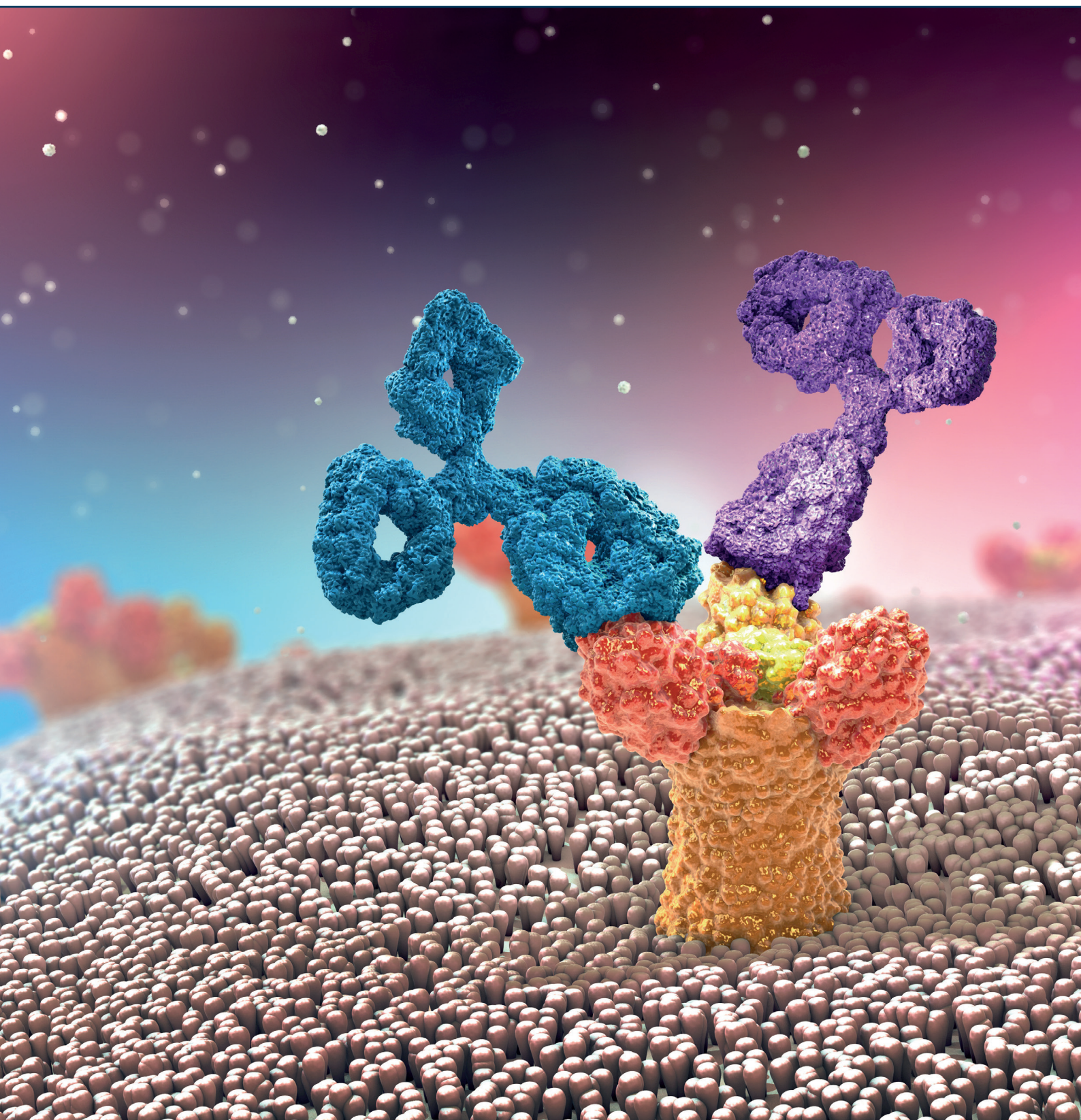




**CLINICAL
DIAGNOSTICS**

Contract Services | 2023

Protein Production, Antibody Generation
and Assay Development



The
NativeAntigen
COMPANY



Our Capabilities

While known for our infectious disease expertise, The Native Antigen Company operates across a range of fields for clients in academia, biopharma and IVD. Our end-to-end capabilities enable us to support your entire pipeline, from concept to expedited product development and scale manufacture. With dedicated teams of molecular biologists, microbiologists, purification scientists and assay development specialists, we excel in three core areas:



Protein Production & Purification

Whether you need a human biomarker, functional enzyme or native antigen, we're able to develop, scale manufacture and purify your protein of interest for a range of different end-user applications. Our protein production capabilities include the full workflow from vector design, through to expression, purification and bespoke formulation. With our proprietary **VirtuE™** HEK293 expression system, we're able to produce proteins with native-like glycosylation and proper folding for maximal performance in assays. For more information on our protein production and purification capabilities, see pages [3-4](#).



Antibody Generation & Purification

Whether you need monoclonal, polyclonal or human-chimerised antibodies, we offer a range of antibody generation and expression capabilities. In conjunction with our in-house protein development capabilities, we can also provide custom antigenic targets. Our additional services include hybridoma banking, conjugation and a range of antibody engineering options. For more information on our antibody generation and purification capabilities, see page [5](#).



Assay Development & Analysis

Our assay team has decades of experience developing ELISAs, as well as partnering with clients to support their assay optimisation and validation pipelines. Depending on the application, we can develop and advise on a range of formats, from simple antigen-down assays, to more complex double antigen bridging (DABAs) and surrogate neutralisation assays. We're also able to raise and optimise antigen-antibody and antibody-antibody pairs, as well as offering a range of analytical services, including endotoxin, stability, and bioactivity testing. For more information on our assay development and analysis capabilities, see page [6](#).



Working With Us

When working with us, our clients benefit from:



Quality

Traceable from manufacture through to delivery, our processes ensure a high level of confidence in the quality and reproducibility of our products. We operate to ISO9001:2015 standards, thereby meeting the requirements of ISO13485 or GMP systems for raw materials to be manufactured to recognised quality standards. We also welcome external audits and requests for further documentation.



Agility

With extensive experience responding to viral outbreaks, we understand what it means to be agile. To maximise speed to market for our clients, we're able to parallelise multiple feasibility studies, accelerate scale manufacture and purify products with a range of different techniques.



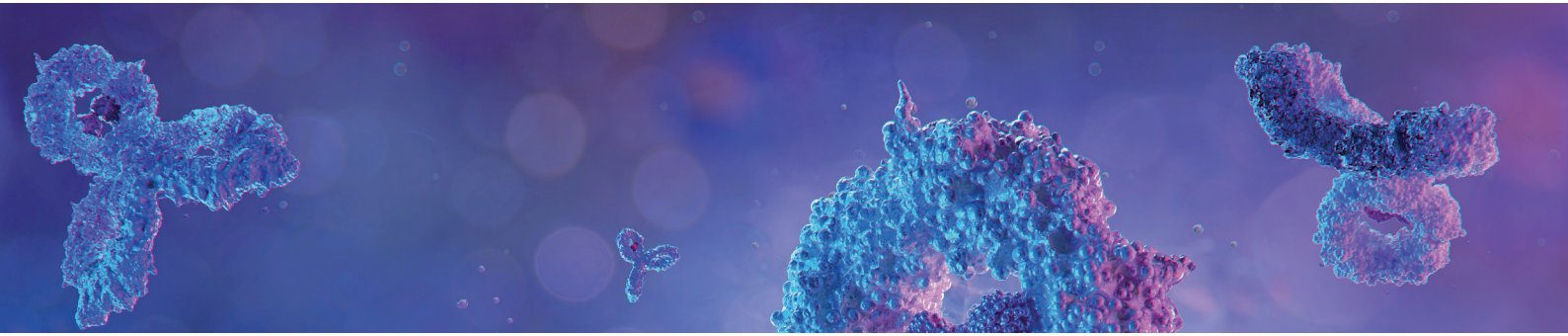
Transparency

Honesty and transparency are central to what we do. We understand that nothing hampers collaboration more than poor communication and so have established systems to ensure that our clients are fully informed of their project's progress at each stage. During a project, clients gain direct access to our R&D team, who provide regular progress updates and data.



Flexibility

We're able to follow specific protocols to yield highly standardised datasets for regulatory submissions, as well as adapting our workflows to meet changing client needs through the course of a project. We understand that flexibility is key for our clients and always seek to accommodate their needs.



Protein Production & Purification

Protein Production

Whether you need a human biomarker, functional enzyme or native antigen, we're able to develop and scale manufacture your protein of interest for a range of different applications. Our production services include:

- Vector design and codon optimisation
- Parallelised transfection/transduction with multiple constructs
- Expression from a range of systems, including mammalian, insect and *E. coli*
- Small-scale testing and expression optimisation (go/no-go decision stages)
- Scalability in adherent and suspension cultures
- Bespoke and modular workflows
- Cytoplasm and secretion-specific expression

Protein Purification

With a dedicated purification team, we're able to use a range of methods to achieve maximal protein purity and batch consistency. Purifying your protein will begin with a discussion about specific requirements, such as functional purity, enzymatic activity, removal of specific contaminants or use of bespoke buffers. We can then work with you to develop a custom strategy with typical steps including:

- Cell disruption or concentration of secreted protein by TFF
- Affinity, ion exchange, hydrophobic interaction and size exclusion chromatography
- Protein refolding screen and scale-up by dilution/dialysis
- Membrane preparation by ultra-centrifugation
- Endotoxin removal
- In vitro protein modification
- QC by SDS-PAGE, Western blot and ELISA

If required, more extensive QC can be carried out, including but not limited to, mass spectroscopy, circular dichroism, confocal microscopy, electron microscopy, analytical ultracentrifugation and N-terminal sequencing.

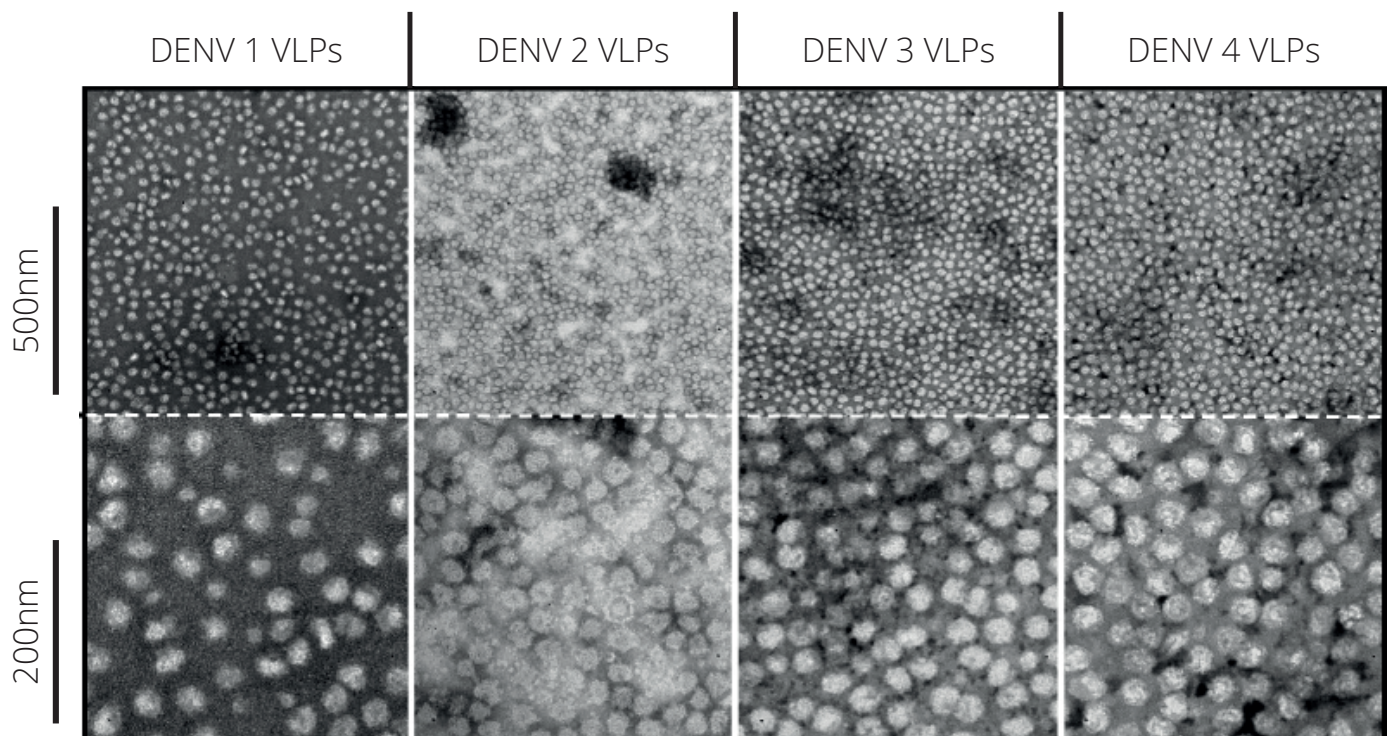
Virus-Like Particle Production

Virus-Like Particle Production

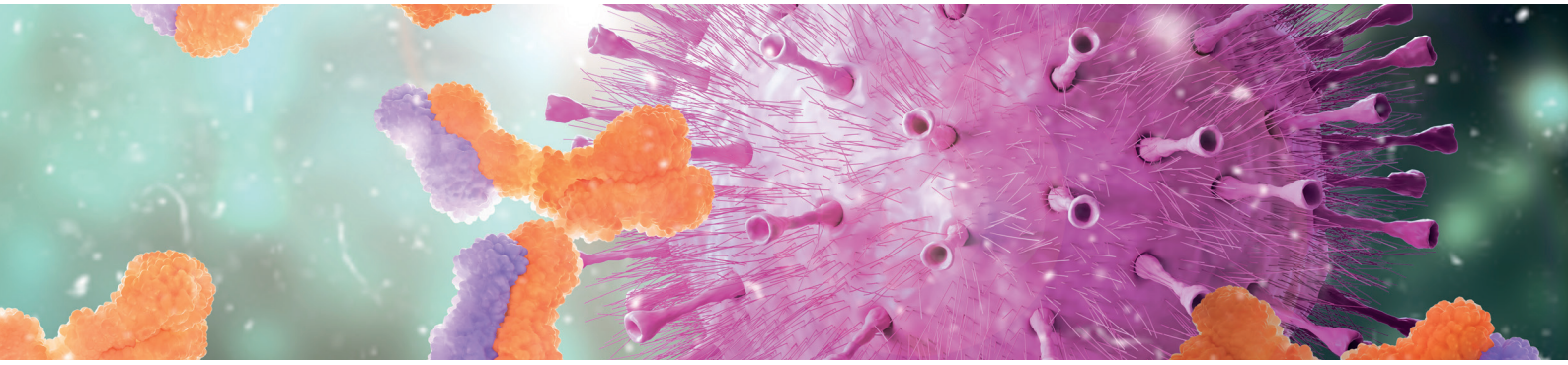
Virus-like particles (VLPs) are particles that structurally and antigenically resemble a virus, but contain no genetic material and are therefore non-infectious. Our team includes world-recognised experts in the development and scale-production of VLPs, working in an ISO9001:2015-accredited suite of laboratories using state-of-the-art virology techniques.

Producing complex oligomeric particles often requires a bespoke approach. We therefore always review a new request with the client to maximise success. VLP production is typically carried out in mammalian or insect cells to ensure proper folding and native-like post-translational modifications. When carrying out a VLP project, typical steps include:

- Gene synthesis and cloning with bicistronic expression vectors
- Expression testing and optimisation
- Large-scale production in mammalian or insect cells
- Ultracentrifugation and column chromatography
- QC with SDS-PAGE, Western blot, confocal and electron microscopy



Electron micrograph of our dengue virus-like particles, produced by Metz and colleagues: <https://virologyj.biomedcentral.com/articles/10.1186/s12985-018-0970-2>



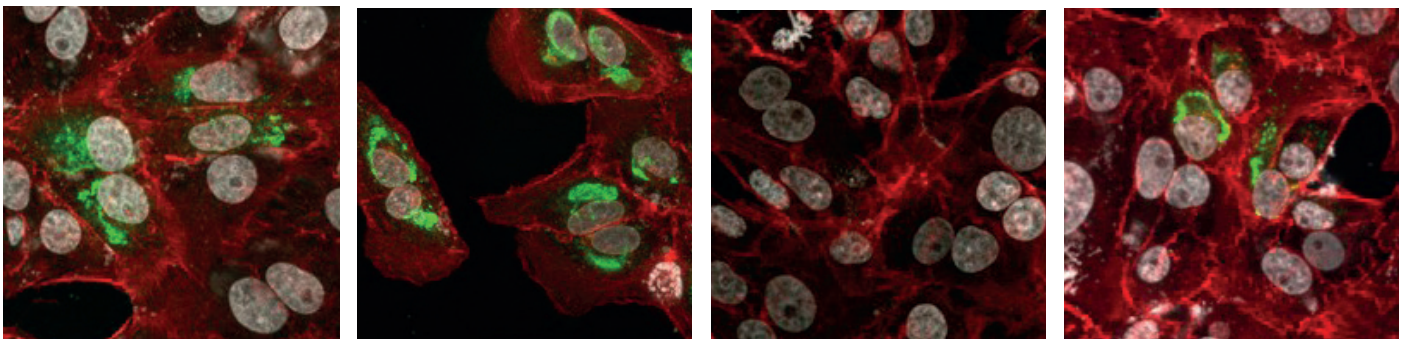
Antibody Generation

Whether you need monoclonal, polyclonal or engineered antibodies, we offer a range of generation, production and purification capabilities. With access to animal facilities, we can generate primary and secondary antibodies from a range of different hosts with our in-house produced antigens or those that clients provide. For scale and batch-consistent production, we also offer recombinant antibody expression capabilities in tandem with a range of engineering options.

Downstream, we can purify antibodies with a range of multi-step methods, including affinity, ion exchange, size exclusion chromatography. For secondary antibodies, we can also carry out extensive cross-adsorption and cross-reactivity testing for maximal specificity.

We strive to not only provide best-in-class services, but offer custom solutions that can meet your bespoke requirements. An antibody project will typically start with a consultation, in which one of our antibody experts can advise on the process that offers you the best chance of raising an antibody that performs to your desired specifications. Our antibody services include:

- Generation of monoclonal and polyclonal antibodies from a range of animals
- Recombinant production of monoclonals, engineered antibodies and fragments
- Production and purification to gram quantities
- Chimerization services
- Additional services, including hybridoma banking and conjugation



Confocal microscopy images from immunofluorescence project with Virology Research Services. Antibodies specific to Zika and Dengue virus-infected Vero cells indicate their intracellular localisation.

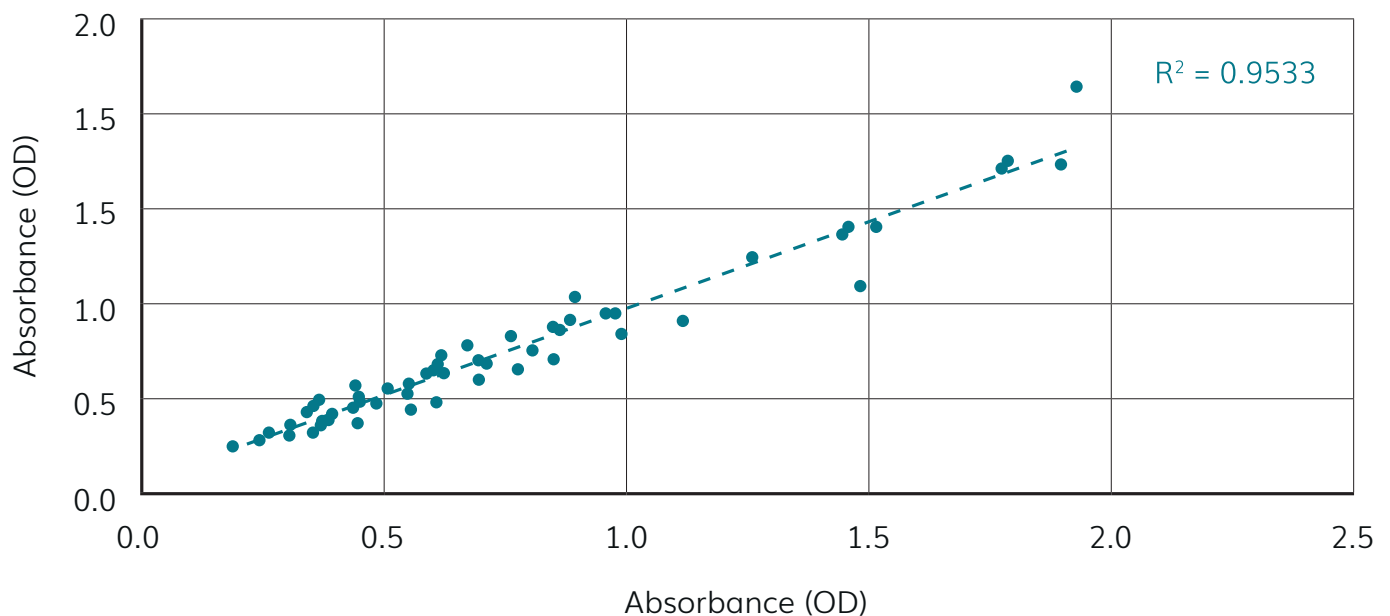
Assay Development & Analysis

Our dedicated assay team has decades of experience in developing immunoassays de novo, as well as partnering with clients to support their assay optimisation and validation pipelines. Depending on the application, we can develop and advise on a range of ELISA formats, from simple antigen-down assays, to more complex double antigen bridging (DABAs) and surrogate neutralisation assays. Our assay development capabilities include:

- Custom antigen and antibody production
- Conjugation and plate coating
- Antigen-antibody pair optimisation in ELISA
- LoQ/LoD, linearity and parallelism analysis

In addition to ELISA development, we now offer a range of virology testing services, including:

- Viral titre (TCID50) assays
- In vitro antiviral assays
- Plaque and neutralisation assays
- Antibody-dependent enhancement assays
- Virucidal suspension assays



Correlation between assays developed by 3rd party and The Native Antigen Company as part of a 2-year assay development project.

The Native Antigen Company develops and manufactures premium quality antigens and antibodies as well as offering a range of services to the diagnostic and biopharmaceutical industries.

Our proprietary VirtuE™ expression system has been developed for the purpose of producing native-like proteins, which are widely adopted by leading *in vitro* diagnostic, vaccine and academic groups in cutting-edge R&D, where correct folding and glycosylation are vital. Our contract services range from antibody generation, to scale production of recombinant and native antigens, and bespoke assay development and QC.

Building on our recognised expertise in infectious diseases, we are expanding our portfolio to include a range of disease-state markers and other critical reagents for human health.

