UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FRONTIER THERAPEUTICS, LLC

Petitioner

v.

MEDAC GESELLSCHAFT FÜR KLINISCHE SPEZIALPRÄPARATE MBH

Patent Owner

Inter Partes Review Case No. IPR2016-00649
Patent Number 8,664,231

EXPERT DECLARATION OF DR. SEAN NICHOLSON

June 2, 2016

Table of Contents

I. Qualifications

1. I am a Professor in the Department of Policy Analysis and Management at Cornell University and a research associate at the National Bureau of Economic Research. Prior to assuming my current position at Cornell, I served as an Assistant Professor in Healthcare Systems at the Wharton School of the University of Pennsylvania. I have a Ph.D. in economics from the University of Wisconsin-Madison and an A.B. in economics from Dartmouth College. My research and teaching specialty is the economics of healthcare. My curriculum vitae, including a list of publications, is attached as Appendix A.
2. In my academic career, I have researched the economics of the healthcare industry, with an emphasis on the economic behavior of, and interaction between, government and employer-sponsored health plans, hospitals, and physicians. I have published articles in leading academic journals regarding my field of study. In addition, I have served as a principal investigator on research projects sponsored by the Centers for Disease Control and Prevention, the Agency for Healthcare Research and Quality, the Robert Wood Johnson Foundation, and by leading pharmaceutical companies such as Merck & Co., Inc., Pfizer, Astra Zeneca, and Johnson & Johnson. I have also consulted to four biopharmaceutical companies, Cephalon, Inc., Amgen, Merck, and Pfizer, and provided executive education for Edwards Lifesciences, Anesthesia Business Group, the Hospital Association of New York State (HANYS), the West Penn Allegheny Health System, Teva Pharmaceutical Industries, Ltd, Aventis, Wyeth, Eisai, and Johnson & Johnson. In addition, I have experience working as a management consultant in the hospital industry.
3. My research projects have included examining how physicians form their treatment styles and how those styles change over time, examining how

managed care insurance plans are able to reduce medical spending and premiums, identifying what types of firms are most effective at developing drugs, examining why biotechnology and pharmaceutical firms form drug development alliances and merge and the impact of those decisions, assessing risk in the healthcare industry, and determining the value of new medical technologies. I co-edited the *Oxford Handbook of the Economics of the Biopharmaceutical Industry*, which covers many topics, including how firms finance research and development, set drug prices, and market pharmaceutical products. I have also conducted research and offered expert testimony in several cases in the healthcare industry. A list of the matters in which I have testified in the last four years is attached as Appendix B.

II. Assignment

4. Frontier Therapeutics, LLC ("Petitioner") has petitioned for *Inter Partes* Review ("IPR) of United States Patent No. US 8,664,231 B2 (the "'231 patent"), which is owned by Medac Gesellschaft für klinische Spezialpräparate mbH (collectively with its United States subsidiary Medac Pharma, Inc., "Medac"). The '231 patent issued in the United States on March 4, 2014.[1] The claim at issue in the '231 patent relates to a method characterized by the subcutaneous administration of "methotrexate…at a concentration of more than

[1] United States Patent No. US 8,664,231 B2 (Ex. 1001). I am informed and understand that the priority application of this patent was filed in Germany on July 21, 2006 and in the European Patent Office, as Receiving Office for the Patent Cooperation Treaty, on July 20, 2007. *Id.*

30 mg/ml" for the treatment of inflammatory autoimmune diseases.[2] I will refer to this claim as the "Innovation" throughout my report. Medac markets a methotrexate product, Rasuvo™ (methotrexate) injection ("Rasuvo™"), which I understand uses the Innovation.[3] Antares Pharma, Inc. ("Antares") also markets a methotrexate product, Otrexup™ (methotrexate) injection ("Otrexup™"), which I understand uses the Innovation.

5. I understand that a key question at issue in this IPR is whether the Innovation was obvious. I have been retained by counsel for Medac to evaluate whether there were economic reasons why no company had introduced a product like Rasuvo™ or Otrexup™, *i.e.*, a product using the Innovation, for the treatment of inflammatory autoimmune disease, examples of which include rheumatoid arthritis, psoriasis, and polyarticular juvenile idiopathic arthritis ("PJIA") in the United States prior to July 21, 2006, the earliest priority date of the '231 patent. I refer to this date as the date of the "filing of the '231 patent" throughout my report. The absence of a product using the Innovation, without an underlying economic reason for such an absence, is evidence that the Innovation was not obvious.

6. I evaluate two economic factors that should affect whether a company had the economic incentive to introduce a product using the Innovation into the United States market:

    a. First, I evaluate whether there was a valuable economic opportunity in the market for drugs treating inflammatory autoimmune diseases,

[2] Ex. 1001 cl. 8.

[3] Ex. 2061 ("About Rasuvo™," *Medac Pharma,* www.rasuvo.com/patients/background).

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS
Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS
Sync your system to PACER to automate legal marketing.