RULES BASED MEDICINE
a Q² Solutions Company

Vaccine Development Applications

TruCulture® is a whole blood collection and culture system for immune monitoring of subjects in clinical trials. Utilized in hundreds of clinical trials for a variety of applications, TruCulture also has applications for vaccine development, for example:

Detect vaccine-dependent T cell activation (antigen recall)

Early safety studies of vaccines and their individual components

Profile the functional immune status of clinical trial participants

By incorporating specific antigens and or adjuvants, we can develop and manufacture custom TruCulture tubes for vaccine clinical studies. In addition to positive and negative control tubes for T cell activation, we have a suite of viral and microbial innate immune system stimulants.

truculture®

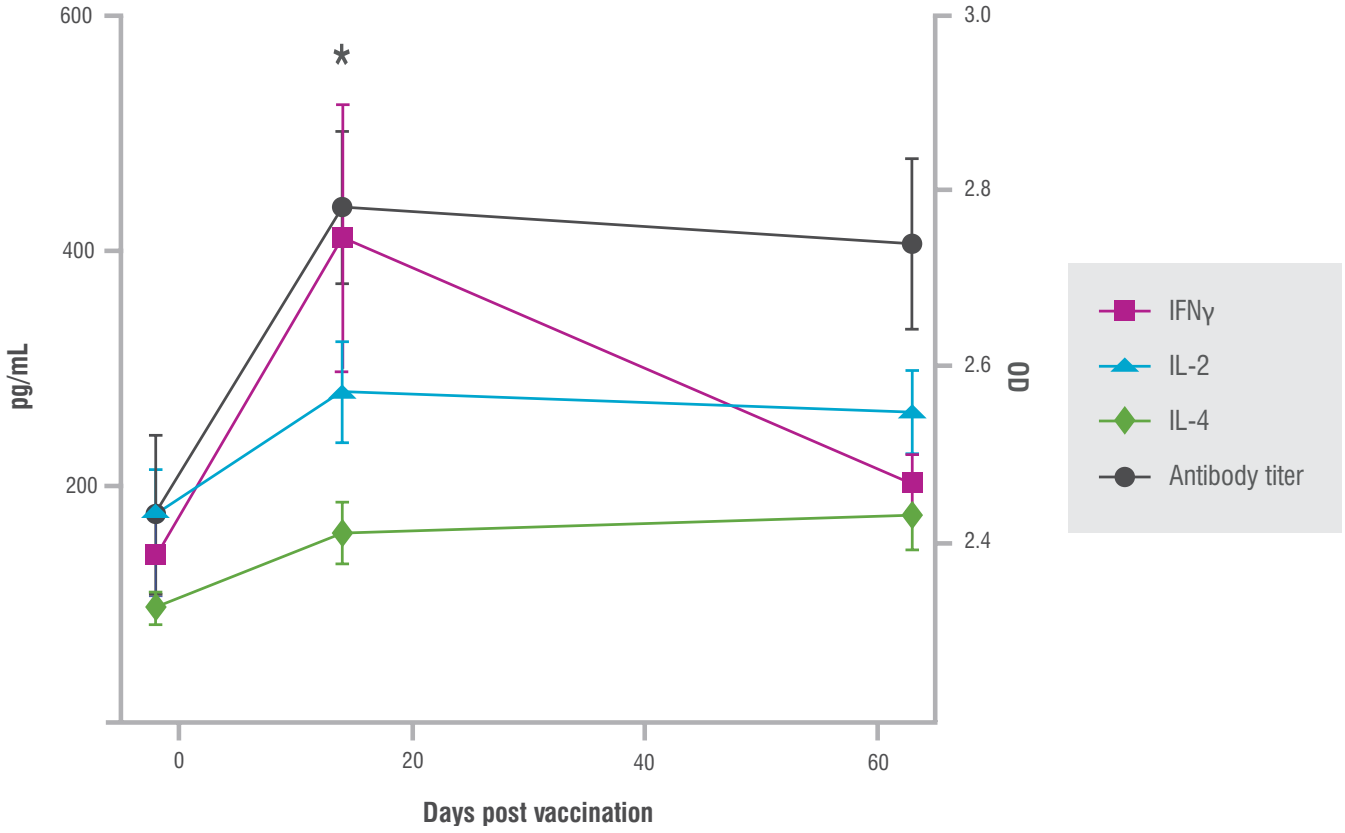
1. Vaccine-dependent T cell activation

Demonstrating specific T cell antigen responses is more challenging than showing humoral antibody responses. The ability of stored blood or PBMCs to secrete IFNγ upon subsequent antigen stimulation declines by over 80% in just 1-2 hrs after collection.[1] With TruCulture, the cytokine release assay starts the instant a 1mL blood sample is drawn directly into the TruCulture tube containing media and antigen.

The versatility of TruCulture allows incorporation of any water-soluble component for investigating antigen-specific recall responses for any vaccine clinical study. *Figure 1* shows that blood from healthy subjects collected in TruCulture tubes containing influenza hemagglutinin proteins showed increased production of T cell cytokines 2 weeks following annual flu vaccination and the increase correlated with relative antibody titer (OD) to hemagglutinin.

Figure 1: TruCulture antigen recall T cell responses post flu vaccination

Whole blood was collected from eight healthy subjects vaccinated with the 2019 annual flu vaccine (Afluria, Sequiris) at 2 days prior- and at 14 and 63 days post-vaccination. Blood was collected in TruCulture tubes containing 5μg/tube recombinant HA antigens from the 2019 vaccine strains (Immune Technology Corporation). After incubation at 37°C for 48 hours, the supernatants were collected and analyzed for 13 analytes by OptiMAP and relative antibody titer by ELISA. Data are graphed as mean +/- SEM. Levels (pg/mL) of T cell cytokines (IFNγ, IL-2, IL-4) are all significantly ($p<0.05$) increased at 2 weeks post-vaccination. Relative antibody titer (OD) against HA proteins were similarly increased ($p<0.001$) at both 14 and 63 days post-vaccination.



2. Early safety studies of vaccines and their individual components

Rules-Based Medicine (RBM), a Q² Solutions Company, has a well-established development process for customized TruCulture products, including a healthy donor pool that can be further tailored according to client needs. The general development process includes testing for: 1) solubility, 2) biological activity, and 3) stability. To learn more about our custom development service please see our TruCulture Custom Stimulant Development white paper.

3. Profile a subject's functional immune status

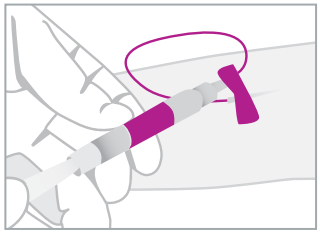
Led by our collaborators at the Pasteur Institute, we have a large body of published evidence on the utility of TruCulture for defining the functional immune response at the individual and population level.[2-5] Pre- and post-vaccine immunization response to a broad TruCulture stimulation of innate and adaptive immunity can be correlated to responders, non-responders, and those potentially at risk for side effects.

Perfect for this type of application and validated for use with TruCulture supernatants is OptiMAP, a single multiplex immunoassay panel that measures 13 cytokines of the major immune response pathways (TH1, TH2, TH17, and monocyte/macrophage).

truculture®

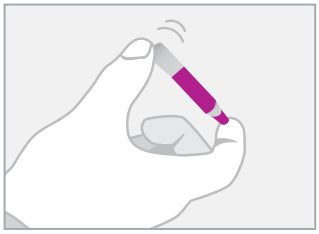
A whole blood collection and culture tube for standardized immunophenotyping procedures

TruCulture tubes are designed to capture immune cell activity at the time and place of sample collection, thereby minimizing the bias and variability introduced by sample shipping and manipulation. These revolutionary tubes consist of an integrated whole-blood collection and leukocyte culture system that is reliable, simple to use and does not require specialized laboratory equipment. The *ex vivo* TruCulture procedure preserves physiological cellular interactions to more accurately reflect the complexities of the human immune system, bringing added value to immune monitoring in clinical trials.



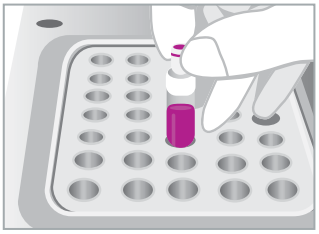
1. COLLECT

Draw 1 mL of blood directly into the TruCulture Tube and break off the plunger.



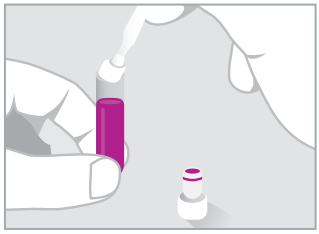
2. MIX

Gently invert tube to mix 3 to 5 times.



3. INCUBATE

Place tube in 37°C heat block for up to 24 or 48 hours.



4. SEPARATE

Manually insert valve to separate supernatant from the cells. Collect supernatant and cell layer for downstream analysis.

References

1. Cytokine-based human whole blood assay for the detection of antigen-reactive T cells. (1995) Petrovsky N & Harrison LC. J of Immunol. Methods 186 37-46.
2. Distinctive roles of age, sex, and genetics in shaping transcriptional variation of human immune responses to microbial challenges. (2018) Piasecka B, *et al.* Proc Natl Acad Sci U S A 115(3): E488-E497.
3. Standardized whole blood stimulation improves immunomonitoring of induced immune responses in multi-center study. (2017) Duffy D, *et al.* Clin Immunol 183: 325-335.
4. Standardized whole-blood transcriptional profiling enables the deconvolution of complex induced immune responses. Urrutia A, *et al.* (2016) Cell Reports 16, 2777–2791.
5. Functional analysis via standardized whole-blood stimulation systems defines the boundaries of a healthy immune response to complex stimuli. (2014) Duffy D, *et al.* Immunity 40(3): 436-450.

Contact us

Toll free: +1 866.726.6277
Direct: +1 512.835.8026
Website: RBM.Q2LabSolutions.com/TruCulture

RULES BASED MEDICINE
a Q² Solutions Company