Genedata
solutions in silico

immatics®

> ***Genedata Biologics gives all our R&D groups a central place to record and access TCR-related information in real time, along the end-to-end workflow.***
>
> **Dominik Maurer, Ph.D.,** VP of Immunology at Immatics

INDUSTRY
Cell & Gene Therapy (CGT)

GENEDATA CUSTOMER SINCE
2019

ABOUT IMMATICS
Immatics is a globally operating clinical-stage biopharmaceutical company developing novel T cell receptor (TCR) -based immunotherapies

KEY CHALLENGES
Need a purpose-built enterprise software solution to increase efficiency of proprietary TCR engineering for cell and gene therapy R&D

RESULTS
Streamlined workflows, central access to all TCR-related R&D data, improved collaboration across various teams, more transparent decision-making

GENEDATA SOLUTION

BIOLOGICS

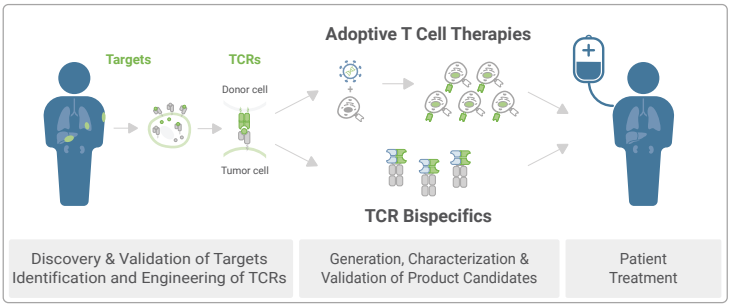
Immatics Builds on Genedata Biologics for Cell Therapy Innovation

Biotechnology – Cell & Gene Therapy (CGT)

Background & Challenges

Immatics is focusing on the development of novel therapies to treat cancer patients with solid tumors. To develop T cell receptor-based immunotherapies, Immatics employs two innovative proprietary technologies. Immatics' XPRESIDENT® technology is one of the largest mass spectrometry platforms in the world, encompassing numerous tumor sample spectra. This allows Immatics to identify the peptides unique to tumor tissue, representing potential novel cancer targets. Immatics' XCEPTOR® technology is used to identify T cell receptors that bind the tumor-specific targets, isolate their binding regions, and further optimize them for even greater specificity and improved affinity. Protein engineering is then applied to design and produce TCRs with desired binding characteristics for use in two therapeutic approaches: autologous and allogeneic adoptive cell therapies and TCR-based bispecific molecules.

The company's proprietary pipeline currently includes seven product candidates in pre-clinical and clinical stages. Ten additional programs are developed with leading biopharmaceutical companies such as Bristol Myers Squibb, GlaxoSmithKline, Amgen, and Genmab.



The Immatics' approach to developing TCR-based immunotherapies: *Tumor-specific targets and corresponding TCRs are discovered, validated, and characterized using proprietary technologies. Natural or optimized TCRs with low micromolar affinity and favorable specificity are developed for use in adoptive cell therapy. Affinity-matured TCR variable domains with low to sub-nanomolar affinity and favorable specificity are engineered into highly potent TCR bispecifics with extended half-life and antibody-like stability.*

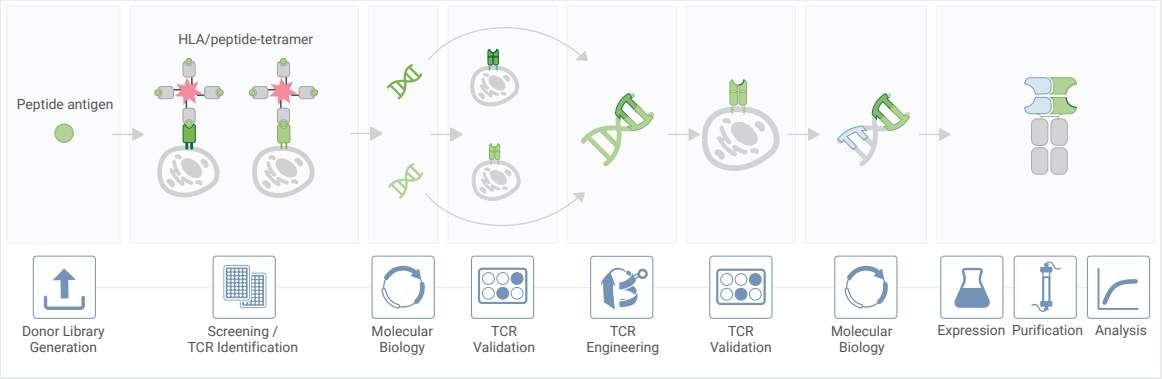
The TCR-related R&D workflow at Immatics is very sophisticated, involving hundreds of individual steps and iterations to generate new molecules and cell lines, engineer and optimize the therapeutic modalities, and constantly test and monitor them to see if they are fit-for-purpose. Each step generates critically important data that needs to be captured, processed, analyzed, and made available to various R&D teams. The complex data stream includes all molecule, sequence, and sample details, assay, and analytics values, as well as decisions such as the CDR combinations to be used to engineer distinctive TCR bispecific molecules. This data must be integrated, stored, related, and interpreted in real time to support the day-to-day activities of the various Immatics' R&D teams.

"We required a scalable software solution that is compatible with Immatics' proprietary platforms to facilitate the systematic analysis of our TCR data for our proprietary and partnered programs," said Dominik Maurer, Ph.D., VP of Immunology at Immatics.

Solution

To identify the optimal digital workflow platform, Immatics performed a comprehensive market assessment, based on their specific requirements, before choosing Genedata Biologics®. While the preference was for a commercial off-the-shelf (COTS) product to provide a maximum of built-in functionalities, facilitate deployment, and ensure future maintenance, a custom development project was also

Immatics' workflow requirements for the new digital platform: *A diagram of the TCR bispecifics' portion of the workflow highlighting selected key steps such as tumor-specific peptide discovery and associated TCR screening, molecular characterization and TCR validation, affinity maturation and further protein engineering, as well as protein expression, purification, and analysis. Data needs to be captured, processed, related, and interpreted to streamline the overall R&D workflow.*



Immatics' new digital workflow platform, based on Genedata Biologics: *The new platform acts as Immatics' TCR workflow and information backbone, connecting various R&D teams. Here, a screenshot shows a dedicated lead finding campaign listing all relevant molecules, such as optimized TCRs as well as affinity matured and highly engineered TCR-based bispecifics. Genedata Biologics provides direct access to all relevant R&D information about a therapeutic TCR or TCR bispecifics candidate, its components, and its full historical record including specificity, efficacy, safety, stability, manufacturability, and developability.*

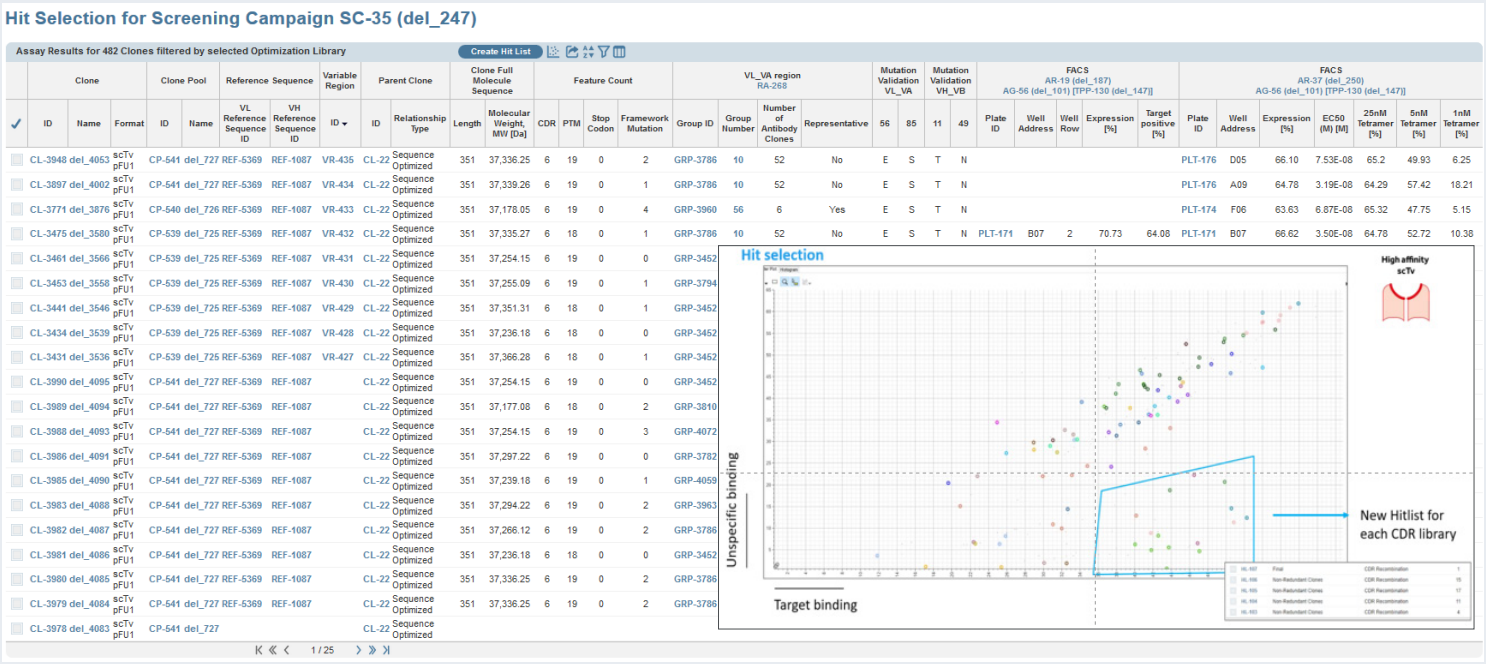
65 Target Product Proteins — Create Request — Protein Analyzer

✓	ID	Name	Format	TPP Format Glyph	Chain Info	Chain Multiplicity	Production Dataset ID	Project ID	Registered By
☑	TPP-116	IM_TPP-1109	TCR		Alpha Chain, Beta Chain	1, 1	PDS-16	PRJ-16	Irvin Maier
☐	TPP-114	TCR.VR-104	TCR		Alpha Chain, Beta Chain	1, 1	PDS-15	PRJ-15	Irvin Maier
☑	TPP-90	TCER (A).003TCR-M001-G04.anti-CD3	TCER (A)		Heavy Chain 1, Heavy Chain 2	1, 1		PRJ-12	Irvin Maier
☐	TPP-89	TCER (A).anti-CD3.TCR_Clone_2	TCER (A)		Heavy Chain 1, Heavy Chain 2	1, 1	PDS-13	PRJ-9	Irvin Maier
☐	TPP-88	TCER (A).VR-52.TCR_Clone_2	TCER (A)		Heavy Chain 1, Heavy Chain 2	1, 1	PDS-13	PRJ-9	Irvin Maier

considered. "We did speak to several software providers, but it was clear early on that Genedata's out-of-the-box product provided the best solution for us," said Felix Unverdorben, Ph.D., Associate Director of Immunology at Immatics. "During our very first conversations with Genedata it was obvious that they understood our research processes and had a product that could be easily adjusted to our needs. Their system had everything in place already and wouldn't need major changes to be made afterwards," Dr. Unverdorben continued.

Without the need to embark on a costly and time-consuming software customization project, the roll-out of Genedata Biologics was straight-forward – and fast. During the deployment project, Genedata worked closely with Immatics to optimally set up the platform and configure Immatics-specific CGT workflows. With extensive domain knowledge and experience from working with both small and large cell and gene therapy companies, Genedata knows how to accelerate, simplify, and optimize specialized CGT processes directly with each customer. "I only realized over the course of the deployment process how different the languages of lab scientists and software developers really are, and we very much appreciated the know-how and mediating skills of Genedata's scientific consultants. They understood the topic and the problems we faced in the lab and could translate them into a tailored solution adapted to our needs. This way, we could benefit from an established platform that still could be flexibly adjusted as needed, " said Sebastian Bunk, Ph.D., Senior Director responsible for developing Immatics' pipeline of TCR Bispecifics.

Genedata Biologics is now used productively for all proprietary and partnered R&D programs at Immatics, including bispecifics and adoptive cell therapies. As an integrated workflow platform, it enables efficient screening, engineering, production, and testing of TCRs and TCR-based molecules, as well as lentivirus production and cell line development. The system comprehensively tracks properties of each therapeutic candidate, including specificity, efficacy, safety, stability, manufacturability, and developability. It also provides the necessary scalability to support Immatics' quickly growing R&D organization. It maintains a complete historical record of



Genedata Biologics' integrated dashboards enable informed and transparent decision-making: *An example of a dedicated hit selection table integrating and interpreting molecule information (e.g., sequence information) in the context of assay data (e.g., flow cytometry results) for distinct TCR clones assessed for affinity maturation (back panel). Affinity selection data can also be systematically visualized to select optimal lead candidates demonstrating both high specificity and optimal affinity (outlined in blue on the front panel). Such specialized dashboards are built into Genedata Biologics and available out-of-the-box.*

each molecule, cell line or sample used for TCR engineering, and documents the full context of decisions, including all supporting experimental data. "We can actually track which clone delivers which CDR of which parental optimization library, so we have complete documentation throughout our whole process here - this is really cool," continued Dr. Unverdorben.

Efficiency Gains & Cost Savings

With Genedata Biologics as a central place to record and access all TCR-related information, Immatics is seeing both significant efficiency gains and cost savings. Documenting day-to-day lab operations has been streamlined and simplified, and scientists can now focus more on exciting R&D projects and experimentation. "The implementation of the Genedata platform has helped us to digitalize Immatics' TCR-related R&D. This means that time-consuming paperwork is minimized, and we can easily find information when it is needed," said Dr. Unverdorben. "While our initial focus when adopting the Genedata platform was to make our documentation and decision making more efficient, we have realized that we are also reducing manual errors and inconsistencies, which is an additional major benefit on top of the efficiency gains," Dr. Unverdorben continued.

Specialized groups at Immatics focus on subsets of tasks in the TCR-related R&D process, such as TCR discovery, validation, engineering, and production. Besides enabling a smooth handover of samples and information between the groups along the overall workflow, Genedata Biologics provides dedicated purpose-built functionalities for each of these groups, such as optimization libraries, molecular workspace, and hit selection tools.

However, the benefits of data accessibility and transparency extend beyond laboratory logistics. Regardless of the geographic location, the latest data is accessible to various teams, making it possible to work simultaneously and efficiently on joint projects. All involved teams have access to Genedata Biologics, which acts as the source of TCR-related data and thus assists in Immatics' ability to enhance their digital capabilities.

A return-on-investment (ROI) calculation produced during the initial selection process predicted that ongoing cost savings would outweigh the investment of bringing in the Genedata platform. "When we embarked on our search for a software solution to support our R&D, we considered different options and in the end committed to the higher initial expense," said Dr. Bunk. "What we discovered is that the Genedata platform has provided efficiency gains on many fronts, eliminated redundancies in our daily work, and decreased our overall ongoing operating costs. In the end, we are very happy about the decision to proceed with Genedata, not only for its operational and scientific support, but also from a business perspective," Dr. Bunk added.

Outlook

To address future requirements, Genedata continues to develop the Genedata Biologics platform and support the newest technologies and approaches in biotherapeutics R&D. Continual investment in product development keeps the platform future-proof. The multiple releases each year provide Genedata customers with new functionalities, for example to support additional CGT modalities, at no additional cost. This ensures that Immatics can benefit well beyond the initial deployment as the Genedata platform evolves and incorporates innovative therapeutic modalities and new R&D technologies as they emerge.

Developing novel biotherapeutics is a long and expensive process. A robust, all-in-one solution can greatly shorten R&D timelines. By having the foresight to adopt Genedata Biologics, Immatics now has all their critical TCR-related R&D data centrally available with maximum traceability and accuracy so they can make decisions in a faster and more transparent way, which ultimately accelerates the development of new therapeutic approaches.