

## X-VIVO™ Media

---

Lonza's R&D efforts and collaboration with many clinical trials have provided Lonza with the tools and expertise to support the developments in adoptive immunotherapy, cancer therapy, genetic therapy and other cellular therapies. Lonza's philosophy for the development of serum-free formulations for use in cellular therapy is to provide a nutritionally complete and balanced environment for the cells. We have not included any exogenous growth factors, artificial stimulators of cellular proliferation or undefined supplements.

The products are devoid of any protein-kinase C stimulators and are suitable for the investigation of second messenger systems in the activation of human and murine lymphocytes. The formulations are complete and contain pharmaceutical grade human albumin, recombinant human insulin and pasteurized human transferrin. All X-VIVO™ Medium products are manufactured under current GMPs and are listed with the FDA in a product Master File. Permission to cross-reference the Master File may be obtained by contacting the Product Manager.

### X-VIVO™ 10 Medium

The X-VIVO™ 10 Medium formulation is designed to support the generation of Lymphokine Activated Killer (LAK) cells in a serum-free environment. The original protocols involved the incubation of patient or normal donor Peripheral Blood Lymphocytes (PBL) at  $1.0-3.0 \times 10^6$  cells/ml for a period of 3 days in the presence of 1,000 Cetus units of rIL-2/ml. Optimal LAK cell generation is achieved when peripheral blood lymphocytes are incubated for three to ten days at a density of  $1.0-6.0 \times 10^6$  cells/ml in the presence of 100 - 1000 Cetus units of rIL-2. X-VIVO™ 10 Medium is available as a 1X liquid in several convenient configurations.

### X-VIVO™ 15 Medium

X-VIVO™ 15 Medium is similar in composition to X-VIVO™ 10 Medium and has been optimized for the proliferation of Tumor Infiltrating Lymphocytes (TIL)

under serum-free conditions. The formulation supports the proliferation of purified CD3+ cells isolated from peripheral blood and human tumors. X-VIVO™ 15 Medium has also been used to support the growth of human monocytes, macrophage cells and cell lines, PBL, granulocytes and natural killer (NK) cells. In addition, X-VIVO™ 15 Medium provides a serum-free environment for the expansion of HUT-78 and related human lymphocytic cell lines.

### X-VIVO™ 20 Medium

X-VIVO™ 20 Medium was developed and optimized to support the generation of LAK cells from monocyte-depleted PBL at high density. Initial cell densities between  $2.0-3.0 \times 10^7$  cells/ml were successfully used to generate LAK cells. X-VIVO™ Medium 20 may also be used as a growth medium for PBL and TIL.

### Other Applications of X-VIVO™ Products Include:

- Proliferation of PBL
- Proliferation of TIL
- Cryopreservation and transplantation of organs
- Cultivation of human monocytes and macrophages
- Cultivation of stem cells
- Cultivation of dendritic cells

### Partial List of Cell Types Grown with X-VIVO™ Medium

- Human and murine Lymphokine Activated Killer (LAK) cells
- Peripheral Blood Lymphocytes
- Human and murine Tumor Infiltrating Lymphocytes (TIL)
- Human T cells
- Human and murine macrophages
- Human and murine hematopoietic stem cells (colony formation and proliferation)
- Cryopreservation of human tissue

- Proliferation of draining lymph node lymphocytes

## **X-VIVO™ Media References**

### **X-VIVO™ 10 Medium**

1. Cavazzana-Calvo, M. and others. "Gene Therapy of Human Severe Combined Immunodeficiency (SCID) -X1 Disease." *Science* 288 (April 2000): 669-672
2. Pawelec, G. and others. "T Cell Immunosenescence in Vitro and in Vivo." *Exp Gerontol* 34, no. 3 (June 1999): 419-29.
3. Pawelec, G. and others. "Extrathymic T Cell Differentiation in Vitro From Human CD34+ Stem Cells." *J Leukoc Biol* 64, no. 6 (December 1998): 733-9.
4. Weich, N. S. and others. "Recombinant human interleukin-11 directly promotes megakaryocytopoiesis in vitro." *Blood* 90, no. 10 (November 1997): 3893-902.
5. Williams, Stephanie F. and others. "Selection and Expansion of Peripheral Blood CD34+ Cells in Autologous Stem Cell Transplantation for Breast Cancer." *Blood* 87 (1996): 1687-91.
6. Sandstrom, Craig E. and others. "Comparison of Whole Serum-Deprived Media for Ex Vivo Expansion of Hematopoietic Progenitor Cells From Cord Blood and Mobilized Peripheral Blood Mononuclear Cells." *Journal of Hematotherapy* 5 (1996): 461-73.
7. Zimmerman, Todd M. and others. "Clinical Use of Selected and Expanded Peripheral Blood CD34+ Cells: A Preliminary Report of Feasibility and Safety." *Journal of Hematotherapy* 4 (1995): 527-29.
8. Purdy, Malcolm H. and others. "Large Volume Ex Vivo Expansion of CD34-Positive Hematopoietic Progenitor Cells for Transplantation." *Journal of Hematotherapy* 4 (1995): 515-25
9. Abrahamsen, T. G. and others. "Stimulatory Effect of Counterflow Centrifugal Elutriation in Large-Scale Separation of Peripheral Blood Monocytes Can Be Reversed by Storing the Cells at 37 Degrees C." *J. Clin. Apheresis* 6 (1991): 48-53.
10. Streck, Richard J. and others. "Lysis of Autologous Human Macrophages by Lymphokine-Activated Killer Cells: Interaction of Effector Cell and Target Cell Conjugates Analyzed by Scanning Electron Microscopy." *Journal of Leukocyte Biology* 48 (1990): 237-46.

11. Helinski, Ernest H. and others. "Tumor-Cytolytic Human Macrophages Cultured As Nonadherent Cells: Potential for the Adoptive Immunotherapy of Cancer." *Cancer Detection and Prevention* 14, no. 4 (1990): 471-81.

### **X-VIVO™ 15 Medium**

1. Kugler, Alexander and others. "Regression of Human Metastatic Renal Cell Carcinoma After Vaccination With Tumor Cell - Dendritic Cell Hybrids." *Nature Medicine* 6, no. 3 (March 2000): 332-36.
2. Yang, Shiaolan and others. "Generation of Retroviral Vector for Clinical Studies Using Transient Transfection." *Human Gene Therapy* 10 (January 1999): 123-32.
3. Chen, Bing-guan and others. "The Role of Tumor Necrosis Factor Alpha in Modulating the Quantity of Peripheral Blood-Derived, Cytokine-Driven Human Dendritic Cells and Its Role in Enhancing the Quality of Dendritic Cell Function in Presenting Soluble Antigens to CD4+ T Cells In Vitro." *Blood* 91, no. 12 (1998): 4652-61.
4. Jonuleit, H. and others. "Pro-Inflammatory Cytokines and Prostaglandins Induce Maturation of Potent Immunostimulatory Dendritic Cell Under Fetal Calf Serum-Free Conditions." *Eur J Immunol* 27, no. 12 (December 1997): 3135-42.
5. Steinbrink, K. and others. "Induction of Tolerance by IL-10 Treated Dendritic Cells." *J Immunol* 159, no. 10 (November 1997): 4772-80.
6. Jonuleit, H. and others. "Induction of IL-15 Messenger RNA and Protein in Human Blood-Derived Dendritic Cells: a Role for IL-15 in Attraction of T Cells." *J Immunol* 158, no. 6 (March 1997): 2610-5.
7. Strobl, Herbert and others. "Flt3 Ligand in Cooperation with Transforming Growth Factor- $\beta$ 1 Potentiates In Vitro Development of Langerhans-Type Dendritic Cells and Allows Single-Cell Dendritic Cell Cluster Formation Under Serum-Free Conditions." *Blood* 90, no. 4 (1997): 1425-34.
8. Strobl, Herbert and others. "TGF- $\beta$ 1 Promotes In Vitro Development of Dendritic Cells From CD34+ Hemopoietic Progenitors." *Journal of Immunology* 157 (1996): 1499-507.

## X-VIVO™ 20 Medium

1. Luft, T. and others. "Type I IFNs Enhance the Terminal Differentiation of Dendritic Cells." *J Immunol* 161, no. 4 (August 1998): 1947-53.
2. Luft, T. and others. "A Serum-Free Culture Model for Studying the Differentiation of Human Dendritic Cells From Adult CD34+ Progenitor Cells." *Exp Hematol* 26, no. 6 (June 1998): 489-500.
3. Jonuleit, H. and others. "Pro-Inflammatory Cytokines and Prostaglandins Induce Maturation of Potent Immunostimulatory Dendritic Cell Under Fetal Calf Serum-Free Conditions." *Eur J Immunol* 27, no. 12 (December 1997): 3135-42.

## Storage

2°C to 8°C

## Product Use Statement

**THESE PRODUCTS ARE FOR RESEARCH USE ONLY.** Not approved for human or veterinary use, for application to humans or animals, or for use in clinical or *in vitro* procedures.

## Ordering Information

Catalog Number	Description	Size
04-380Q	X-VIVO™ 10 Medium with L-glutamine, gentamicin, and phenol red	1 L
04-743Q	X-VIVO™ 10 Medium with L-glutamine; without gentamicin or phenol red	1 L
BE04-418F <i>(Europe only)</i>	X-VIVO™ 15 Medium with L-glutamine, gentamicin, and phenol red	500 ml
04-418Q	X-VIVO™ 15 Medium with L-glutamine, gentamicin, and phenol red	1 L
04-744Q	X-VIVO™ 15 Medium with L-glutamine; without gentamicin or phenol red	1 L
04-448Q	X-VIVO™ 20 Medium with L-glutamine, gentamicin, and phenol red	1 L

TS-04-380-1 08/10