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Introduction

In the Bluegrass Region and Kentucky, Lexington is a hub for the life sciences industry. Lexington has leveraged its culture of innovation and commercialization, a superior business climate, top ranked research programs at the University of Kentucky (UK), and an expansive network of medical centers to provide an environment where any market niche of the life sciences industry can grow. The life sciences industry has two components: direct patient care and biotechnology.

Direct patient care includes hospitals, nursing facilities, and medical centers, and it is a prominent market in Lexington with a strong base of health care facilities, employers, and resources. There are several major medical centers including Baptist Health, Shriners’s Hospitals for Children, CHI St. Joseph Hospital (part of Catholic Health Initiatives), and the UK Medical Center. In fact, the UK HealthCare System is an extensive network that includes four hospitals, over 80 specialized clinics, more than 140 outreach programs, and six health professional colleges. In 2022, the UK HealthCare network served 1.3 million outpatient visitors, performed 34,418 surgeries, and employed 9,000 full-time personnel¹. The Lexington Clinic, a multi-specialty medical group with 29 locations throughout the Bluegrass Region, employs over 350 physicians and provides services to more than 2,000 patients every day and 600,000 patients every year².



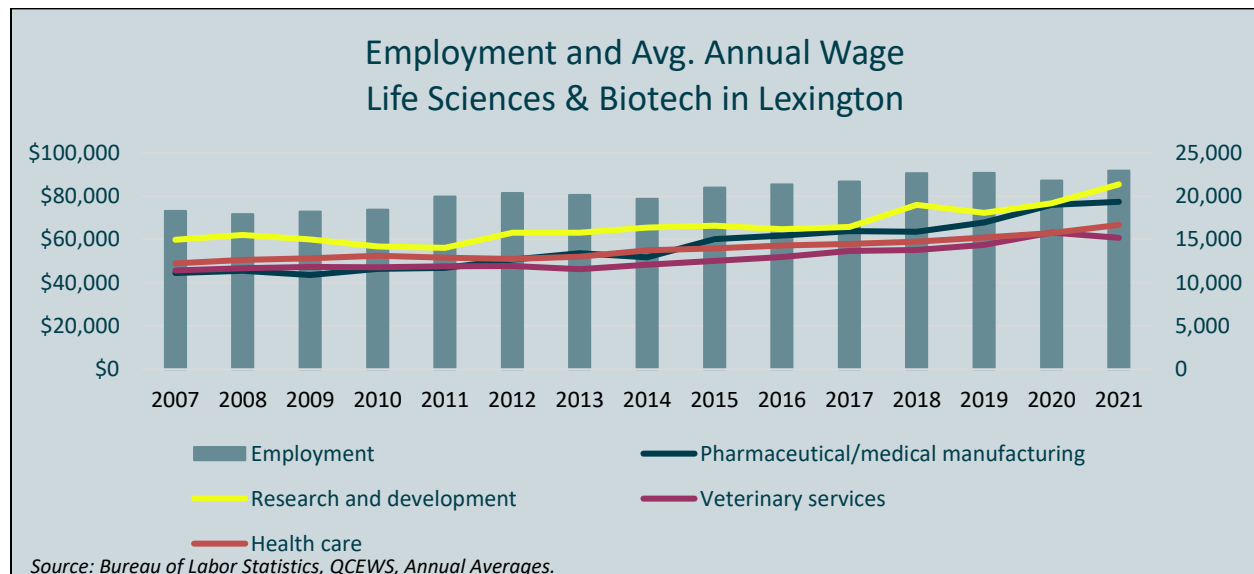
¹ UK HealthCare Annual Report 2022. [UK HealthCare Annual Report 2022](https://www.ukhealthcare.com/annual-report-2022)

² <https://www.lexingtonclinic.com/aboutusoverview2.html>

Direct patient care is a major employment industry for Lexington, with a high-quality stock of human capital for medical professionals. According to the U.S. Bureau of Labor Statistics, over 22,000 people were employed as health care practitioners and technicians in 2021, including 300 family medicine physicians, 70 radiation therapists, 70 optometrists, 560 physical therapists, 8,000 registered nurses, 990 clinical laboratory technologists and technicians, 330 surgical technologists, 1,010 pharmacists, and 290 veterinarians³.

Biotechnology includes institutions involved with animal and plant science research, designing and manufacturing medical/veterinary products, and developing high-tech solutions for healthcare systems. Biotechnology is one of the fastest growing industries in the United States, and Lexington is committed to fueling its growth in the Bluegrass. In fact, over 100 biotech companies are located in the Bluegrass.

Health care and biotechnology are supported by strong ties to academic programs at the University of Kentucky. UK’s College of Pharmacy is one of the nation’s top pharmacy programs, ranked the 6th Best Pharmacy Programs by U.S. News & World Report⁴ in 2020, and the university ranked in the top 100 of National Institute of Health (NIH) funded institutions in fiscal year 2023 with \$143,637,320 through 294 awards⁵. The cutting-edge medical research on disease and drug development performed by the graduate students and faculty has benefited the area and the nation. Graduates enrich the workforce and faculty members have created 64 graduate since 1994⁶. Furthermore, UK allocated nearly \$480 million to research and development in FY 2023, and most UK’s R&D expenditures (over 70%) are devoted to the field of life sciences.⁷



³ Bureau of Labor Statistics, OES, Lexington-Fayette MSA, May 2022.

⁴ <http://grad-schools.usnews.rankingsandreviews.com/best-graduate-schools/top-health-schools/pharmacy-rankings>

⁵ <https://report.nih.gov/>

⁶ <https://www.research.uky.edu/research-analytics/stats-rankings>

⁷ <https://www.research.uky.edu/research-data>

Plant and Genetic Engineering

The Bluegrass Region has acquired a niche within the plant and genetic engineering segment of the life sciences industry, and many area companies are creating valuable pharmaceuticals. In 1980, scientist Dr. Pearse Lyons founded Alltech in Lexington, Kentucky. A global leader in animal health, Alltech has bioscience centers in the U.S. and Ireland, offices and distributors in more than 120 countries, and nearly 100 production facilities globally, three of which are in Kentucky⁸. In Lexington, the company is known for its beverage division. The Alltech Lexington Brewing and Distilling Co. produces an award-winning line of beers and spirits with a brewery and distillery in downtown Lexington and in Pikeville.

Naprogenix is a startup biotech research company that derives compounds from native Kentucky plants to develop new technologies. Plants have a variety of uses in food and medicine and Naprogenix enhances specific bioactivity and qualities of native plants through genomics and molecular pharmacology to increase their usefulness to the pharmaceutical, health, and agrochemical industries. Naprogenix's products are natural, giving the company a competitive advantage as consumers increasingly pull away from synthetic ingredients in both chemicals and medicines.



Similarly, ParaTechs Corporation recently developed a bio-insecticide targeting corn earworm moths, the highest crop-damaging pest in North America and the second-highest worldwide. ParaTechs's bio-insecticide is a mutated nudivirus, a sexually transmitted disease that sterilizes 100% of corn earworm moths it infects, compared to a 30% effectiveness rate when the nudivirus occurs in nature. In addition to increased effectiveness, ParaTechs's bio-insecticide reduces the need for chemical pesticides and is unlikely to affect other species that do not mate with corn earworm moths. As a startup, ParaTechs was originally housed in UK's Advanced Science and Technology Commercialization Center (ASTeCC) before moving to its current location in 2010.



ParaTechs's lab space, courtesy of Angelika Fath-Goodin.

A third Lexington company developing enhanced organisms is MosquitoMate. Founded by University of Kentucky researchers in 2010, MosquitoMate has developed a biopesticide to reduce or eliminate Asian tiger and *Aedes aegypti* mosquitoes through sterilization. These pests carry several diseases that are harmful to people and animals, such as dengue, yellow fever, heartworm, West Nile virus, chikungunya fever, and the Zika virus. MosquitoMate infects male mosquitoes with a form of *Wolbachia* bacteria and releases them to mate with females, who are permanently sterilized by the *Wolbachia*. As a result, the next generation of mosquitoes is reduced and the spread of disease is prevented. MosquitoMate's

⁸ <https://www.alltech.com/about>

biopesticide is not transmitted to humans, animals, or other insects, and does not include chemicals or genetic modification.



Hera BioLabs Inc. is a Lexington-based Contract Research Organization (CRO) and a spinoff of Transposagen Biopharmaceuticals, which Commerce Lexington recruited in 2008. Hera BioLabs is a toxicology and personalized therapeutic testing company. Hera uses gene editing tools and services to manufacture genetically specialized products and services. The company utilizes their gene editing technologies to establish preclinical research models for oncology & immuno-oncology. In 2016, Hera announced an investment of \$1.8 million to move its operations from its current location on the University of Kentucky campus and establish a new headquarters, creating 23 new high-skill jobs in Lexington. In 2018, the company proceeded with a full launch of their OncoRat SRG platform and xenograft efficacy services.

Industrial Hemp and Cannabidiol

Known as the plant with 50,000 uses, industrial hemp's fibers, hurds, seeds, and oil can be used to produce a wide array of products ranging from insulation and concrete to textiles and medicines. Cannabidiol (CBD), the oil coming from the plant, is the part most often referenced for its proposed medicinal benefits. The FDA has approved one CBD based drug called Epidiolex which is used for the treatment of seizures associated with Lennox-Gastaut syndrome and Dravet syndrome in people 2 years of age and older, but consumers have reported an array of other benefits including pain relief, anxiety and depression treatment, reducing acne, promoting heart health, and alleviating cancer-related symptoms. According to Research and Markets, the global industrial hemp market is expected to grow from \$6.8 billion in 2022 to \$18.1 billion in 2027⁹.



Kentucky's climate, soil, and proximity to major markets makes it the ideal location for hemp businesses. Companies in the Commonwealth have access to an abundant supply of growers, top universities pioneering research on the versatile crop, the agglomeration effects of a thriving hemp and biotech cluster, and to 65% of the U.S. personal income and population within a day's drive.



Dedicated to responsibility, innovation, and sustainability for the right reasons, Zelios is an emerging leader in the hemp industry. Recognizing Kentucky's historical connection to hemp along with the logistical advantages the Bluegrass provides, the company established their largest facility in

⁹ www.researchandmarkets.com

Lexington to allow for continuous growth in their processing capabilities¹⁰. In 2018, Zelios announced an expansion to their operations with a reported investment of \$2.1 million and the creation of 44 jobs.

Medical Application Technology

Application technology for the medical industry and pharmaceuticals is another segment of the life sciences industry being developed in Lexington. Several companies are headquartered in the UK Coldstream Research Campus, including Summit Biosciences and Intralink-Spine, Inc.

Founded in 2009, Summit Biosciences Inc. develops and manufactures prescription nasal sprays for pharmaceutical companies in the United States and Europe. The company operates its cGMP production facility on the University of Kentucky Coldstream Research Campus. A recent \$19 million expansion has added increased manufacturing, laboratory, and warehouse space to support clinical and commercial production of several new nasal medicines. With its unique platform and critical mass of expertise in Lexington, Summit Biosciences attracts nationwide talent to the Bluegrass.



Intralink-Spine, Inc. develops and manufactures Rejuve, an injectable medical device to treat degenerative disc disease (DDD), lower back pain, and related spinal disease by stabilizing and reinforcing tissue, joints, and spinal discs. Intralink-Spine located in Lexington after receiving an SBIR match grant from the state in 2010. In 2022, the company was acquired by Spinal Simplicity to begin the process of bringing the Intralink technology to European markets.

Piramal Pharma Solutions is a specialty pharmaceutical contract manufacturer of sterile liquid and lyophilized parenterals and injectables. Originally founded as Coldstream Laboratories by the University of Kentucky Research Foundation in 2007, the company was purchased by Piramal Enterprises Limited for \$35 million in 2015 to enhance Piramal's products by acquiring Coldstream's expertise in developing and manufacturing sterile injectables. Piramal kept operations in Lexington, where the company continues to thrive. In 2020, the company invested \$21 million in an expansion to their existing facility and equipment which is expected to create 35 to 60 full-time jobs.

Catalent®

Catalent Pharma Solutions is a global leader in providing innovators in the life sciences with the services, delivery technologies, and manufacturing solutions needed to successfully launch pharmaceuticals, biologics, and consumer health products. Located just outside of Lexington,

Catalent's Winchester, KY location is the flagship U.S. manufacturing location for large scale complex controlled release (CR) oral dose forms, with integrated analytical and development services. The company has 20 years of expertise in product development, technology transfers, and commercial manufacturing, and roots in industry leading Glatt technology¹¹. Since 2019, Catalent has announced over

¹⁰ <https://zelios.com/facilities/>

¹¹ <https://www.catalent.com/our-locations/north-america/winchester-usa/>

\$200 million in new investments, adding 277 new jobs, and has more than doubled its facility's footprint in Winchester, KY.

NX Development Corporation is a Lexington biotech company responsible for creating Gleolan (aminolevulinic acid HCL), the only optical imaging agent with FDA approval for use during fluorescence-guided surgery in patients with glioma. Gleolan is a supplement created to aid in the visualization of a patient's malignant tissue. NX Development's new technology makes it easier for surgeons to see tumors during their removal¹². NX Development went through a merger acquisition in 2018 with the German, biotech firm photonamic GmbH & Co KG. In 2020, the company announced a \$1.2 million expansion with the creation of 20 full-time jobs.



In nearby Versailles, ECM Biosciences develops antibodies and other biological reagents for life science research in neuropathology, cancer, immune dysfunction, and cardiovascular disease. ECM Biosciences also offers custom antibody testing and production services and works in collaboration with other researchers around the world.



Founded in 1982, Neogen Corporation has grown to more than 2,000 employees in multiple U.S. and international locations. Lexington serves as Neogen's Animal Safety headquarters, which recently announced an expansion, and has grown to 220 employees across two

Lexington facilities and one in Mt. Sterling, KY. Utilizing many technologies from University of Kentucky based research, Neogen develops, manufactures, and markets a diverse line of products dedicated to food and animal safety.¹³

A cutting-edge animal health products company, MEP Equine Solutions recently developed an innovative parasite diagnostics and management tool, the Poop2Proof, with support from the University of Kentucky's Maxwell H. Gluck Equine Research Center as a research facility partner. Poop2Proof detects and diagnoses parasites through on-site sample collection, filtration, and analysis using a smartphone app. The existing method of analyzing intestinal parasites required special equipment, user expertise, manually counting fecal eggs on a microscope slide, and several days of processing, but Poop2Proof is easy to use and produces immediate results on location.

¹² <https://nxdevcorp.com/nx-development-corp-nxdc-launches-fda-approved-gleolan-aminolevulinic-acid-hcl-for-enhanced-visualization-of-high-grade-gliomas-including-glioblastomas/>

¹³ <https://animalsafety.neogen.com/en/>

Healthcare & Veterinary Technology

The healthcare and social assistance industry makes up the largest portion of primary jobs in Lexington at 20.7% largely due to Lexington’s role as the healthcare hub for the Central and eastern portions of Kentucky and the presence of a major medical institutions in the University of Kentucky¹⁴. This substantial customer base makes Lexington an ideal destination for established and emerging HealthTech companies. The World Health Organization defines a HealthTech as “the application of organized knowledge and skills

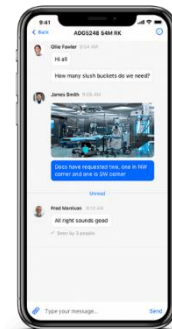


in the form of devices, medicines, vaccines, procedures and systems developed to solve a health problem and improve quality of lives.¹⁵”

Lexington is home to a robust animal science sector fueled primarily by a unique niche in the equine industry. Known as the “Horse Capital of the World”, the city has many equine related companies specializing in animal physiology, behavior, nutrition, and treatments. Additionally, over 30 equine management and breed organizations are in the Kentucky

Horse Park. These factors have led to the emergence of a local veterinary technology sector, also known as VetTech.

Founded in 2016, originally as HealthTech Solutions, OmniLife is transforming the organ procurement process with their secure messaging platform, TXP Chat. The company was created around the need for a more efficient organ procurement process that would increase access, affordability, and the quality of organ transplants. The first of its kind, TXP Chat is a completely HIPAA compliant communication system for use by transplant centers and other healthcare providers. OmniLife has completed both a Phase I and Phase II SBIR grant through the National Institute of Health.



Nymb! Systems is the only cloud-based electronic medical records and practice management system for the orthotic and prosthetic specialties. As of 2020, the company has processed over \$25 million in claims with 174 offices and 748 users¹⁶. Similarly, to OmniLife, Nymb!’s software is HIPAA compliant and provides secure transmission and storage of all data. By reducing training, time spent in the software, and reporting practices can grow faster.

¹⁴ U.S. Census Bureau, LEHD, OnTheMap Program, 2002 – 2020.

¹⁵ <https://www.who.int/health-technology-assessment/about/healthtechnology/en/>

¹⁶ <http://nymb!.healthcare/>



Hippo Manager is the largest independently owned cloud-based veterinary management software in the U.S. The company's software provides everything needed for a veterinary clinic or hospital including SOAP notes/medical records, patient scheduler, reporting, point of sale, inventory, reminders, and more. Hippo's goal is to increase the quality of care patients receive by reducing the time and resources spent by veterinarians in managing their practices so they can spend more time where they need to, with patients. Today, Hippo's clients include nearly 1,000 active vets serving 3.8 million patients in 22 countries¹⁷.

VetData provides data conversion service and integration solutions for companies throughout the veterinary space. VetData's platform, VetData Marketplace, builds on over 20 years of experience working with veterinary data, supports most practice management systems, and provides a single data integration service for managing practices across many locations. The company also provides software for managing hospitals' supply chains and for producing reports that produce practical insights.



Commercializing the Life Sciences Industry and Biotechnology in the Bluegrass

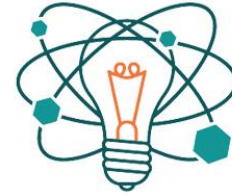


With an abundance of resources, the University of Kentucky is positioned to help companies with human capital and financing. Assisting companies with commercialization and technology transfer on the University of Kentucky campus is the ASTeCC campus incubator, which provides lab space for startups and helps connect researchers and entrepreneurs to economic development activities, such as commercialization and licensing. In addition, Lexington is home to the only research and development business park in the state of Kentucky – UK's Coldstream Research Campus. Coldstream, a 735-acre office park, was specifically designed for recruiting high-tech and biotech companies, university centers, and startups. Coldstream offers intellectual capital and resources from UK, as well as infrastructure for new and existing companies. In 2020, the UK Board approved the construction of a \$15 million research lab at Coldstream to support early stage, high-tech companies by providing the space they need to expand¹⁸.

¹⁷ <https://hippomanager.com/>

¹⁸ <http://www.uky.edu/coldstream/News/uk-board-approves-construction-15-million-coldstream-research-lab-support-early-stage-high-tech>

KY Innovation, a division of the Kentucky's Cabinet for Economic Development, funds the Kentucky Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Matching Funds program to help create, recruit, and retain small businesses, including high-tech and biotech. The SBIR/STTR Matching Funds Program is an innovative initiative that provides matching funds up to \$150,000 for Phase I and up to \$500,000 for Phase II for Kentucky businesses. To date¹⁹, 665 jobs have been created, 22 licensing agreements executed, 208 patents filed, 42 out-of-state companies relocated, and \$46.3 million in federal grants awarded as a result of the program. Small businesses and startups can also find help from the Bluegrass Angels, a local group of angel investors willing to provide seed capital and management guidance to local regional startups and new businesses. The BBDP has attracted over 28 new companies to Lexington because of the state match program, UK research assets, and great quality of life.



Local Attributes

Aside from an established life sciences industry in the local economy and a unique support system that emphasizes innovation, Lexington has numerous attributes to support the life sciences. Lexington's workforce, strategic geographic location, low cost of doing business, and high quality of life are among the city's strongest assets.

The 2021 Census data ranks Lexington the 11th most educated city in the nation among cities with populations of at least 300,000 people, with 46% of the population 25 years or older holding at least a bachelor's degree. Even more impressive, 20% have an advanced degree, ranking Lexington 10th for graduate or professional degree attainment. These high levels of educational attainment are at least partially due to the 10 colleges and universities within 40 miles of Lexington. Over 20,000 students are enrolled in these institutions, graduating nearly 70,000 annually²⁰. Lexington has received numerous accolades fueled by its educated population, including being ranked the 7th Best City for New College Grads by *SmartAsset* in 2022 and 10th Best Cities for Young Professionals by *Smart Asset* in 2020,

The Bluegrass Region's central location places Lexington within a 600-mile radius of the majority of the nation's employment, retail sales, and population. In addition, Kentucky's excellent transportation system of integrated state-maintained roads, interstates, and parkways the Bluegrass within overnight range of more than two-thirds of the U.S. market²¹. Central Kentucky boasts two major interstate highways, Interstate-75 and Interstate-64. I-75, a major north-south corridor, and I-64, a major east-west route, intersect north and east of downtown Lexington. Lexington is also home to the Blue Grass Airport and is

¹⁹ <https://www.kyinnovation.com/sbir/>, March 2020.

²⁰ <https://locateinlexington.com/data-facts-and-figures/why-lexington/educated-workforce/> - Commerce Lexington Inc. analysis of Kentucky Council on Postsecondary Education and U.S. Census Bureau ACS data.

²¹ <http://thinkkentucky.com/kyedc/pdfs/LogisticsQuickFacts.pdf?07112017&49>

within an hour's drive of the Cincinnati/Northern Kentucky International Airport and the Louisville International Airport.

Kentucky enjoys a tremendous competitive advantage in the provision of energy, natural gas, and water supply. Kentucky's industrial sector energy costs are among the lowest in the nation, averaging over 18% lower than the national average. In 2022, *Site Selection Magazine* ranked Lexington the #10 Top South Central Region Metro by Number of Economic Development Projects and ranked Kentucky #2 Top State by Number of Economic Development Projects Per Capita.

While Lexington is a first-class place to locate a business, it is also one of the best places to live and raise a family. In addition to a low cost of living, affordable housing, and low commute times, the region enjoys a wealth of natural beauty and offers various outdoor activities. Lexington boasts many outstanding lifestyle and cultural amenities of a major metropolitan area including premiere horse-racing, numerous museums, and prestigious athletic teams. For a look into life in Lexington, click [here](#).

