEN: PIXXD2 WO 2005009943 A2 20050203 CAN 142:197754 AN 2005:99455 CAPLUS

Nelson, Mark L.; Ohemeng, Kwasi; Frechette, Roger; Abato, Paul; Assefa, Haregewein; Bandarage, Upul; Berniac, Joel; Bhatia, Beena; Chen, Jackson; Ismail, Mohamed Y.; Kim, Oak A.; Mathews, Jude; McIntyre, Laura; Nihlawi, Mohammed; Pearson, Andre; Reddy, Laxma; Sheahan, Paul; Sizensky, Emmanuelle; Tourigny, Justin; Verma, Atul K.; Viski, Peter; Warchol, Tadeusz. **Preparation of substituted tetracycline compounds for the treatment of bacterial infections and neoplasms.** PCT Int. Appl. (**2003**), 118 pp. CODEN: PIXXD2 WO 2003079984 A2 20031002 CAN 139:292094 AN 2003:777531 CAPLUS

Paul Abato, Courtney M. Yuen, Jeanne Y. Cubanski, and Christopher T. Seto **Inhibitors of Plasmin that Extend into Both the S and S' Binding Sites: Cooperative Interactions Between S1 and S2.** *JOC.* **2002***, 67*(4), 1184-1191.

Paul Abato and Christopher T. Seto. **EMDee: An Enzymatic Method for Determining Enantiomeric Excess.** *J. Am. Chem. Soc.* **2001**, *123*, 9206-9207.

Paul Abato, Jeffrey L. Conroy, and Christopher T. Seto. **Combinatorial Library of Serine and Cysteine Protease Inhibitors that Interact with Both the S and S' Binding Sites.** *J. Med. Chem.* **1999**, *42*, 4001-4009.

Jeffrey L. Conroy, Paul Abato, Mousumi Ghosh, Mariana I. Austermuhle, Michel R. Kiefer, and Christopher T. Seto**. Synthesis of Cyclohexanone-Based Cathepsin B Inhibitors that Interact with Both the S and S' Binding Sites.,** *Tetrahedron Lett*. **1998**, *39*, 8253-8255.