

# Ficoll-Paque PLUS

## CELL PREPARATION

Ficoll-Paque™ PLUS is a sterile, ready-to-use aqueous medium for density gradient centrifugation. The medium consists of a mixture of Ficoll™ PM400 and sodium diatrizoate at a density of 1.077 g/mL. Ficoll-Paque PLUS is QC-tested to ensure low levels of endotoxins. The medium was developed for large- or small-scale purification of mononuclear cells from human peripheral blood, using a simple and rapid centrifugation technique developed by Boyum (1, 2). Protocols for purifying mononuclear cells from sources other than human peripheral blood have also been developed (3–6). Mononuclear cell isolation can be automated and functionally closed by using Sepax™ technology (7, 8).

Ficoll-Paque PLUS offers:

- Low levels of endotoxin
- Complete QC package to assure reliability
- Reliable isolation of lymphocytes with representative proportions of T and B cells
- Greater than 90% lymphocyte viability
- Rapid isolation with a recovery of 60% ± 20% of the lymphocytes present in the original blood sample
- Sterile aqueous medium
- Stable for at least 3 yr under appropriate storage conditions

Ficoll-Paque PLUS is a recognized standard in laboratories worldwide for the isolation of mononuclear cells for analytical research studies.

## Applications

Ficoll-Paque PLUS is optimized for the isolation of mononuclear cells from human peripheral blood. However, the medium can be adapted for the isolation of human lymphocytes from other sources, including abdominal, amniotic, and pleural fluids (3–6), as well as bone marrow (9, 10). Separation of normal human peripheral blood by the recommended protocol typically yields a lymphocyte preparation with:



**Fig 1.** Ficoll-Paque PLUS is a sterile density gradient centrifugation medium for separation of mononuclear cells from human blood.

- 60% ± 20% recovery of the lymphocytes present in the original blood sample
- 95% ± 5% mononuclear cells
- > 90% viability of the separated cells
- 3% ± 2% granulocytes
- 5% ± 2% red blood cells
- < 0.5% of the total platelets of the original blood sample

The density of Ficoll-Paque PLUS (1.077 g/mL) is optimized for the isolation of mononuclear cells from human blood. If a density other than 1.077 g/mL is required for optimal separation, Cytiva offers density gradient media of densities 1.073 g/mL (Ficoll-Paque PREMIUM 1.073), and 1.084 g/mL (Ficoll-Paque PREMIUM 1.084). An alternative is to use Percoll™ or Percoll PLUS, which are well-suited for density gradient centrifugation when other densities are preferred. Iso-osmotic gradients in the density range of 1.0 to 1.3 g/mL are possible with Percoll products, allowing improved yield and purity. Furthermore, Ficoll-Paque PLUS and Percoll products have been used in combination to isolate defined subpopulations of blood cells.

## Specifications

Density	1.077 + 0.001 g/mL
Stability	Stable for 3 yr if stored between 4°C and 30°C and protected from direct light
Endotoxins	Contains < 0.12 EU/mL
Sterility	Autoclave steam sterilization with sterility assurance level (SAL) of 10 <sup>-6</sup>

## References

1. Boyum, A. Isolation of mononuclear cells and granulocytes from human blood. Isolation of mononuclear cells by one centrifugation, and of granulocytes by combining centrifugation and sedimentation at 1 g. *Scand. J. Clin. Lab. Invest.* **21**, 77–89 (1968).
2. Boyum, A. Isolation of leucocytes from human blood. Further observations. Methylcellulose, dextran, and Ficoll as erythrocyte aggregating agents. *Scand. J. Clin. Lab. Invest.* **97**, 31–50 (1968).
3. Minami, R. *et al.* Gradient separation of normal and malignant cells. II. Application to in vivo tumor diagnosis. *Acta Cytol.* **22**, 584–588 (1978).
4. Elequin, T. T. *et al.* A quick method for concentrating and processing cancer cells from serous fluids and fine-needle nodule aspirates. *Acta Cytol.* **21**, 596–599 (1977).
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7. Richman, S. *et al.* Factors affecting the turnaround time for manufacturing, testing, and release of cellular therapy products prepared at multiple sites in support of multicenter cardiovascular regenerative medicine protocols – a Cardiovascular Cell Therapy Research Network (CCTR) study. *Transfusion* **52**, 2225–2233 (2012).
8. Kaur, I. *et al.* Comparison of two methodologies for the enrichment of mononuclear cells from thawed cord blood products: The automated Sepax system versus the manual Ficoll method. *Cytotherapy* **19**, 433–439 (2017).
9. Arkin, S. *et al.* Expression of intercellular adhesion molecule-1 (CD54) on hematopoietic progenitors. *Blood* **77**, 948–953 (1991).
10. Deguchi, Y. and Kehrl, J. H. Selective expression of two homeobox genes in CD34-positive cells from human bone marrow. *Blood* **78**, 323–328 (1991).

## Ordering information

Product	Pack size	Product code
Ficoll-Paque PLUS	6 × 100 mL	17144002
Ficoll-Paque PLUS	6 × 500 mL	17144003

### Related products

Ficoll PM400	100 g	17030010
Ficoll PM400	500 g	17030050
Ficoll PM400	5 kg	17030005
Ficoll-Paque PREMIUM 1.073	6 × 100 mL	17544652
Ficoll-Paque PREMIUM 1.084	6 × 100 mL	17544602
Percoll PLUS	250 mL	17544502
Percoll PLUS	1 L	17544501
Percoll	250 mL	17089102
Percoll	1 L	17089101
Percoll	6 × 1 L	17089109

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