NGS is Accelerating Therapeutic Antibody Discovery

WHAT LIES BEYOND?

Predicting Successful Biologics of the Future
# Table of contents

**Introduction:**  
- NGS on the roadmap for many antibody R&D companies  
- Revealing the next blockbuster biologic  
- Realizing NGS’ full potential  
- Innovative software to command NGS  
- The power of doing NGS analysis in the Cloud  
- Cloud enabled scientific acceleration  
- Integrating antibody R&D applications  
- Geneious Biologics and NGS power new research

**Conclusion:**  
- Seeing the future

Request a Demo
NGS on the roadmap for many antibody R&D companies

Around the globe, enterprises involved in therapeutic antibody R&D are drastically improving efficacy and potency of monoclonal antibodies by revolutionizing how next-generation sequencing (NGS) is applied to their discovery and development.

The ability to mass sequence antibody DNA and include novel experimental data, which is now routinely generated in high-throughput sequencing, has provided biopharmaceutical enterprises with a vast amount of highly valuable research data. This data, if maximized and applied effectively, contains the keys to better, more effective antibody therapies of the future.

With NGS already in play or on the roadmap for many companies involved in therapeutic antibody R&D, this eBook aims to explain why a cloud-based bioinformatics platform is needed to extract maximum value from NGS and associated data, enhance speed and accuracy during discovery, protect valuable intellectual property (IP) and predict therapeutic antibody breakthroughs of the future.

Revealing the next blockbuster biologic

The iterative development of potent antibody therapeutics involves generating, sequencing, analyzing and optimizing antibodies to improve their clinical potential.

NGS allows a massive increase in the generation of antibody sequence data for R&D at relatively low cost and in a short time frame. Large NGS datasets open an opportunity for researchers to delve deeper into an antibody’s therapeutic properties. By revealing previously unseen novelties in sequence libraries and expanding repertoire analysis, NGS allows researchers to extract new knowledge about an antibody’s blockbuster potential.
Realizing NGS’ full potential

Unlocking the full possibilities of NGS requires innovative new software approaches that give researchers the power to probe reams of antibody sequence information quickly and accurately in order to narrow their search for successful therapeutic candidates.

The software challenge is to create a secure analysis platform, with nearly limitless processing power, that supports storage, management and sharing of NGS antibody data, creates a robust and defensible repository of research activity, enables predictive analysis and allows researchers to focus on what counts - understanding their most promising antibodies in minute detail.

Frustratingly, the sheer complexity of studying and comparing millions of potentially life saving therapeutic antibodies, at the DNA level, is beyond the capability of most currently available data management and analysis tools. Using rudimentary analysis tools can make antibody discovery a painstaking, drudgerous task and put a company’s IP at risk.
Geneious Biologics’ rapid development is singularly focused on bringing the unprecedented capability described above to NGS data analysis.

Engineered to intelligently manage and process NGS data at massive scale in the cloud, Geneious Biologics brings together advanced analytics tools in a user friendly interface, to help researchers understand the diversity and quality of their antibody libraries in never before known detail.

Innovative software to command NGS

Imagine a software platform for antibody NGS screening, analysis and engineering that can:

- Compare millions of NGS sequences with no manual intervention thus freeing scientists to focus on strategic research
- Augment researchers’ ability to quickly identify irregularities and understand unique properties in antibody NGS sequences
- Compare new with historical research findings and apply novel new analysis approaches in order to advance understanding and avoid repeating mistakes
- Search and filter large NGS datasets allowing R&D companies to quickly find and prioritize millions of stored sequences
- Provide a detailed record of all research activity to defend IP if it is challenged
- Proactively spot high-level trends, across time, by consolidating and analyzing historical NGS data
- Use machine learning and artificial intelligence (AI) to scour NGS repositories and predict the properties of effective therapeutic antibodies

Geneious Biologics’ rapid development is singularly focused on bringing the unprecedented capability described above to NGS data analysis.
The power of doing NGS analysis in the Cloud

Geneious Biologics’ API enables organizations to consolidate NGS and assay data from multiple sources on a unified cloud platform. Conducting antibody sequence analysis centrally, in the cloud, eliminates the problem of research results spread across disparate computers and servers. In this environment predictive analytics can be applied to the entirety of an enterprise’s critical antibody research data to probe for deeper insight and potentially derive predictions about an antibody candidate’s efficacy.

Cloud enabled scientific collaboration

Undertaking mission critical antibody R&D on a unified cloud platform allows scientists and researchers to collaborate better. Centralized collaboration software drives consistency in NGS antibody analysis by encouraging standardized, predictable workflows across research operations. Effective collaboration aids scientists in tracking and replicating their work, bringing organizational benefits by allowing entire research divisions to leverage historical insights, knowledge and experience across lines of business.

Geneious Biologics improves the effectiveness of Antibody Discovery teams by allowing multiple roles, from screening to optimization to construct generation to cloning, to share the same analysis tools and data. This removes the need to ask colleagues to search for a particular sequence on their siloed data instance and can significantly increase speed and accuracy in drug discovery.
Integrating antibody R&D applications

Geneious Biologics is fully interoperable with Geneious Prime desktop DNA analysis software. Seamless cloud integration allows users to transfer sequence data in real time from Geneious Biologics to Geneious Prime, and vice versa, simplifying transfer of NGS antibody data for downstream processing.

Minimizing the need to export NGS and assay data between applications not only removes a significant data management challenge, it lessens the risk of data loss. Workflows managed on the Geneious Biologics cloud platform are logged and traceable, streamlining the flow of antibody NGS data across the entire drug discovery process.

Consolidating antibody research data in the cloud also simplifies the traceability of information, an important consideration in protecting critical IP developed during therapeutic antibody R&D.
Geneious Biologics and NGS power new research

Bicycle Therapeutics and Isogenica are two examples of customers successfully using Geneious Biologics to achieve deep understanding of their large repertoires of antibodies and antibody-like constructs.

Isogenica has applied Geneious Biologics’ NGS tools to simplify analysis and improve understanding of the diversity contained in their three proprietary antibody libraries.

Bicycle Therapeutics is using Geneious Biologics to gain deeper insight into their proprietary bicyclic peptide (Bicycles®) platform. Additionally, Bicycle Therapeutics intends to use Geneious Biologics’ motif identification capabilities to mine years of accumulated data and predict sequences that can be developed into successful biologic drugs.

Seeing the future

Companies involved in therapeutic antibody R&D who position themselves to take full advantage of NGS and predictive analytics will certainly outperform those who do not.

Storing and collaborating on NGS antibody sequence data centrally, in the cloud, brings huge benefit over time as new techniques of machine learning and AI can be applied to massive quantities of historical NGS data.

Geneious Biologics is committed to accelerating therapeutic antibody discovery today and will continue to work with innovators in antibody R&D to help them protect their mission critical research and bring lifesaving biologic drugs of the future to market faster.
The Power Behind NGS Analysis

Request a Demo