

HEK-Blue™ IL-2 Cells

Interleukin-2 reporter cells

Catalog code: hkb-il2

<http://www.invivogen.com/hek-blue-il2>

For research use only

Version 18K12-MM

PRODUCT INFORMATION

Contents:

- 1 vial of HEK-Blue™ IL-2 cells (3-7 x 10⁶ cells)
 - 1 ml of puromycin (10 mg/ml). Store puromycin at 4°C or at -20°C.*
 - 2 x 1 ml of HEK-Blue™ CLR Selection (250X concentrate); a solution containing several selection antibiotics. Store at 4°C or at -20°C.*
 - 1 ml of Normocin™ (50 mg/ml); a formulation of three antibiotics active against mycoplasmas, bacteria and fungi. Store at -20°C.*
- *The expiry date is specified on the product label.
- 1 ml of QB reagent and 1 ml of QB buffer (sufficient to prepare 100 ml of QUANTI-Blue™ Solution, a SEAP detection reagent). QB reagent and QB buffer are stable for 1 year at -20°C. QUANTI-Blue™ Solution is stable for 2 weeks at 4°C and for 2 months at -20°C.

Handling Cells Upon Arrival

Cells must be thawed immediately upon receipt and grown according to handling procedures (as described on the next page) to ensure the best cell viability and proper assay performance.

Note: Avoid freezing cells upon receipt as it may result in irreversible damage to the cell line.

Disclaimer: We cannot guarantee cell viability if the cells are not thawed immediately upon receipt and grown according to handling procedures.

Cell Line Stability

Cells will undergo genotypic changes over time that will result in reduced responsiveness in normal cell culture conditions. Genetic instability is a biological phenomenon that occurs in all stably transfected cells. Therefore, it is critical to prepare an adequate number of frozen stocks at early passages. HEK-Blue™ IL-2 cells should not be passaged more than 20 times to remain fully efficient.

Quality control:

- HEK-Blue™ IL-2 cells were stimulated by various cytokines. As expected, human and murine IL-2 induced the production of SEAP (see validation sheet).
- The stability of this cell line for 20 passages following thawing has been verified.
- These cells are guaranteed mycoplasma-free.

USE RESTRICTIONS

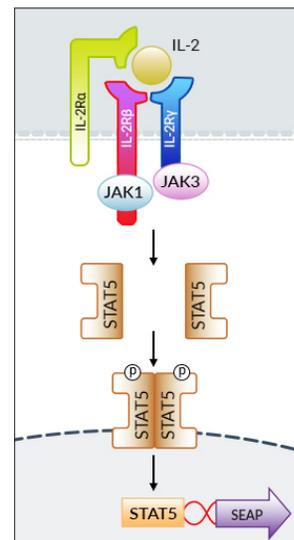
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INTRODUCTION

Interleukin-2 (IL-2), also known as T cell growth factor, is mainly produced by activated T lymphocytes following antigen stimulation. This secreted cytokine plays an important role in immune activation and homeostasis^{1, 2}. Specifically, IL-2 plays dual roles by inducing natural killer cells as well as promoting the differentiation of naïve CD4⁺ T cells into regulatory T cells (Treg) cells. Interestingly, IL-2 has been approved for use as a high-dose immunotherapeutic agent against cancer¹. Additionally, research indicates that IL-2 has potential as a low-dose therapy for autoimmune diseases.

IL-2 exerts its action by binding to the heterotrimeric IL-2 receptor (IL-2R), consisting of IL-2R α (CD25), IL-2R β (CD122), and the common interleukin chain, IL-2R γ (CD132). This binding leads to the activation of a signaling cascade through tyrosine kinases of the Janus family (JAK1 and JAK3) and signal transducer and transcription activator 5 (STAT5), which initiates transcriptional elements and regulates the expression of IL-2-inducible genes.



1. Choudhry H. *et al.*, 2018. Prospects of IL-2 in Cancer Immunotherapy. Biomed Res Int. 2018;9056173.
2. Boyman O. & Sprent J., 2012. The role of interleukin-2 during homeostasis and activation of the immune system. Nat Rev Immunol. 12(3):180-90.

CELL LINE DESCRIPTION

HEK-Blue™ IL-2 cells are specifically designed to monitor the activation of the JAK-STAT pathway induced by IL-2. They were generated by stable transfection of HEK293 cells with the human IL-2R α , IL-2R β and IL-2R γ genes, along with the human JAK3 and STAT5 genes to obtain a fully active IL-2 signaling pathway.

In order to detect the activation of the IL-2 pathway, they were further transfected with a reporter gene expressing a secreted embryonic alkaline phosphatase (SEAP) under the control of the IFN- β minimal promoter fused to four STAT5 binding sites. Therefore stimulation with human or murine IL-2 triggers the JAK/STAT5 pathway and induces SEAP production. SEAP can be readily monitored when using QUANTI-Blue™, a SEAP detection medium. These cells respond to human and murine IL-2.

HEK-Blue™ IL-2 cells should be maintained in growth medium (as described on the next page) supplemented with HEK-Blue™ CLR Selection and Puromycin.

TECHNICAL SUPPORT

InvivoGen USA (Toll-Free): 888-457-5873

InvivoGen USA (International): +1 (858) 457-5873

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SAFETY CONSIDERATIONS

Biosafety Level 2

HEK-Blue™ IL-2 cells were derived from HEK293 cells (transformed with adenovirus 5 DNA) that require **Biosafety level 2** according to CDC guidelines. The biosafety level may vary depending on the country. In the United States, HEK293 cell lines are designated Biosafety Level 2 according to the Center for Disease Control and Prevention (CDC). In Germany, HEK293 cell lines are designated Biosafety Level 1 according to the Central Committee of Biological Safety, Zentrale Kommission für die Biologische Sicherheit (ZKBS). Please check with your country's regulatory authority regarding the use of these cells.

HANDLING PROCEDURES

Required Cell Culture Medium

- Growth Medium: DMEM, 4.5 g/l glucose, 2 mM L-glutamine, 10% (v/v) fetal bovine serum (FBS), 100 U/ml penicillin, 100 µg/ml streptomycin, 100 µg/ml Normocin™
- Test Medium: DMEM, 4.5 g/l glucose, 2 mM L-glutamine, 10% (v/v) heat-inactivated FBS (30 min at 56°C), 100 U/ml penicillin, 100 µg/ml streptomycin, 100 µg/ml Normocin™

Note: Heat-inactivated FBS is also commercially available.

- Freezing Medium: DMEM with 20% FBS and 10% (v/v) DMSO

Required Selective Antibiotic(s)

- HEK-Blue™ CLR Selection and Puromycin

Initial Culture Procedure

The first propagation of cells should be for generating stocks for future use. This ensures the stability and performance of the cells for subsequent experiments.

1. Thaw the vial by gentle agitation in a 37°C water bath. To reduce the possibility of contamination, keep the O-ring and cap out of the water. Thawing should be rapid.

2. Remove the vial from the water bath as soon as the contents are thawed, and decontaminate by dipping in or spraying with 70% (v/v) ethanol.

Note: All steps from this point should be carried out under strict aseptic conditions.

3. Transfer cells in a tube containing 15 ml of pre-warmed growth medium. **Do not add HEK-Blue™ CLR Selection or Puromycin until the cells have been passaged twice.**

4. Centrifuge vial at 1000-1200 RPM (RCF 200-300 g) for 5 minutes.

5. Remove supernatant containing the cryoprotective agent and resuspend cells with 1 ml of growth medium without selection antibiotics.

6. Transfer the vial contents to a 25 cm² tissue culture flask containing 5 ml of growth medium without selection antibiotics.

7. Place the culture at 37°C in 5% CO₂.

Frozen Stock Preparation

1. Resuspend cells at a density of 5-7 x 10⁶ cells/ml in freezing medium freshly prepared with cold growth medium.

Note: A T-75 culture flask typically yields enough cells for preparing 3-4 frozen vials.

2. Prepare 1 ml aliquots of cells in cryogenic vials.

3. Place vials in a freezing container and store at -80°C overnight.

4. Transfer vials to liquid nitrogen for long term storage.

Note: If properly stored, cells should remain stable for years.

Cell Maintenance

1. Maintain and subculture the cells in growth medium supplemented with 1X HEK-Blue™ CLR Selection and 1 µg/ml puromycin.
2. Renew growth medium twice a week.
3. Cells should be passaged when a 70-80% confluency is reached. Do not let the cells grow to 100% confluency.

Note: A subcultivation ratio of 1:2 to 1:8 is recommended. As a general guide:

1:2 split should be 70-80% confluent in 1 day

1:4 split should be 70-80% confluent in 2 days

1:8 split should be 70-80% confluent in 4 days

Cell Handling Recommendations

To ensure the best results:

- Use HEK-Blue™ IL-2 cells with less than 20 passages.

REPORTER ASSAY

Day 1:

1. Prepare HEK-Blue™ IL-2 cell suspension: gently rinse cells twice with pre-warmed phosphate buffered saline (PBS), detach the cells in presence of PBS by tapping the flask or by using a cell scraper, resuspend cells in fresh, pre-warmed test medium and prepare a cell suspension at ~280,000 cells/ml.

Notes:

- Some FBS may contain alkaline phosphatases that can interfere with SEAP quantification. We recommend to use heat-inactivated FBS to inactivate these enzymes which are thermosensitive.

- The response of HEK-Blue™ IL-2 cells can be altered by the action of trypsin. Do not use trypsin to detach HEK-Blue™ IL-2 cells.

2. Add 20 µl of each sample per well of a flat-bottom 96-well plate.

3. Add 20 µl of recombinant human or murine IL-2 at 1 ng/ml (positive control) in one well.

4. Add 20 µl of a recombinant cytokine such as recombinant human TGF-β1 at 10 ng/ml (negative control) in one well.

Note: For the negative control, do not use STAT5-activating cytokines.

5. Add 180 µl of cell suspension (~50,000 cells) per well.

6. Incubate the plate at 37°C in a CO₂ incubator for 20-24 h.

Day 2:

1. Prepare QUANTI-Blue™ following the instructions on the enclosed data sheet.

3. Add 20 µl of induced HEK-Blue™ IL-2 cell supernatant per well of a flat-bottom 96-well plate.

3. Add 180 µl of resuspended QUANTI-Blue™ Solution per well.

4. Incubate the plate at 37°C incubator for 1-3 h.

5. Determine SEAP levels using a spectrophotometer at 620-655 nm.

RELATED PRODUCTS

Product	Catalog Code
HEK-Blue™ CLR Selection	hb-csm
Normocin™	ant-nr-1
Puromycin	ant-pr-1
QUANTI-Blue™ Solution	rep-qbs
Recombinant human TGF-β1	rcyc-htgfb1

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QUANTI-Blue™ Solution

Medium for detection and quantification of alkaline phosphatase in standard and HTS assays

Catalog code: rep-qbs, rep-qbs2

<http://www.invivogen.com/quantiblu>

For research use only

Version 18D13-MM

PRODUCT INFORMATION

Contents

QUANTI-Blue™ Solution is available in two pack sizes:

- **rep-qbs** containing 5 x 1 ml of QB reagent and 5 x 1 ml QB buffer to prepare 500 ml of QUANTI-Blue™ Solution sufficient for 25 x 96-well plates (standard procedure) or 20 x 1536-well plates (HTS screening)

- **rep-qbs2** containing 10 x 1 ml of QB reagent and 10 x 1 ml QB buffer to prepare 1 liter of QUANTI-Blue™ Solution sufficient for 50 x 96-well plates (standard procedure) or 40 x 1536-well plates (HTS screening)

Required Material (not provided)

- Sterile water
- Sterile screw cap tube, glass bottle or flask

Storage and Stability

- Store QB reagent and QB buffer at -20°C. Product is stable for 1 year at -20°C when properly stored.
- Reconstituted QUANTI-Blue™ Solution is stable for 2 weeks at 2-8°C and for 2 months at -20°C. Keep reconstituted QUANTI-Blue™ away from light.

Quality Control

- Each lot is thoroughly tested to ensure the absence of lot-to-lot variation.
- Physicochemical characterization (including pH, solubility).
- Functional assays using alkaline phosphatase or SEAP-expressing reporter cells.

DESCRIPTION

QUANTI-Blue™ is a colorimetric enzyme assay developed to determine any alkaline phosphatase activity (AP) in a biological sample, such as supernatants of cell cultures. QUANTI-Blue™ Solution changes from pink to a purple-blue color in the presence of AP.

Secreted embryonic alkaline phosphatase (SEAP) is a widely used reporter gene. It is a truncated form of placental alkaline phosphatase, a GPI-anchored protein. SEAP is secreted into cell culture supernatant and therefore offers many advantages over intracellular reporters.

FEATURES AND ADVANTAGES

- **Requires small samples of cell supernatants** - 20 µl is sufficient.
- **No need to process samples** - Preparation of cell lysates or heating of samples is not required.
- **Determine secreted AP activity without disturbing cells** - The same cell cultures can be repeatedly sampled for kinetic studies.
- **Assay can be completed in 30 min** - Hands-on time no longer than 10 min. The enzymatic activity can be detected as early as 15 min after incubation of the samples in QUANTI-Blue™ Solution.
- **Wide dynamic range allows to detect low and high levels of AP** - No need to perform multiple sample dilutions.
- **Highly sensitive for quantitative measurement** - Higher saturation threshold than with pNPP (p-nitrophenyl phosphate) resulting in more significant differences between no, low or high AP activity.
- **Extremely simple to use** - 1) Prepare solution with water, 2) add sample to detection reagent, 3) incubate at 37°C, and 4) assess AP activity.

METHODS

QUANTI-Blue™ Solution has been optimized for use in 96-well plates (standard procedure) and in 1536-well plates (high throughput screening procedure).

A. Standard procedure

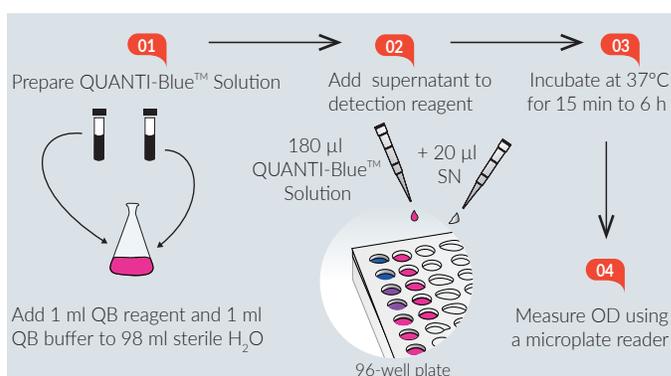


Figure 1. Standard procedure using QUANTI-Blue™ Solution.

The following protocol refers to the use of 96-well plates. Ensure QB reagent and QB buffer are completely thawed before use.

Note: For fast thawing, QB reagent and QB buffer can be placed at 37°C for 2 minutes. Ensure heating at 37°C does **not** exceed 5 minutes.

1. Prepare 100 ml of QUANTI-Blue™ Solution by adding 1 ml of QB reagent and 1 ml of QB buffer to 98 ml of sterile water in a sterile glass bottle or flask.
2. Mix well by vortexing and incubate at room temperature for 10 min before use.
3. Use QUANTI-Blue™ Solution immediately or store at 2-8°C or -20°C.
4. Dispense 180 µl of QUANTI-Blue™ Solution per well into a flat-bottom 96-well plate.
5. Add 20 µl of sample (supernatant of SEAP-expressing cells) or negative control (cell culture medium).
6. Incubate at 37°C for 15 min to 6 h.
7. Measure optical density (OD) at 620-655 nm using a microplate reader.

Note: If the negative control turns purple/blue, it means the fetal bovine serum (FBS) contains alkaline phosphatase. We recommend to heat FBS at 56°C for 30 min to inactivate the alkaline phosphatase activity.

For different cell culture plate formats, please refer to the table below:

	96-well plate	24-well plate	12-well plate
QUANTI-Blue™	180 µl	450 µl	900 µl
Supernatant	20 µl	50 µl	100 µl

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B. High Throughput Screening procedure

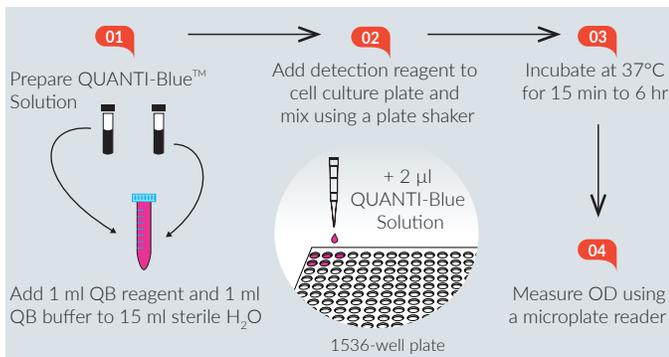


Figure 2. High throughput screening procedure using QUANTI-Blue™ Solution.

This procedure has been optimized for use directly in flat-bottom 1536-well plates, in which cell culture volume does not exceed 5 µl. Ensure QB reagent and QB buffer are completely thawed before use.

Note: For fast thawing, QB reagent and QB buffer can be placed at 37°C for 2 minutes. Ensure heating at 37°C does **not** exceed 5 minutes.

1. Prepare 17 ml of QUANTI-Blue™ Solution by adding 1 ml of QB reagent and 1 ml of QB buffer to 15 ml of sterile water in a 50 ml screw cap tube.
2. Mix well by vortexing and incubate at room temperature for 10 minutes before use.
3. Use QUANTI-Blue™ Solution immediately or store at 2-8°C or -20°C.
4. Dispense 2 µl of QUANTI-Blue™ Solution per well of a 1536-well plate.
5. Mix using a plate shaker.
6. Incubate at 37°C for 15 min to 6 h.
7. Measure OD at 620-655 nm using a microplate reader.

Note: If the negative control turns purple/blue, it means the fetal bovine serum (FBS) contains alkaline phosphatase. We recommend to heat FBS at 56°C for 30 min to inactivate the alkaline phosphatase activity.

RELATED PRODUCTS

Product	Catalog Code
pNiFty2-SEAP (Zeo®)	pnifty2-seap
pSELECT-zeo-SEAP	psetz-seap
HEK-Blue™ Detection Recombinant SEAP Protein	hb-det2 rec-hseap
Reporter cells	
HEK-Blue™ hTLR2	hkb-htlr2
HEK-Blue™ hTLR4	hkb-htlr4
RAW-Blue™ Cells	raw-sp
THP1-Blue™ NF-κB Cells	thp-nfkb
THP1-Blue™ ISG Cells	thp-isg

For a complete list of InvivoGen's Reporter Cell Lines visit <http://www.invivogen.com/reporter-cells>

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