

STEMprep™ Automated Tissue Dissociation System: Maximize Cell Viability and Yield

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INTRODUCTION

- Addressing Tissue Processing Challenges:** Isolating high-quality cells in sufficient quantities is difficult, as balancing enzymatic and mechanical dissociation is time-consuming and technically demanding.
- Streamlined Solution:** The STEMprep™ Tissue Dissociation System standardizes processing with an automated instrument, pre-set programs, specialized Sample Tubes, and tissue-specific enzyme kits.
- Proven Effectiveness:** STEMprep™ efficiently generates viable cells from mouse spleen, brain, lung, liver, and tumors, with newly optimized kits for kidney and intestine.
- Flexible Protocols:** Mouse spleens can be dissociated with or without enzymes using either the 1-minute Enzyme-Free Protocol or the STEMprep™ Mouse Spleen Dissociation Kit and associated protocol.
- Versatile Applications:** STEMprep™-processed cells are compatible with immunomagnetic separation, flow cytometry, and functional assays. The homogenization protocol enables direct extraction of high-quality RNA for in-depth genetic analysis.
- Advancing Research:** By improving speed, consistency, and efficiency of tissue processing, STEMprep™ accelerates tissue research and discovery.

METHODS

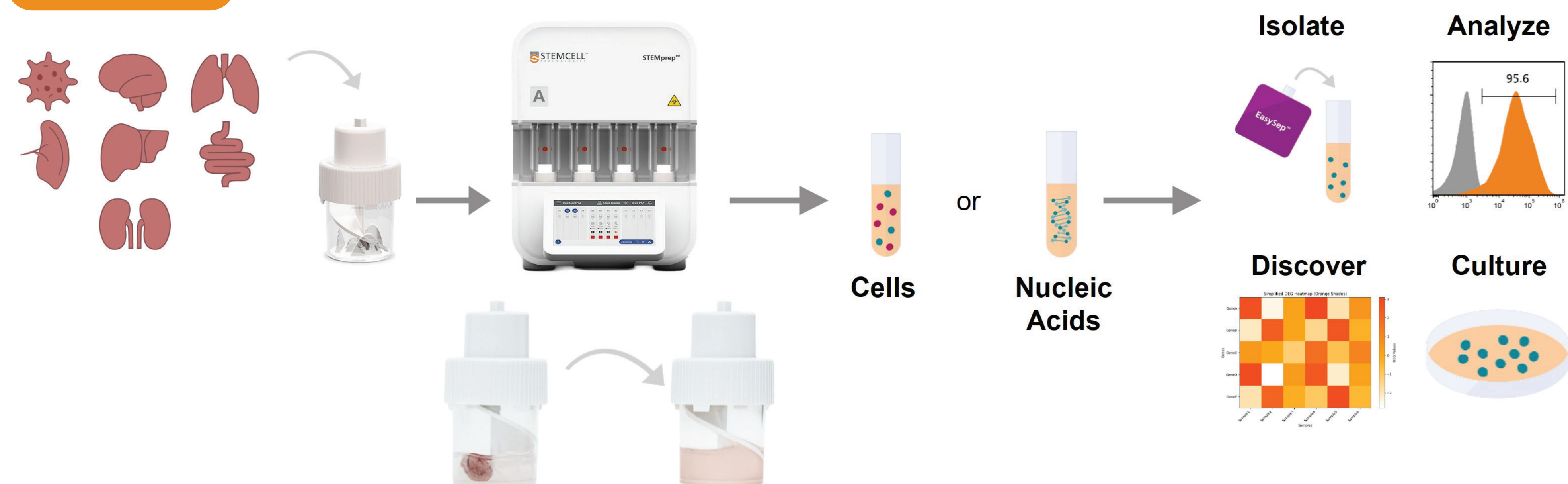


FIGURE 1. STEMprep™ System: Streamlined Tissue Dissociation for Diverse Downstream Applications

The STEMprep™ Tissue Dissociation System offers a versatile workflow for generating single-cell suspensions or tissue homogenates from a variety of mouse tissues for subsequent analyses and applications.

RESULTS

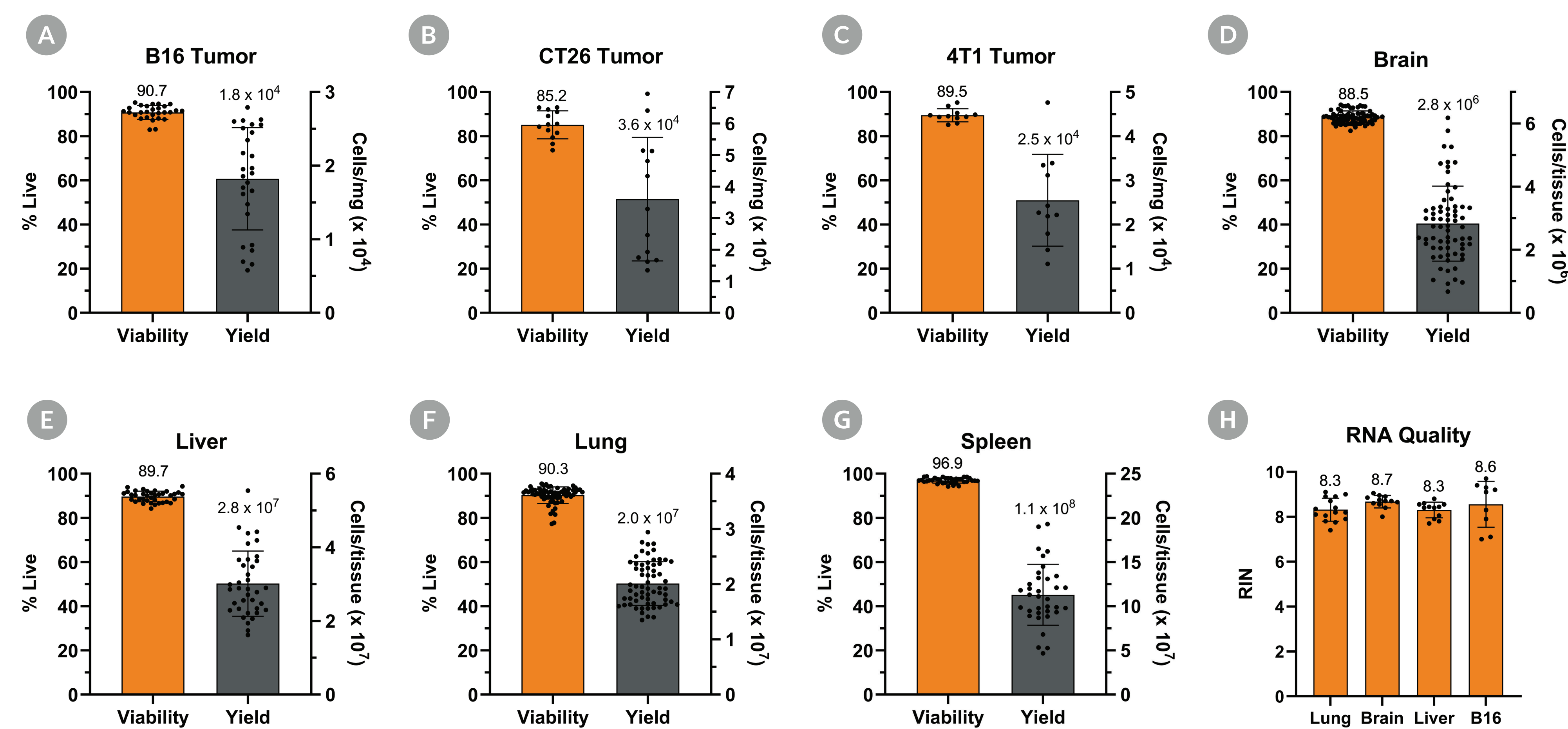


FIGURE 2. The STEMprep™ System Enables Reliable Automated Mouse Tissue Processing

Mouse tissues were dissociated into single-cell suspensions using the STEMprep™ Tissue Dissociator and the applicable STEMprep™ Tissue Dissociation Kits. Viability and yield of single-cell suspensions generated from (A) B16 melanoma tumors (n = 28), (B) CT26 colon carcinoma tumors (n = 13), (C) 4T1 mammary tumors (n = 11), (D) brain (n = 68), (E) liver (n = 37), (F) lung (n = 64), and (G) spleen (n = 35). Primary solid tumors were generated by subcutaneous injection into the flanks of mice. Tumor, liver, and lung samples were treated with ammonium chloride solution to lyse red blood cells. Brain samples were processed with 18% (v/v) OptiPrep™ to remove myelin and cell debris prior to analysis. Cell viability and yield following STEMprep™ processing were assessed by flow cytometry. (H) RNA integrity number (RIN) of RNA extracted from mouse livers, brains, livers, and B16 tumors homogenized on the STEMprep™ Tissue Dissociator in combination with the EasySep™ Total Nucleic Acid Extraction Kit (with DNase I treatment, n = 9 - 15). Data are presented as mean ± SD.

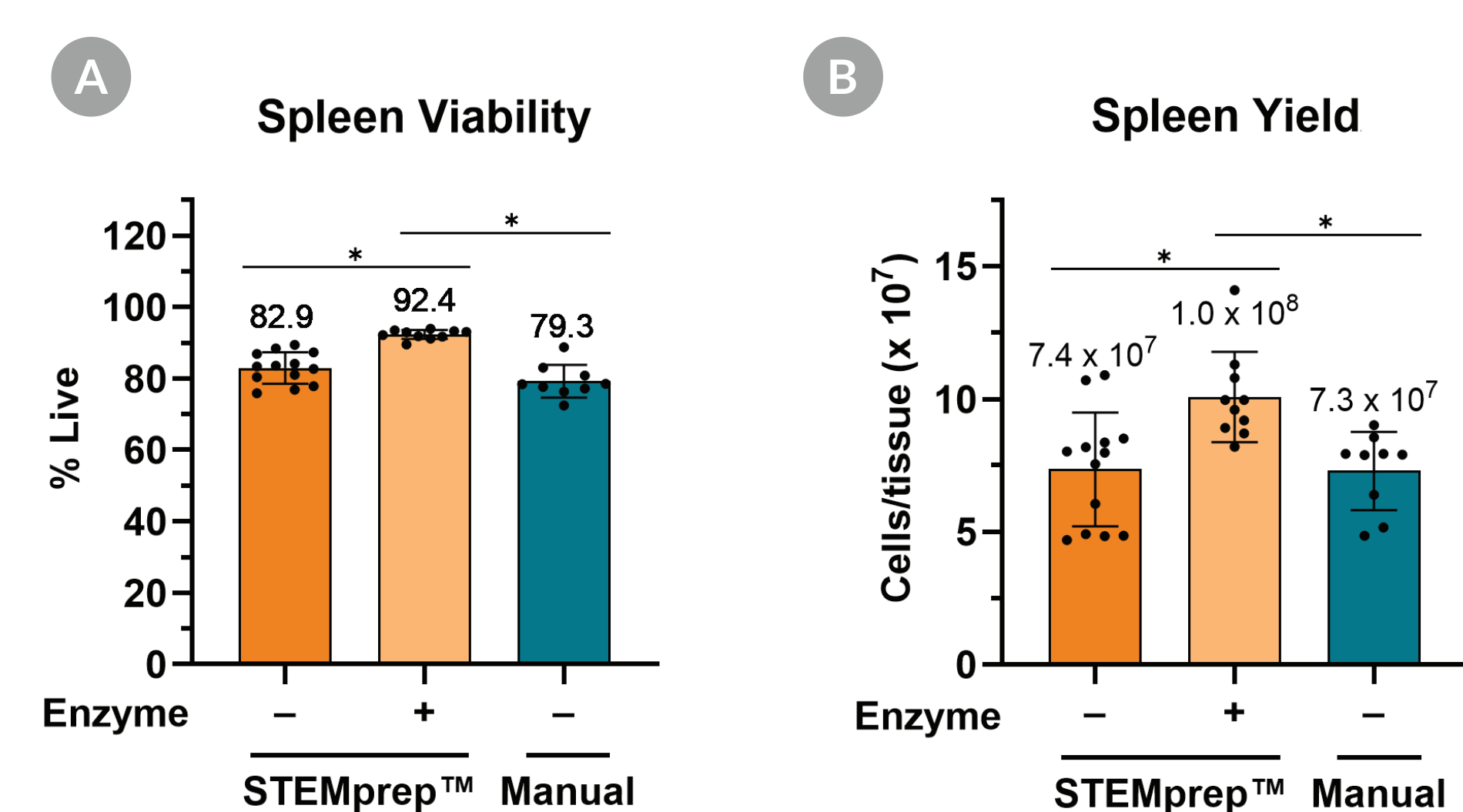


FIGURE 3. Mouse Spleens Can Be Processed on STEMprep™ with or without Enzymes

Mouse spleens were processed into single-cell suspensions using one of three methods: an automated, 1-minute, enzyme-free protocol using the STEMprep™ Tissue Dissociator, an automated enzyme-based protocol using the STEMprep™ Mouse Spleen Dissociation Kit and the STEMprep™ Tissue Dissociator, or a manual protocol without enzymes. (A) Viability of total nucleated cells and (B) yield of viable cells per spleen assessed by flow cytometry. Data are presented as mean ± SD (n = 9 - 13). *p < 0.05, one-way ANOVA with Tukey's multiple comparisons test.

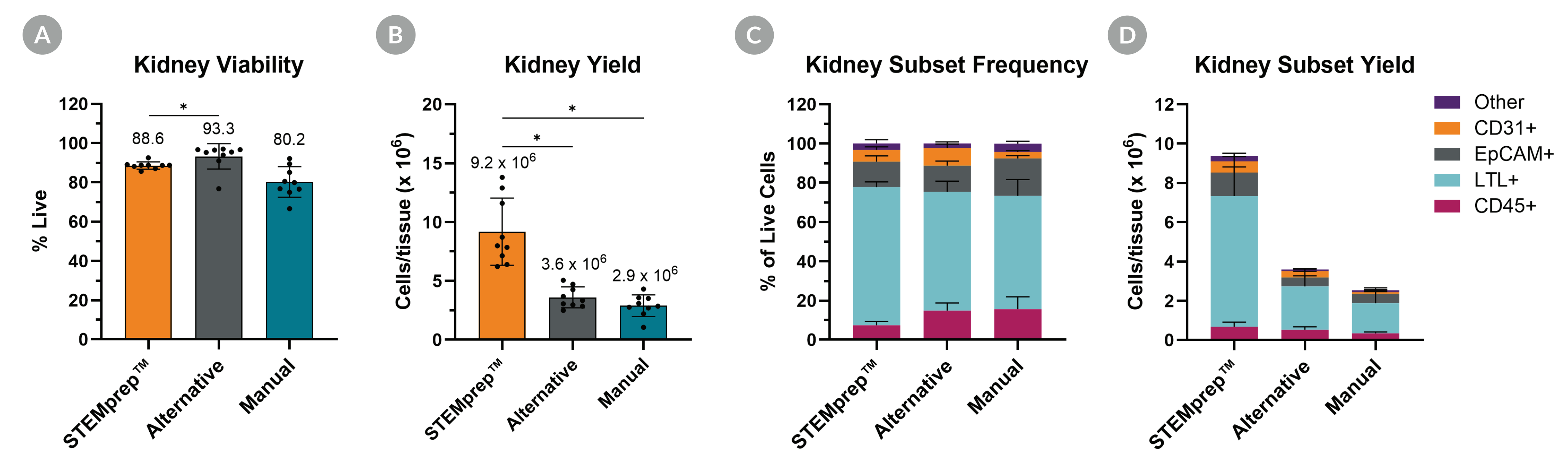


FIGURE 4. STEMprep™ Mouse Kidney Dissociation Kit Achieves High Cell Viability and Yield

Mouse kidneys were dissociated into single-cell suspensions using one of three methods: the STEMprep™ Mouse Kidney Dissociation Kit on the STEMprep™ Tissue Dissociator, an alternative automated system, or a standard manual dissociation method. (A) Viability of total nucleated cells (n = 9). (B) Yield of viable kidney cells per whole organ. Data are presented as mean ± SD (n = 9). (C) Frequency and (D) total number of CD45+ immune and CD45- non-immune cell subsets, including CD31+ endothelial cells, EpCAM+ epithelial cells, and LTL+ proximal tubule cells post-dissociation. Data are presented as mean ± SD (n = 6). Viability, yield, and subset information were assessed by flow cytometry. *p < 0.05, one-way ANOVA with Tukey's multiple comparisons test

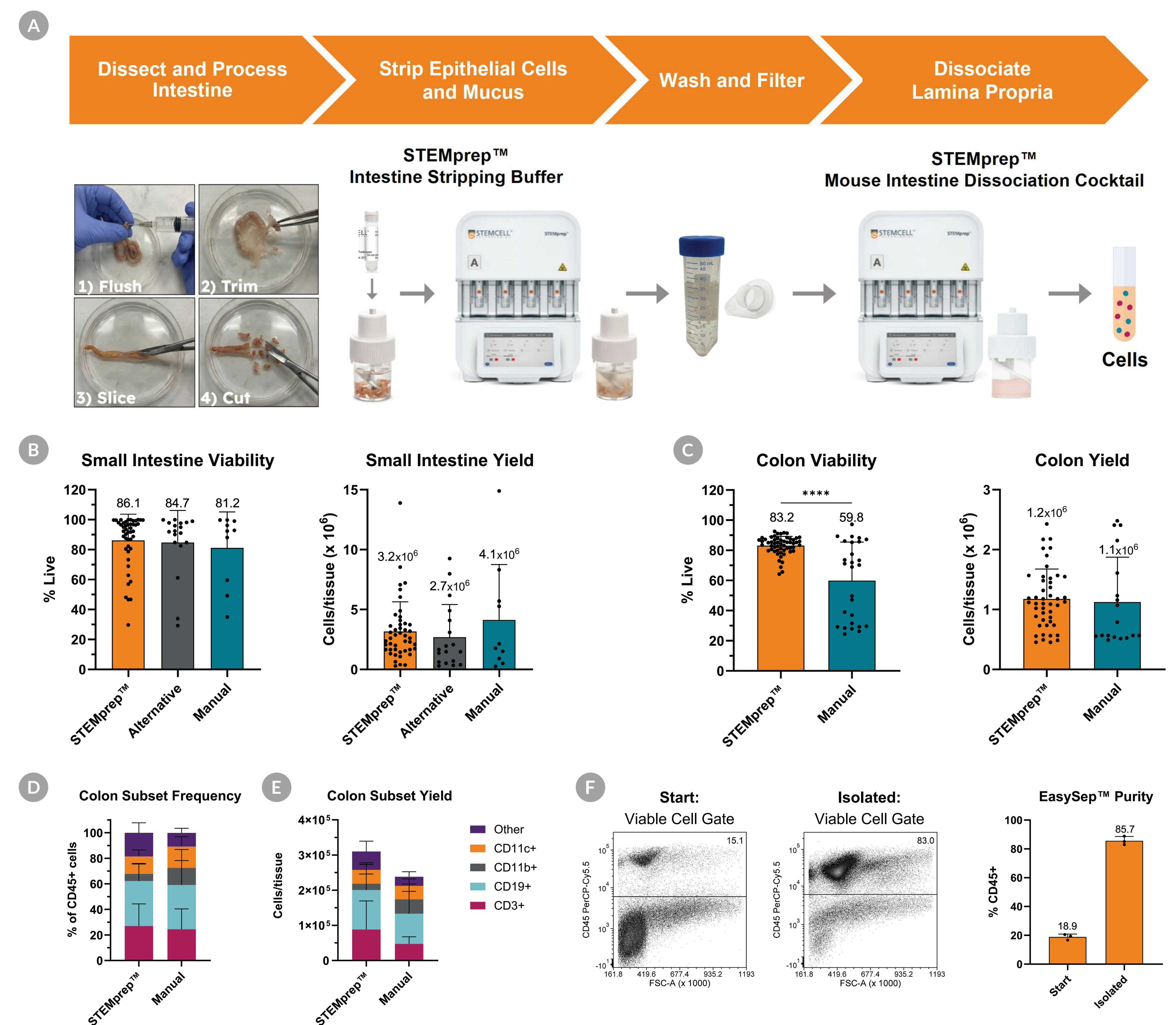


FIGURE 5. STEMprep™ Mouse Intestine Dissociation Kit Streamlines Processing and Achieves High Cell Viability and Yield

(A) Schematic representation of the steps to isolate lamina propria cells using the STEMprep™ Mouse Intestine Kit and the STEMprep™ Tissue Dissociator. (B) Viability and yield of small intestine lamina propria cells dissociated using the STEMprep™ system, an alternative automated system, or a standard manual method (n = 10 - 46). (C) Viability and yield of colon lamina propria cells dissociated using the STEMprep™ system or a standard manual method (n = 18 - 47). (D) Frequency and (E) total number of immune cell subsets within leukocyte (CD45+) gate in the colon (n = 3). (F) Colon leukocytes were isolated using EasySep™ Mouse TIL (CD45) Positive Selection Kit following dissociation with the STEMprep™ Mouse Intestine Kit. Representative flow plots and summary data of colon CD45 purity before and after EasySep™ (n = 3). Data are presented as mean ± SD. ****p < 0.0001, with an unpaired t-test.

SUMMARY

- High cell viability and yields are achieved from mouse tissues using the STEMprep™ System.
- Mouse spleen can be dissociated in the presence or absence of enzymes, with maximum viability using the STEMprep™ Mouse Spleen Dissociation Kit.
- STEMprep™ delivers superior kidney cell recovery compared to alternative methods.
- The STEMprep™ Mouse Intestine Dissociation Kit streamlines lamina propria dissociation from both the small intestine and colon.
- EasySep™ can be used downstream of STEMprep™ to isolate high-purity intestinal CD45+ immune cells.