WHITEPAPER

Leveraging AI to **Generate Breakthrough Ideas** in Science

PRESENTED BY:

DOCTOR EVIDENCE®
AI Powered Insights

PUBLISHED BY:

FIERCE Biotech

Abstract

TODAY'S PHARMACEUTICAL PROFESSIONALS FACE INCREASING PRESSURE TO DISCOVER, position, and repurpose drugs more efficiently than ever before. This requires an almost impossible task of understanding the vast and ever-expanding universe of published medical literature, as well as the ability to analyze that literature in a meaningful way. Artificial intelligence (AI) technology now empowers scientists to directly harness data and evidence to triage idea generation and hypothesis testing. "Practical creativity" – where ideas are backed by data that offer directional clues to where you can effectively go – is now possible. AI, properly applied, can democratize idea generation, so that scientists have the power at their fingertips to ask questions and get directional answers that warrant additional investigation and investment. This allows them to focus their efforts on smaller, more targeted and highly relevant literature sets.

Doctor Evidence (DRE) offers DOC Analytics, an AI-driven software solution created specifically to empower scientists with the ability to discover and explore new hypotheses based on supporting evidence in real-time. Never before was it possible to quickly check the validity of an idea, with deeply applied methodological rigor, in real-time. DRE's technology enables scientists and stakeholders to support critical business decisions that shape the arc of success or failure for a therapeutic product using the IDEA framework: **I**dentify and **D**iscover **E**vidence for **A**nalysis. By unlocking the power of AI technology applied to medicine, we unlock the possibility of better healthcare in the future for all.

Leveraging AI to Generate Breakthrough Ideas in Science

Pharmaceutical companies today operate under increasingly tight pressure to discover, position, and repurpose drugs with greater efficiency and efficacy than ever before, with the new drug approval rate at less than 12% and the cost of bringing a new drug to market reaching a new height of between $1 billion and $2.6 billion (Gardner, 2020 and Sullivan, 2019). While the vast amount of published medical literature is a primary resource for researchers, locating and analyzing the right data also creates a bottleneck to decision making, idea exploration, and workflow. Not only must scientists identify relevant articles, they must also spend time interpreting the reported data. DRE's DOC Analytics — DOC stands for "Digital Outcome Conversion" — radically streamlines this process by delivering directional answers to researchers' questions. This grants new powers for idea generation, validation, feasibility and landscape assessment, and hypothesis testing.

Instead of requiring highly credentialed researchers to spend significant time identifying, screening, reading, extracting data, and painstakingly analyzing each source, DOC Analytics lets them build "natural language medical questions and get precise search results," according to Doctor Evidence (DRE) (PR Newswire, 2020). The platform leverages artificial intelligence via DRE's DOC Search platform to generate highly targeted results. These results are then processed into rapid feasibility and landscape assessments using DOC Analytics' statistical analysis engine. All results are completely transparent and are automatically assigned the correct statistical package.

DOC Analytics operates on the IDEA framework: **I**dentify and **D**iscover **E**vidence for **A**nalysis. By entering a targeted question in the search engine, researchers will find actionable answers from articles sourced from all available research databases, greatly reducing selection bias and required critical appraisal of literature time. Scientists can now cover immense ground in minutes, marking ideas that show scientific promise for further study and ruling out those that lack supportive evidence. This helps teams make important business decisions to build their clinical programs with more optimized resource allocation, which in turn increases availability for higher value-added activities and greater margins in a challenging environment. This represents a turning point for the development of therapeutic products for companies and patients alike; by applying AI-driven analytics to medical literature, better healthcare solutions are possible.

In a single decade, between 2003 and 2013, not only did the cost of a successfully approved drug increase by 145%, but the actual rate of successful release dropped to only 12%.

Industry Challenges

The significant increase in drug-to-market costs is not the only challenge pharmaceutical firms are working to overcome.

Increased pressure for faster R&D times

In order to reduce the cost of drugs for consumers, in 2016 the FDA implemented the 21st Century Cures Act to accelerate research, development, and delivery of new therapeutics to the market (Congress.gov, 2016). Though the intention of this is to reduce the cost of drugs for consumers, it increases liability for the drugmakers in terms of greater regulatory and patient safety risks.

Patent cliffs

Drug patents expire, and when they do, the sharp drop-off of those drugs' sales have a pronounced effect on the manufacturer and the market alike (Drug Patent Watch, 2020). As soon as a patent expires, competitors scramble to position new branded drugs to fill the market niche, and ultimately the market is flooded with lower-cost generics. Prescription drugs at risk for patent expiration worldwide are predicted to account for $36 billion in 2022, according to Statista (Statista, 2020).

Fewer successful drug approvals

In a single decade, between 2003 and 2013, not only did the cost of a successfully approved drug increase by 145%, but the actual rate of successful release dropped to only 12%. This represents a nearly 50% decrease, according to research done by Tufts Center for the Study of Drug Development (DiMasi et al, 2016).

Out-of-pocket costs vs. time

The $2.6 billion figure for new, approved compounds is largely accounted for by research and development (R&D) (Gardner, 2020). Forbes notes that this price tag must also account for the cost of failures, which comprise the overwhelming majority of new drug initiatives (Herper, 2017).

The larger figure breaks down into two broad categories of nearly equal importance: (1) a firm's out-of-pocket costs, which account for a little more than half of the $2.6 billion, and (2) its time costs, which account for a little less than half (Sullivan, 2019). These time costs are composed of sacrificed returns on the part of investors and the firm alike as scientists research, develop, and rigorously test the product — and it is an area in which DOC Analytics is uniquely suited to help.

By allowing companies to do more with less, DOC Analytics can reduce overhead and put companies on the course to better products with faster concept-to-completion times.

With the volume of scientific data growing dramatically, identifying the appropriate sources is increasingly time-consuming. The industry needs a way to ask specific questions and receive actionable, data-backed answers in very little time.

DOC Analytics

The aforementioned challenges highlight the need for a solution to help pharmaceutical companies shorten the amount of time required for R&D while improving the quality of their therapeutics. Given the scale of these challenges, any technological solution that can save researchers time reviewing literature is highly valuable. While sourcing information from published medical literature is a high value-added activity, reading through irrelevant articles is not. With the volume of scientific data growing dramatically, identifying the appropriate sources is increasingly time-consuming. The industry needs a way to ask specific questions and receive actionable, data-backed answers in very little time.

DOC Analytics provides this capability. Researchers can ask natural-language or PICO Framework-formulated questions, and the platform immediately delivers an answer with real-time, powerful quantitative analyses complete with key visualizations. These "Bayesian-in-a-browser" analytics allow scientists to take advantage of the sheer quantity of research available today instead of struggling against it.

DOC Analytics is a specialized tool for conducting feasibility and landscape assessments, allowing firms to ultimately capture "90% of the value of what would normally be a $100,000 outsourced project in minutes," according to Toby Sayre, Chief Commercial Officer at DRE. The cloud-based platform is intuitive for the user. For example, a user could ask the system, "Does Humira increase ACR20 in patients with Rheumatoid Arthritis?" and receive a data-backed response with full transparency in data sources and statistical methods.

Additional capabilities for expert users include direct and indirect meta-analysis, including network meta-analysis and cohort analysis, from clinical studies. Literature available for analysis includes all articles and data from publicly available search engines such as PubMed, MEDLINE, and pre-print articles. It also includes over 60,000 pre-curated articles and all data from Clinicaltrials.gov, as well as the WHO trial registry. The intuitive Dashboard interface allows executive-level questions to be structured, organized, and answered precisely and rapidly.

Advanced filtering and configurability let researchers select inclusion and exclusion criteria to narrow down their search to the appropriate study types, cohort sizes, certain sub-populations, and other filtering options.

The solution to this battle must use "artificial intelligence (AI)" along with real-world data to generate hypotheses at scale and improve testing efficiencies for dozens of use cases across the value chain."

DOC Analytics Adds Value to Firms and Consumers

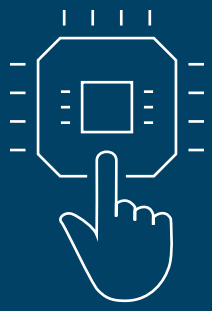
In another recent report, McKinsey & Company outlines the "integrated-evidence-generation battleground" that pharma companies currently occupy (Davidson, et al, 2020). The solution to this battle must use "artificial intelligence (AI) along with real-world data to generate hypotheses at scale and improve testing efficiencies for dozens of use cases across the value chain." Using such a solution has a dramatic impact on a company's ability to understand drug effectiveness and make more informed decisions around pricing. For companies with revenues between $20 and $50 billion, using such technology "could improve earnings by around $300 million a year within three to five years as a result" (Davidson, et al, 2020).

DOC Analytics delivers rapid insights that save companies resources, letting them direct those resources where they are most likely to yield returns and beneficial therapies (Champagne, et al. 2020). This delivers benefits across the pharma value chain. AI replaces large amounts of time research teams have conventionally needed to spend conducting feasibility assessments and identifying new targets. These teams can instead rapidly improve formulary positioning, negotiate with more confidence, and provide more robust risk/benefit analysis for any product by pointing to supporting trials, omics, and RWE.

In turn, the capabilities provided by DOC Analytics widen the playing field for idea generation, allowing more parties to ask questions and explore new possibilities. The result is an improvement in patients' lives. By enabling pharmaceutical companies to stay current on real-time data and focus on products with higher safety and efficacy indicators, patients benefit from higher-quality drugs released to market more quickly. Lower overhead costs for drugmakers also translates to the potential for lower drug costs for consumers.

A Platform Solution

Pharmaceuticals have lagged behind many other industries in terms of digitalization due to the high costs and long cycles of development, which is often slowed by legacy processes (Leclerc and Smith, 2018). Whereas conventional methods may take months or years to discover a promising new drug, with platform solutions "it can take as little as weeks or months to go from concept to drug"



Users across an entire enterprise — from C-suite officers to lab personnel — can have personalized, specifiable access levels to DOC Analytics, while information can be instantly shared with everyone in the organization in "read only" form.

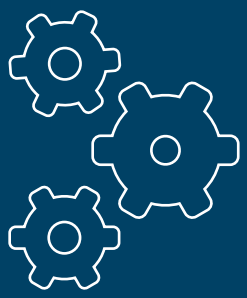
(Leclerc and Smith, 2018). This results in immense value creation for a company.

As a platform solution, DOC Analytics places a large information base behind new therapies and lets pharmaceutical companies eliminate a major pain point. Platform solutions, by their nature, enable industry-wide pre-competitive collaboration; DOC Analytics embraces that ethos by offering a common solution to an industry-wide problem that any company can benefit from (Holland, 2015). It leads companies to greater efficiency with use-case-driven functionality and innovation.

Streamlined Integration With Existing Technology

DRE's DOC Analytics platform works seamlessly with DOC Search and DOC Label for full accessibility and extensibility across software tools. Additionally, the software integrates cleanly with a company's existing technology stack, ensuring a future-proof and scalable solution. The DRE support team can also build custom dashboards and design specialized analyses for additional data sources.

Users across an entire enterprise — from C-suite officers to lab personnel — can have personalized, specifiable access levels to DOC Analytics, while information can be instantly shared with everyone in the organization in "read only" form. Thanks to this vertically integrated methodology, companies benefit from a crowdsourced approach with insights delivered in a digestible and actionable format.



DRE's DOC Analytics platform works seamlessly with DOC Search and DOC Label for full accessibility and extensibility across software tools. Additionally, the software integrates cleanly with a company's existing technology stack, ensuring a future-proof and scalable solution.

DOC Analytics: The Way Forward in the New Normal

The post-COVID new normal will require pharmaceutical companies to become more agile entities, making ever more efficient use of fewer resources and accelerating the pace of their decision making (Sayre, 2020). With the number of medical publications, RWE, and clinical trials growing exponentially, pharmaceutical companies must turn to technology to capitalize on the full spectrum of research available to them.

DOC Analytics represents a new type of core capability for drugmakers: the ability to utilize the ever-growing analytical power of AI to answer natural-language questions in real-time, with data-backed research sourced from all available literature. Such a capability lets companies remain adaptive and nimble in an increasingly complex business ecosystem. DOC Analytics is the breakthrough tool for such an environment, providing rigorously methodological analysis for cutting-edge research applications.

For more information, please visit **https://drevidence.com**.

DOCTOR EVIDENCE®
AI Powered Insights

DRE is a market leading company in the AI-enabled health technology market-place that deploys state-of-the-art solutions to identify, synthesize and analyze complex clinical data into actionable insights. Its technology platform empowers DRE clients to generate and explore hypotheses, and improve health outcomes.