

Contents

1. Description
 - 1.1 Principle of the Tumor Dissociation Kit
 - 1.2 Background information
 - 1.3 Applications
 - 1.4 Reagent and instrument requirements
2. Protocols
 - 2.1 Reagent preparation
 - 2.2 Tumor dissociation protocols
 - 2.2.1 Dissociation using the gentleMACS™ Octo Dissociator with Heaters
 - 2.2.2 Dissociation using the gentleMACS™ Dissociator or the gentleMACS™ Octo Dissociator

1. Description

This product is for research use only.

| | |
|-------------------|--|
| Components | 5 vials, containing: 2 vials of Enzyme H (lyophilized powder) 1 vial of Enzyme R (lyophilized powder) 1 vial of Enzyme A (lyophilized powder) 1 mL of Buffer A |
| Size | For 25 digestions. The specified number of digestions is valid when digesting a tumor in a range of 0.01–1 g following the protocol in chapter 2.2. |
| Storage | Upon arrival immediately store all components at 2–8 °C. Reconstitute all components before the date indicated on the box label. For information about reconstitution and storage after reconstitution of the lyophilized components refer to chapter 2.1. |

1.1 Principle of the Tumor Dissociation Kit

Tumor tissues can be dissociated into single-cell suspensions by combining mechanical dissociation with enzymatic degradation of the extracellular matrix, which maintains the structural integrity of tissues.

The tumor tissue is enzymatically digested using the kit components and the gentleMACS™ Dissociators are used for the mechanical dissociation steps. After dissociation, the sample is applied to a filter to remove any remaining larger particles from the single-cell suspension.

Cells should be processed immediately for downstream applications, such as cell separation, cell culture, cellular or molecular analyses.

1.2 Background information

The Tumor Dissociation Kit, human has been developed for the gentle, rapid, and effective generation of single-cell suspensions from primary human tumor tissue or xenografts. It is optimized for a high yield of tumor cells, stromal cells, and tumor infiltrating lymphocytes (TILs), while preserving cell surface epitopes. For detailed information about marker preservation, please contact Technical Support at technicalsupport@miltenyi.com.

Dissociated cells can be subsequently cultured or isolated using MACS® Technology. Furthermore, the single-cell suspension can be analyzed for phenotype distributions, and other functional, genetic, or proteomic studies can be performed.

1.3 Applications

- Dissociation of primary or xenografted human tumor tissue into single-cell suspensions for subsequent cell separations using MACS Technology.
- Cultivation of tumor cell or TIL populations.
- Phenotyping or enumeration of tumor cell or TIL populations by flow cytometry or fluorescence microscopy.

1.4 Reagent and instrument requirements

- RPMI 1640 or DMEM
- MACS SmartStrainers (70 µm) (# 130-098-462)
- MACSmix™ Tube Rotator (# 130-090-753) in combination with an incubator at 37 °C.
- gentleMACS Dissociator (# 130-093-235), gentleMACS Octo Dissociator (# 130-095-937), or gentleMACS Octo Dissociator with Heaters (# 130-096-427)
- gentleMACS C Tubes (# 130-093-237, # 130-096-334)
- (Optional) Red Blood Cell Lysis Solution (10×) (# 130-094-183)
- (Optional) MACS Tissue Storage Solution (# 130-100-008)
- (Optional) Debris Removal Solution (# 130-109-398)
- (Optional) Dead Cell Removal Kit (# 130-090-101)
- (Optional) ART® 1000 REACH™ pipet tips (Molecular BioProducts, Inc.) for removal of dissociated material from the closed C Tubes.
- (Optional) TumorMACS Media, e.g. the Pancreas TumorMACS Medium (# 130-119-484)

2. Protocols

- ▲ For details on the use of the gentleMACS™ Dissociators, refer to the gentleMACS Dissociator user manuals.
- ▲ For cell culture experiments subsequent to tissue dissociation, all steps should be performed under sterile conditions.
- ▲ Tumor tissue in a range of 0.05–0.2 g is dissociated in 2.5 mL enzyme mix and 0.2–1.0 g is dissociated in 5 mL enzyme mix.
- ▲ The MACSmix™ Tube Rotator is used with slow, continuous rotation.

2.1 Reagent preparation

1. Prepare Enzyme H by reconstitution of the lyophilized powder in each vial with 3 mL of RPMI 1640 or DMEM. Prepare aliquots of appropriate volume to avoid repeated freeze-thaw-cycles. Store aliquots at –20 °C. This solution is stable for 6 months after reconstitution. For cell culture experiments subsequent to tissue dissociation, Enzyme H should be sterile filtered prior to aliquoting.
2. Prepare Enzyme R by reconstitution of the lyophilized powder in the vial with 2.7 mL RPMI 1640 or DMEM. Prepare aliquots of appropriate volume to avoid repeated freeze-thaw-cycles. Store aliquots at –20 °C. This solution is stable for 6 months after reconstitution.
▲ **Note:** Make sure to thoroughly mix this suspension immediately before withdrawing the required reaction volume!
3. Prepare Enzyme A by reconstitution of the lyophilized powder in the vial with 1 mL of Buffer A supplied with the kit. Do not vortex. Prepare aliquots of appropriate volume to avoid repeated freeze-thaw-cycles. Store aliquots at –20 °C. This solution is stable for 6 months after reconstitution.

2.2 Tumor dissociation protocols

- ▲ Tumor tissue can be classified as soft, medium, or tough depending on the histological composition of the tissue. For some examples of human tumor types refer to the table below.

| Tumor type | Tumor examples |
|------------|---|
| Soft | Melanoma, ovarian, colon, hypopharyngeal, or renal tumors |
| Medium | Lung and prostate tumors |
| Tough | Breast, pancreatic, hepatocellular, or head and neck squamous cell (HNSCC) tumors |

1. Prepare enzyme mix by adding the following components into a gentleMACS™ C Tube according to the table below.

| Size of tumor sample / biopsy | Enzyme mix | | | |
|-------------------------------|--------------------------|-----------------|-----------------|------------------|
| 0.05–0.2 g | 2.2 mL RPMI 1640 or DMEM | 100 µL Enzyme H | 50 µL Enzyme R | 12.5 µL Enzyme A |
| 0.2–1.0 g | 4.7 mL RPMI 1640 or DMEM | 200 µL Enzyme H | 100 µL Enzyme R | 25 µL Enzyme A |

▲ **Note:** For the analysis of tumor infiltrating leukocytes (TILs) it is recommend to reduce the content of enzyme R to 20% in the enzyme mix (e.g., for >0.2g sample add 20 µL of enzyme R or for <0.2g sample add 10 µL of enzyme R, respectively). Reducing the content of enzyme R will help to preserve cell

surface epitopes but may lead to lower cell yields and viability of endothelial cells, epithelial cells, and tumor-associated fibroblasts (TAFs).

2. Remove fat, fibrous and necrotic areas from the tumor sample.
3. Cut the tumor into small pieces of 2–4 mm.
▲ **Note:** When working with small tumor biopsies, cut the biopsies in 2–4 pieces depending on their length.
4. Transfer the tissue pieces into the gentleMACS C Tube containing the enzyme mix.
5. Tightly close C Tube and attach it upside down onto the sleeve of the gentleMACS Dissociator.

▲ **Note:** It has to be ensured that the sample material is located in the area of the rotor/stator.

2.2.1 Dissociation using the gentleMACS™ Octo Dissociator with Heaters

1. Choose an appropriate gentleMACS™ Program according to the table below.

| Tumor type | gentleMACS Program |
|------------|--------------------|
| Soft | 37C_h_TDK_1 |
| Medium | 37C_h_TDK_2 |
| Tough | 37C_h_TDK_3 |

2. Run the selected program and continue with section 2.2.2, step 10.

2.2.2 Dissociation using the gentleMACS™ Dissociator or the gentleMACS Octo Dissociator

1. Start the dissociation of **either soft, medium, or tough tumors** by running the gentleMACS program **h_tumor_01**
2. After termination of the program, detach C Tube from the gentleMACS Dissociator.
3. Incubate sample for 30 minutes at 37 °C under continuous rotation using the MACSmix™ Tube Rotator.
4. Attach C Tube upside down onto the sleeve of the gentleMACS Dissociator.

▲ **Note:** It has to be ensured that the sample material is located in the area of the rotor/stator.

5. Run the next gentleMACS Program according to the table below.

| Tumor type | gentleMACS Program |
|------------|--------------------|
| Soft | h_tumor_02 |
| Medium | h_tumor_02 |
| Tough | h_tumor_01 |

6. After termination of the program, detach C Tube from the gentleMACS Dissociator.
7. Incubate sample for 30 minutes at 37 °C under continuous rotation using the MACSmix Tube Rotator.
8. Attach C Tube upside down onto the sleeve of the gentleMACS Dissociator.

▲ **Note:** It has to be ensured that the sample material is located in the area of the rotor/stator.

9. Run the next gentleMACS Program d according to the table below.

| Tumor type | gentleMACS Program |
|------------|--------------------|
| Soft | h_tumor_03 |
| Medium | h_tumor_02 |
| Tough | h_tumor_01 |

10. After termination of the program, detach C Tube from the gentleMACS Dissociator.

▲ **Note:** When working with tough tumors, some larger pieces of tissue may remain. To further increase the cell yield, allow the remaining tissue to settle and transfer the supernatant to a new tube. Add RPMI 1640 or DMEM (for >0.2 g sample add 4 mL or for <0.2 g sample add 2 mL, respectively) to the C Tube with the remaining tissue pieces. Insert tube onto the sleeve of the gentleMACS Dissociator. Run program **m_imptumor_01**. Combine the resulting cell suspension with the previously removed supernatant.

11. (Optional) Perform a short centrifugation step to collect the sample material at the bottom of the tube.
12. Resuspend sample and apply the cell suspension to a MACS SmartStrainer (30 µm or 70 µm) placed on a 50 mL tube
- ▲ **Note:** Dissociated tissue can be removed from the closed C Tube by pipetting through the septum-sealed opening in the center of the cap of the C Tube. Use ART 1000 REACH 1000 µL pipette tips.
13. Wash cell MACS SmartStrainer (30 µm or 70 µm) with 20 mL of RPMI 1640 or DMEM.
14. Centrifuge cell suspension at 300×g for 7 minutes. Aspirate supernatant completely.
15. (Optional) If sample appears 'viscous' after dissociation (released DNA), perform a DNase treatment: Centrifuge cell suspension 300×g for 5 minutes, remove supernatant completely, and resuspend pellet in 5 mL RPMI 1640 or DMEM. Add 200 U/mL DNase and incubate for 5 minutes at room temperature. Wash 300×g for 5 minutes with 5 mL serum-containing buffer. Remove supernatant completely and resuspend in RPMI 1640 or DMEM.
16. Resuspend cells as required for further applications.
17. (Optional) To remove erythrocytes or dead cells, use Red Blood Cell Lysis Solution (10×) (# 130-094-183), or the Dead Cell Removal Kit (# 130-090-101).
18. (Optional) In case of excess of debris, use Debris Removal Solution (# 130-109-398).

Refer to www.miltenyibiotec.com for all data sheets and protocols. Miltenyi Biotec provides technical support worldwide. Visit www.miltenyibiotec.com for local Miltenyi Biotec Technical Support contact information.

Legal notices

Limited product warranty

Miltenyi Biotec B.V. & Co. KG and/or its affiliate(s) warrant this product to be free from material defects in workmanship and materials and to conform substantially with Miltenyi Biotec's published specifications for the product at the time of order, under normal use and conditions in accordance with its applicable documentation, for a period beginning on the date of delivery of the product by Miltenyi Biotec or its authorized distributor and ending on the expiration date of the product's applicable shelf life stated on the product label, packaging or documentation (as applicable) or, in the absence thereof, ONE (1) YEAR from date of delivery ("Product Warranty"). Miltenyi Biotec's Product Warranty is provided subject to the warranty terms as set forth in Miltenyi Biotec's General Terms and Conditions for the Sale of Products and Services available on Miltenyi Biotec's website at www.miltenyibiotec.com, as in effect at the time of order ("Product Warranty"). Additional terms may apply. BY USE OF THIS PRODUCT, THE CUSTOMER AGREES TO BE BOUND BY THESE TERMS. THE CUSTOMER IS SOLELY RESPONSIBLE FOR DETERMINING IF A PRODUCT IS SUITABLE FOR CUSTOMER'S PARTICULAR PURPOSE AND APPLICATION METHODS.

Technical information

The technical information, data, protocols, and other statements provided by Miltenyi Biotec in this document are based on information, tests, or experience which Miltenyi Biotec believes to be reliable, but the accuracy or completeness of such information is not guaranteed. Such technical information and data are intended for persons with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. Miltenyi Biotec shall not be liable for any technical or editorial errors or omissions contained herein.

All information and specifications are subject to change without prior notice. Please contact Miltenyi Biotec Technical Support or visit www.miltenyibiotec.com for the most up-to-date information on Miltenyi Biotec products.

Licenses

This product and/or its use may be covered by one or more pending or issued patents and/or may have certain limitations. Certain uses may be excluded by separate terms and conditions. Please contact your local Miltenyi Biotec representative or visit Miltenyi Biotec's website at www.miltenyibiotec.com for more information.

The purchase of this product conveys to the customer the non-transferable right to use the purchased amount of the product in research conducted by the customer (whether the customer is an academic or for-profit entity). This product may not be further sold. Additional terms and conditions (including the terms of a Limited Use Label License) may apply.

CUSTOMER'S USE OF THIS PRODUCT MAY REQUIRE ADDITIONAL LICENSES DEPENDING ON THE SPECIFIC APPLICATION. THE CUSTOMER IS SOLELY RESPONSIBLE FOR DETERMINING FOR ITSELF WHETHER IT HAS ALL APPROPRIATE LICENSES IN PLACE. Miltenyi Biotec provides no warranty that customer's use of this product does not and will not infringe intellectual property rights owned by a third party. BY USE OF THIS PRODUCT, THE CUSTOMER AGREES TO BE BOUND BY THESE TERMS.

Trademarks

gentleMACS, MACS, MACSmix, and the Miltenyi Biotec logo are registered trademarks or trademarks of Miltenyi Biotec and/or its affiliates in various countries worldwide. All other trademarks mentioned in this publication are the property of their respective owners and are used for identification purposes only.

Copyright © 2021 Miltenyi Biotec and/or its affiliates. All rights reserved.