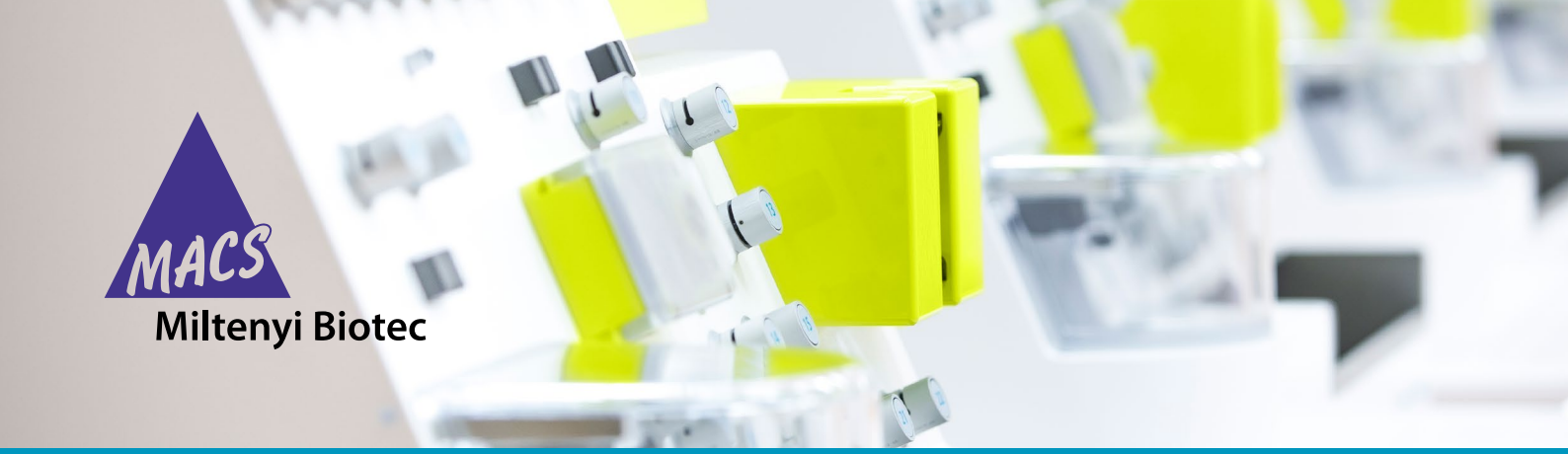

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CliniMACS Prodigy®

Scientific publications

CAR T cells

Blaeschke, F. *et al.* (2018) Induction of a central memory and stem cell memory phenotype in functionally active CD4⁺ and CD8⁺ CAR T cells produced in an automated good manufacturing practice system for the treatment of CD19⁺ acute lymphoblastic leukemia.
Cancer Immunol Immunother.
https://doi.org/10.1007/s00262-018-2155-7
Partly automated GMP-generation of CAR T cells from critically small blood samples was feasible with a new stimulation protocol that leads to high functionality and expansion potential, balanced CD4/CD8 ratios and a conversion to a Tcm/Tscm phenotype.

Zhu, F. *et al.* (2018) Closed-system manufacturing of CD19 and dual-targeted CD20/19 chimeric antigen receptor T cells using the CliniMACS Prodigy device at an academic medical center. Cytotherapy. 20: 394–406.
https://doi.org/10.1016/j.jcyt.2017.09.005
The CliniMACS Prodigy device, tubing set TS520 and TCT software allow CAR T cells to be manufactured in a closed system at the treatment site without need for clean-room facilities and related infrastructure.

Lock, D. *et al.* (2017) Automated manufacturing of potent CD20-directed chimeric antigen receptor T cells for clinical use. Hum Gene Ther. 28: 914–925.
https://doi.org/10.1089/hum.2017.111
Automated cGMP-compliant process on the CliniMACS Prodigy reliably produces a therapeutic dose of anti-CD20 specific CAR T cells, starting from healthy or patient material and independent of operator or device.

Priesner, C. *et al.* (2016) Automated enrichment, transduction and expansion of clinical-scale CD62L⁺ T cells for manufacturing of GTMPs.
Hum Gene Ther. 27: 860–869.
https://doi.org/10.1089/hum.2016.091
Proof of principle in clinical-scale selection, stimulation, transduction and expansion of T cells using the automated closed CliniMACS Prodigy system.

Mock, U. *et al.* (2016) Automated manufacturing of chimeric antigen receptor T cells for adoptive immunotherapy using CliniMACS Prodigy.
Cytotherapy 18: 1002–11.
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The feasibility of CliniMACS Prodigy for T cell transduction is demonstrated with automated generation of CD19-CAR⁺ T cells in clinically relevant doses, including studies on the confirmation of *in vitro* and *in vivo* efficacy of the product.

Virus- / Antigen-specific T cells

Kállay, K. *et al.* (2018) Early experience with CliniMACS Prodigy CCS (IFN-gamma) System in selection of virus-specific T cells from third-party donors for pediatric patients with severe viral infections after hematopoietic stem cell transplantation.
J Immunother. 41: 158–163.
https://doi.org/10.1097/CJI.0000000000000197
Virus-specific T cell therapy implemented by the CliniMACS Prodigy CCS (IFN-gamma) System is an automated, fast, safe, and probably effective way to control resistant viral diseases after pediatric hematopoietic stem cell transplantation.

Kim, N. *et al.* (2018) Robust production of cytomegalovirus pp65-specific T cells using a fully automated IFN-γ Cytokine Capture System.
Transfus Med Hemother. 45: 13–22.
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The findings reported here suggest that the IFN-γ CCS by the CliniMACS Prodigy is a simple and robust approach to produce CMV-CTLs, which may be applicable for the treatment of clinically urgent CMV-related diseases.

Pello, O. M. *et al.* (2017) BKV-specific T cells in the treatment of severe refractory hemorrhagic cystitis after HLA-haploidentical hematopoietic cell transplantation. Eur J Haematol. 98: 632–634.
https://doi.org/10.1111/ejh.12848
Use of products enriched with BKV-specific T cells generated using CliniMACS Prodigy and the Cytokine Capture System is safe and efficient in HLA-haploidentical HCT where BKV cystitis can be a serious complication.

Priesner, C. *et al.* (2016) Comparative analysis of clinical-scale IFN-γ-positive T cell enrichment using partially and fully integrated platforms. Fron. Immunol. 7: 393.
https://doi.org/10.3389/fimmu.2016.00393
The manufacturing process on the CliniMACS Prodigy® saved development and hands-on time due to its higher process integration and ability for unattended operation.

Kumaresan, P. *et al.* (2015) Automated cell enrichment of cytomegalovirus-specific T cells for clinical applications using the cytokine-capture system.
J Vis Exp. 104. (Video)
https://doi.org/10.3791/52808
The goal of this protocol is to manufacture pathogen-specific clinical-grade T cells using a bench-top, automated, second generation cell enrichment device that incorporates a closed cytokine capture system and does not require dedicated staff or use of a GMP facility.

Bunos, M. *et al.* (2015) Automated isolation of primary antigen-specific T cells from donor lymphocyte concentrates: results of a feasibility exercise.
Vox Sang. 109: 387–93.
https://doi.org/10.1111/vox.12291
The CCS protocol on CliniMACS Prodigy is unrestrictedly functional. It runs fully automatically beyond set-up and thus markedly reduces labor. The quality of the products generated is similar to products generated with CliniMACS Plus. The automatic system is thus suitable for routine clinical application.

CD34⁺ and CD45RA⁺ cells

Mueller, N. *et al.* (2018) Generation of alloreactivity-reduced donor lymphocyte products retaining memory function by fully automatic depletion of CD45RA-positive cells.
Cytotherapy. 20: 532–542.
https://doi.org/10.1016/j.jcyt.2018.01.006
The novel, closed, fully GMP-compatible process on CliniMACS Prodigy generates highly CD45RA-depleted cellular products predicted to be clinically meaningfully depleted of GvH reactivity.

Bateman, C. *et al.* (2017) Results of using automated CliniMACS Prodigy for CD34 selection from mobilized peripheral blood stem cell products. Blood. 130: 3201.
http://www.bloodjournal.org/content/130/Suppl_1/3201
Results suggest that the CliniMACS Prodigy can be used for the routine clinical application of CD34 selection to HSCT products.

Ishida, T. *et al.* (2016) Multiple allogeneic progenitors in combination function as a unit to support early transient hematopoiesis in transplantation.
J. Exp. Med. 213: 1865–80.
https://doi.org/10.1084/jem.20151493
The CliniMACS Prodigy, an all-in-one cell-processing instrument, efficiently harvested viable mononuclear cells (MNCs) after protocol optimization, and viable CD34⁺ cells as well from frozen UCB cells.

Hümmer, C. *et al.* (2016) Automation of cellular therapy product manufacturing: results of a split validation comparing CD34 selection of peripheral blood stem cell apheresis product with a semi-manual vs. an automatic procedure. J Transl. Med. 14: 76.
https://doi.org/10.1186/s12967-016-0826-8
The CliniMACS Prodigy is shown to be suitable to perform CD34 selection to validation products met a pre-defined specification.

Stroncek, D. F. *et al.* (2016) Preliminary evaluation of a highly automated instrument for the selection of CD34⁺ cells from mobilized peripheral blood stem cell concentrates. Transfusion. 56: 511.
https://doi.org/10.1111/trf.13394
CD34⁺ cells can be effectively selected from mobilized PBSC concentrates with the CliniMACS Prodigy.

NK cells

Klöß, S. *et al.* (2017) Optimization of human NK cell manufacturing: fully automated separation, improved *ex vivo* expansion using IL-21 with autologous feeder cells, and generation of anti-CD123-CAR-expressing effector cells. Hum Gene Ther. 28: 897–913.
https://doi.org/10.1089/hum.2017.157
Fully automated one-step separation of NK CD56⁺CD3⁻ cells using the CliniMACS Prodigy is shown, starting with approximately 1.2×10^9 leukocytes collected by small-scale lymphapheresis or from buffy coats.

Granzin, M. *et al.* (2015) Fully automated expansion and activation of clinical-grade natural killer cells for adoptive immunotherapy. Cytotherapy 17: 621–31.
https://doi.org/10.1016/j.jcyt.2015.03.611
The automation of the entire NK cell expansion process presented in the present report represents a novel procedure with the use of a single instrument that allows for the efficient production of clinical-grade NK effector cells.

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https://doi.org/10.1016/j.jcyt.2017.05.009
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Skorska, A. *et al.* (2017) GMP-conformant on-site manufacturing of a CD133⁺ stem cell product for cardiovascular regeneration. Stem Cell Res Ther. 8: 33.
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