

# MACS<sup>®</sup> Premium-Grade Cytokines

Start benefiting from lot-specific activity now!

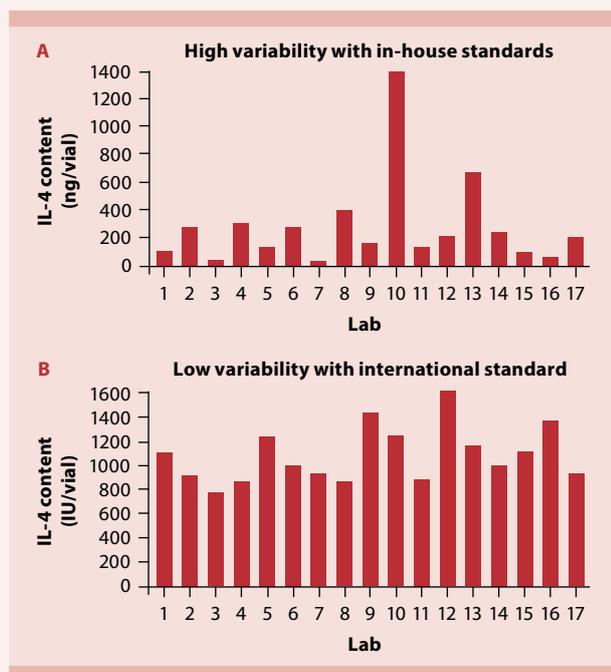
To overcome cytokine variability, you could perform time-consuming lot-to-lot testing. But why should you waste time and money on something we have already done for you? With MACS<sup>®</sup> Premium-Grade Cytokines we provide you with the specific activity value for each lot.

- **Time and cost savings:**  
no lot-to-lot testing needed
- **Reproducible results:** apply the same amount of active cytokine every time
- **Efficient reagent usage:**  
no oversaturation required

► [miltenyibiotec.com](http://miltenyibiotec.com)

## Culture is key for reliable and comparable results

Cell culture experiments are always subject to a certain degree of variability. Therefore, calibration with a defined standard is done to normalize results and minimize variability. One way to compare biological activities of products from different vendors is to normalize cellular assays with a defined international standard, e.g., from the National Institute for Biological Standards and Control (NIBSC) (fig. 1).

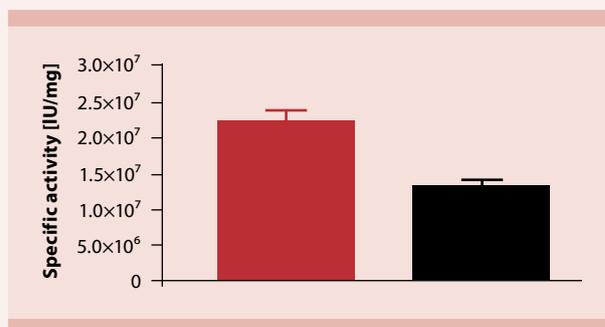


**Figure 1: Variability in biological activity of IL-4 strongly depends on the calibration standard used.** (A) Results obtained when the participating laboratories used different 'in house' standards for assay calibration are highly variable. (B) Results obtained by the same laboratories using the WHO International Standard for IL-4 (88/656) to calibrate bioassays in international units (IU) show a lower degree of variability (figure adapted from Thorpe, et al. (2000) Cytokine Standardization. The Cytokine Reference. Academic Press, London).

## Perform reproducible experiments

Apply the same amount of active protein in every experiment to be sure that effects are real and not due to variable cytokine concentration. Even when samples are measured in parallel, using the same assay, the same batch of cells, and the same set of conditions, a cytokine's specific biological activity can depend on the vendor (fig. 2) and lot that is used. Therefore, we always provide you with the lot-specific activity of your variability (figure adapted from Thorpe, et al. (2000) Cytokine Standardization. The Cytokine Reference. Academic Press, London).

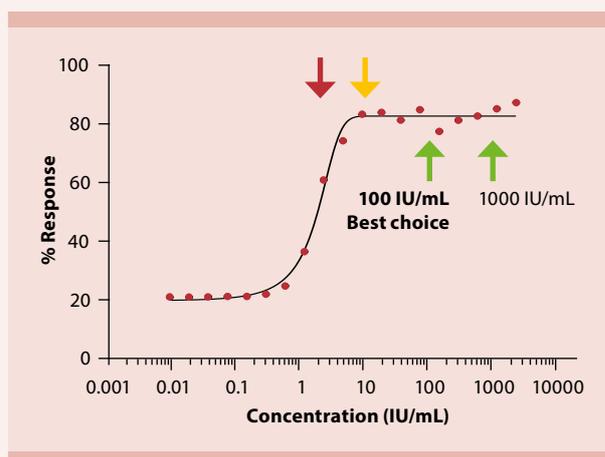
Find the lot-specific activity on the certificate of analysis:  
[www.miltenyibiotec.com/cytokineCoA](http://www.miltenyibiotec.com/cytokineCoA)



**Figure 2: Human GM-CSF biological activity varies between vendors.** Miltenyi Biotec's Human GM-CSF, premium grade (red bar) shows higher specific activity than another commercially available product (black bar) when performing a calibrated proliferation assay using TF-1 cells (NIBSC 88/646).

## Save cost through efficient reagent use

Due to variable cytokine activity, experiments are often oversaturated. With the given lot-specific activity, you can use cytokines at precise concentrations and save reagents. Knowing the exact cytokine activity, you do not need to oversaturate your experiment anymore and can use up to 10 times less of the cytokine (fig. 3).



**Figure 3: Efficient cytokine usage with specific unit-dosing.** Green arrows indicate concentration of cytokine input to reach maximum cellular response. Identical activity can be reached with cytokine concentrations of 100 IU/mL and 1000 IU/mL. Yellow and red arrows indicate insufficient cytokine input.

## Benefits of MACS® Cytokines

- **Reproducibility:** biological activity determined for each lot for exact unit dosing
- **Reliability:** low lot-to-lot variability due to calibration with international standard
- **Superior quality:** stringent manufacturing processes and quality control up to MACS® GMP-Grade

For more information visit:  
[www.miltenyibiotec.com/cytokines](http://www.miltenyibiotec.com/cytokines)