



Development Of An On-site Fat Cryopreservation Method For Repeat Fat Grafting

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Introduction:

- Autologous fat grafting is a popular and established technique in plastic surgery.
- Patients often require repeat grafting due to the average **40-50% of the grafted fat is reabsorbed** within 3-6 months.
- In this study, we aimed to optimize a protocol for **on-site cryopreservation and storage of fat tissue** adaptable for small and large-scale practices that enables repeat procedures.

Materials & Methods:

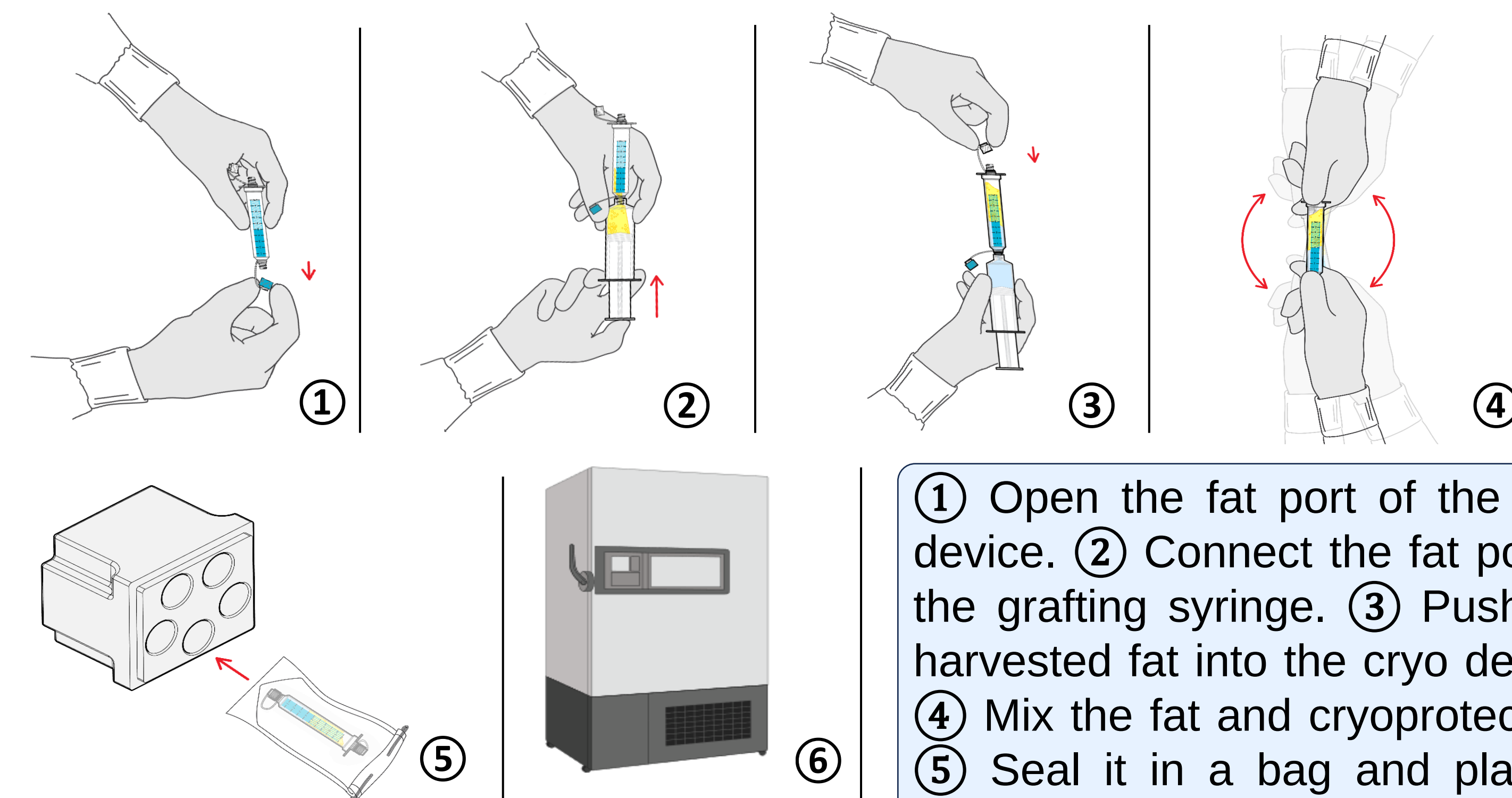
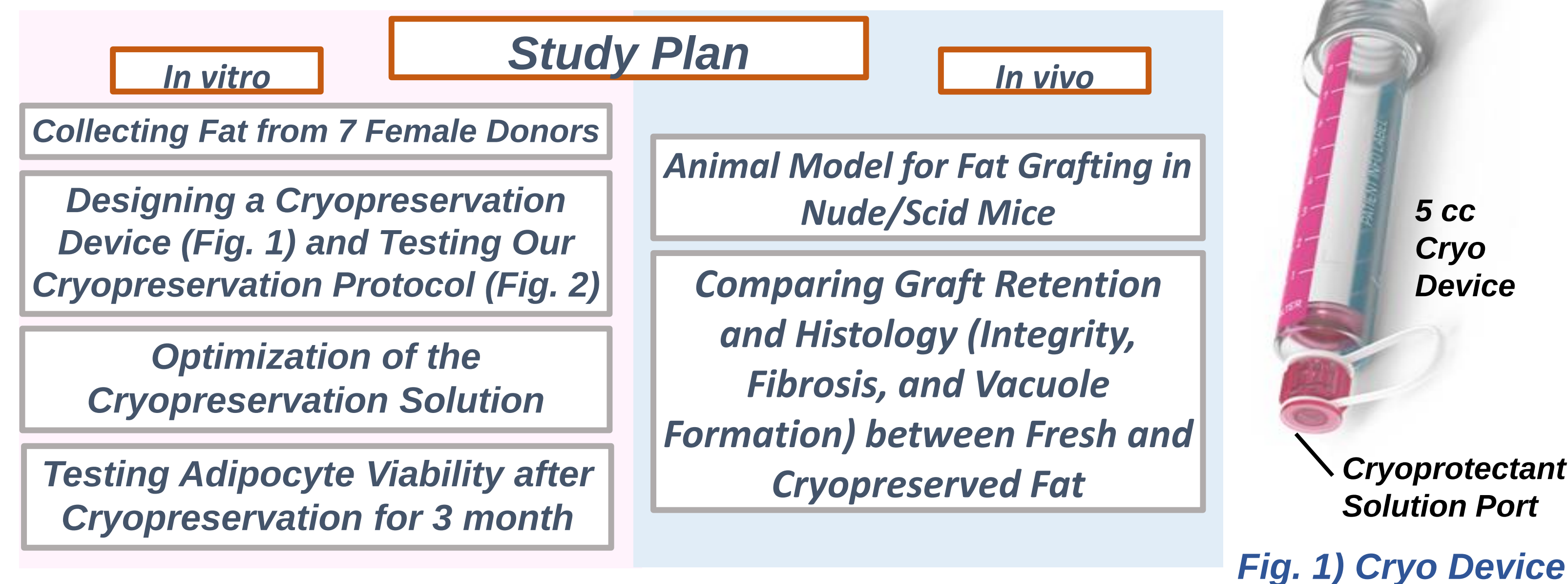


Figure 2. Instructions Panel for Lipoaspirate Cryopreservation

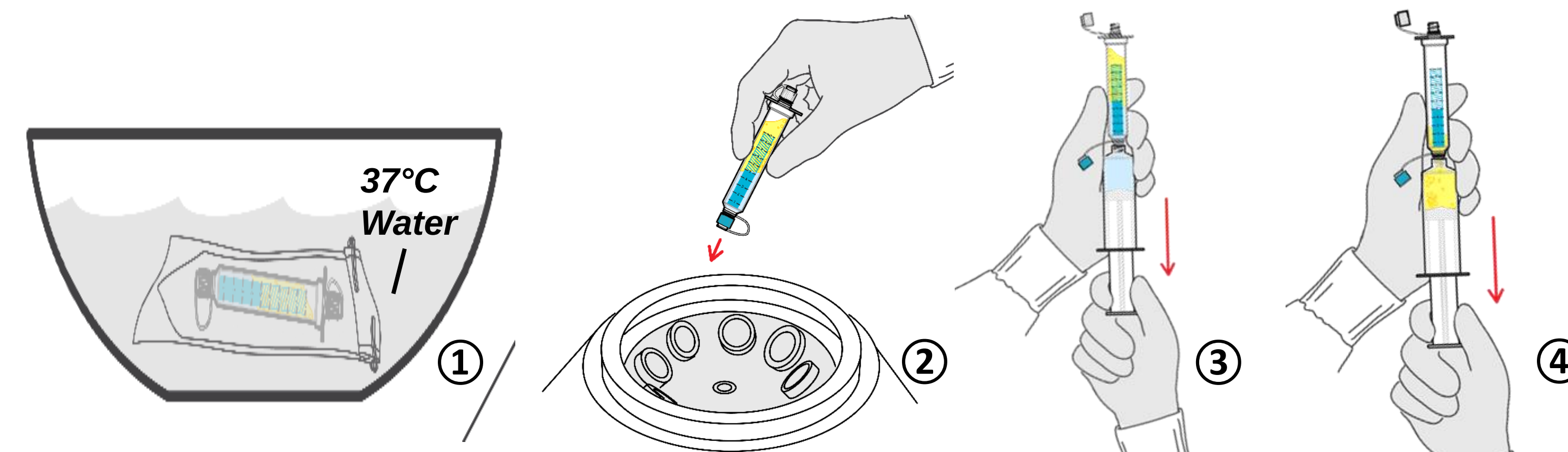


Figure 3. Instructions for Thawing and Preparing the Fat for Injection. ① Thaw in a water bath at 37°C for 40 minutes. ② Centrifuge at 200g for 5 minutes. ③ Collect and discard the cryoprotectant fraction. ④ Load the fat into grafting syringe.

Results:

Cryoprotectant Solution

Optimization. Dimethyl sulfoxide (DMSO), recombinant human serum albumin, and trehalose were tested in different concentrations and combinations to determine the best combination for cryoprotectant solution. A solution comprising of **10% DMSO and 2% human serum albumin** cryopreserved inside a Styrofoam box at -80°C provides a satisfactory outcome (Fig. 4).

Adipocyte Viability Test:

Adipocytes isolated from fat cryopreserved using our protocol were tested for viability using trypan blue staining. All cell counts were compared with fresh fat tissue and showed no difference in viability (Fig. 5)

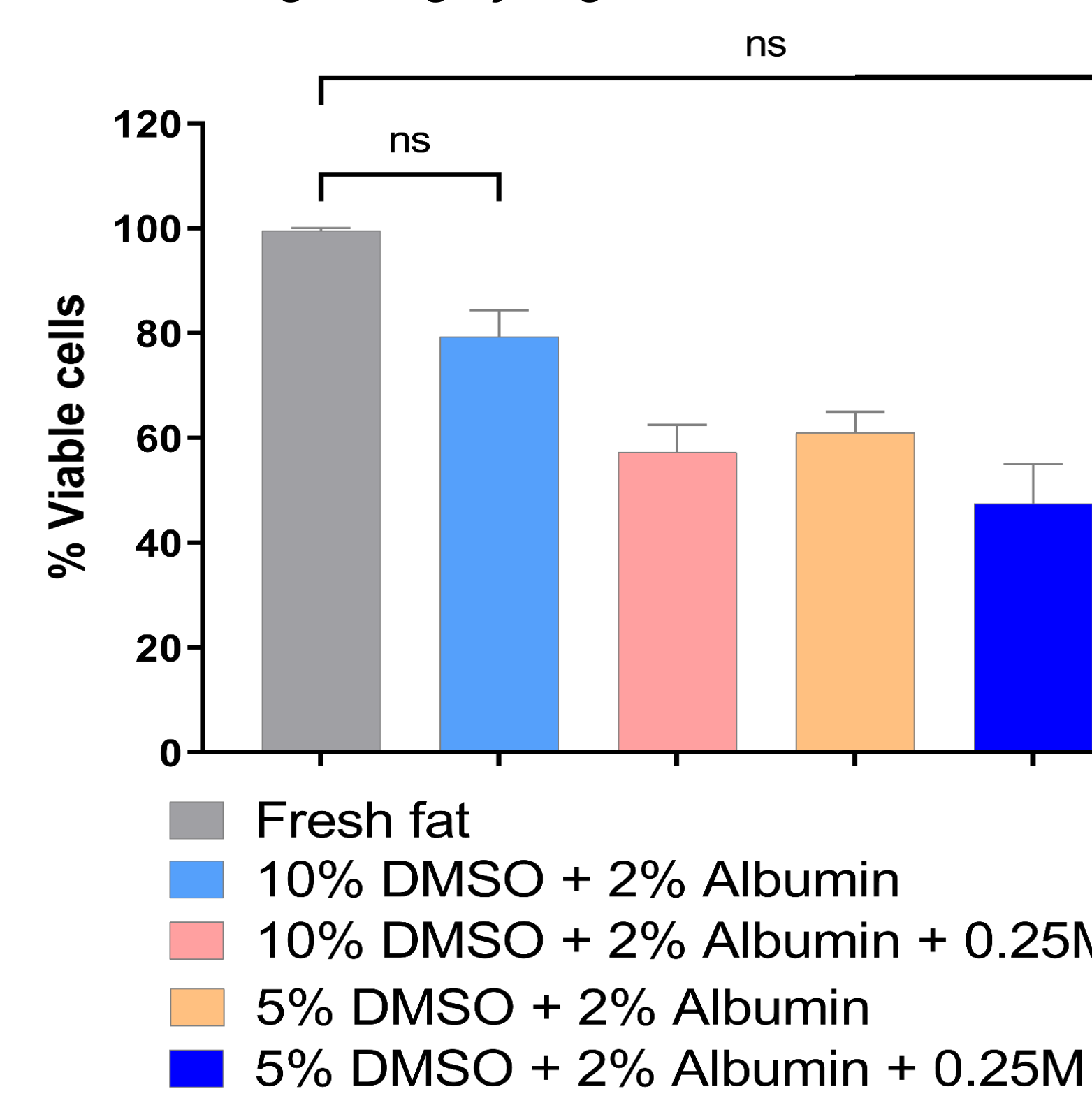


Figure 4. Adipocyte Viability after Cryopreservation with Different Solutions

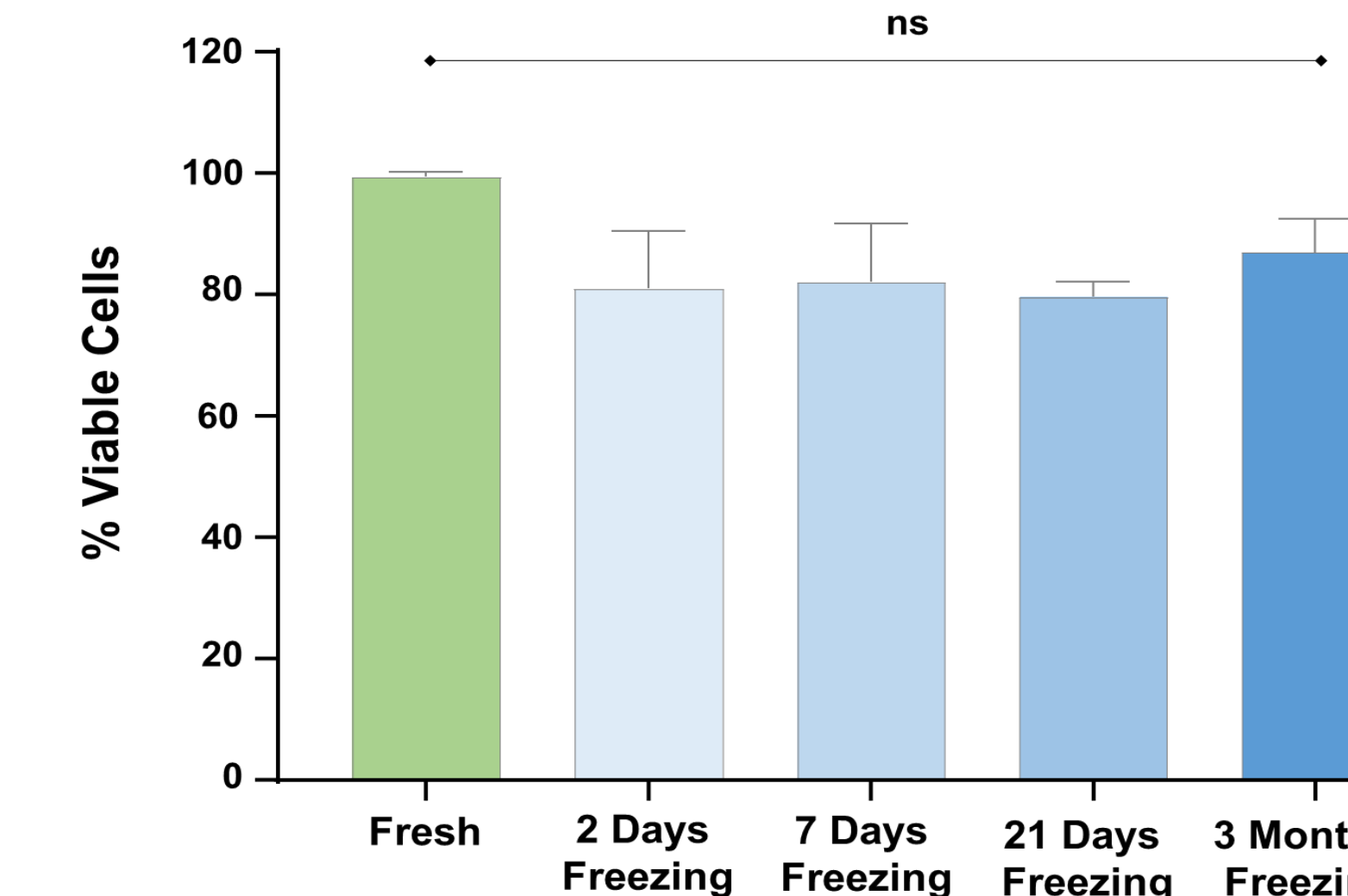


Figure 5. Adipocyte Viability after Fat Cryopreservation

Cryopreserved Fat Retained Volume and Histologic Integrity Post-Grafting.

- Comparison of volume, inflammation, and vacuole formation in grafts with fresh fat post-grafting in Nude/Scid mice.
- No significant difference observed in graft volume retention between fresh fat injections and fat cryopreserved for up to 11 months ($p=0.19$).
- Cryopreservation method yielded similar results to fresh tissue with insignificant changes in vacuole and inflammation scores ($p=0.31$, $p=0.48$) (Fig..)

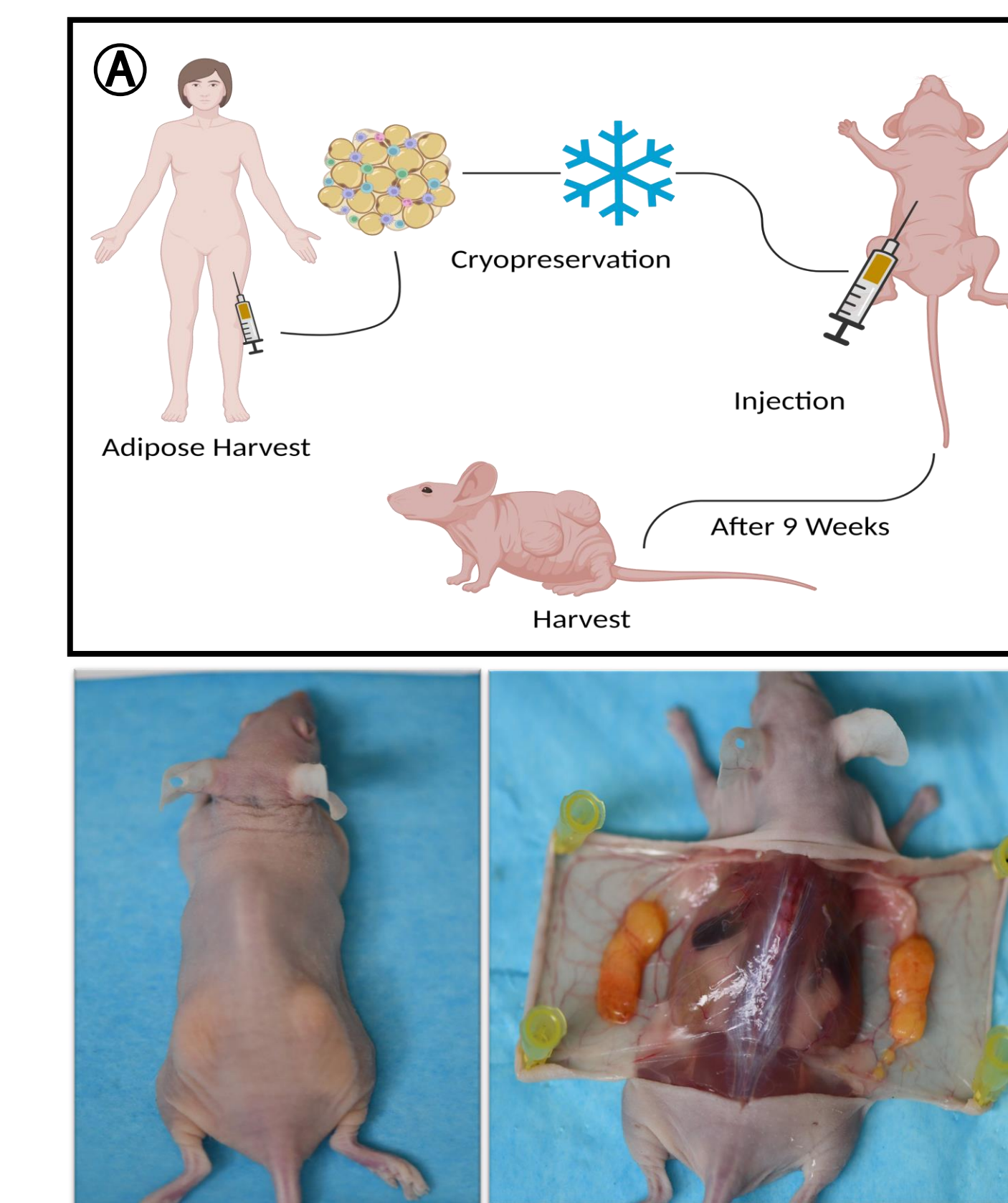


Figure 6. Cryopreservation Protocol Maintains Fat Integrity and Grafting capability for a long term. (A) Animal studies plan (B) Volume Retention in Cryopreserved Fat (C) Histological integrity of cryopreserved fat graft

Conclusions:

- Fat can be preserved with minimal morphological, weight, or volume changes for up to a year using our protocol.
- Clinical adaptation of our protocol will reduce the need for multiple harvest sessions

Disclosures:

- Authors have no disclosures.