sterility can be maintained throughout the process, even if certain components are removed during processing, for example through the use of valves, clamps, and heat seals. Furthermore, any or all of the steps can be automated or manually accomplished, according to the specific needs of the application or the user.

[0006] Thus, in one aspect, the present disclosure relates to a tissue mincing tool. The tissue mincing tool includes a compartment for a tissue sample, a solid member actuatable by a handle and moveable within the compartment, a rotatable cutting surface at one end of the compartment, and a sterile, sealed container. The compartment is arranged to position the tissue sample between the solid member and the rotatable cutting surface and actuation of the handle in one direction causes the solid member to move only towards the rotatable cutting surface. The rotatable cutting surface separates the compartment from the sterile, sealed container, such that a tissue sample that is pressed, via the solid member, into contact with and through the rotatable cutting surface ~~can be~~ is deposited as a minced tissue within the container. The cutting surface can be dimensioned to mince the tissue sample into fragments having an average cross-section no greater than four square millimeters. For example, the number of square millimeters may be no greater than 3, 2, 1, 0.5, 0.3, 0.2, 0.1, or 0.05 in various embodiments of the present disclosure. The tissue mincing tool can also include a second cutting surface for further reducing the average cross-section of the fragments. The cutting surface of the tissue mincing tool can include an automated cutting system. For example, the cutting surface may include semi-automatic scissors. One or more mincer screens may be positioned in proximity to the cutting surface. The tissue mincing tool may further include a suction cup for stabilizing the tool during operation thereof. The tissue mincing tool also or alternatively can include a fluid conduit in communication with the sterile, sealed container, and a separator unit such as one or more filters within the fluid conduit. The sterile, sealed container optionally includes at least one sealed access port permitting the sterile introduction of a fluid into the container.

[0007] In the tissue mincing tool, the compartment for the tissue sample can incorporate one or more features to facilitate the application of a force to the tissue sample, impelling it beyond the cutting surface and into the sterile, sealed container. For example, a portion of the compartment can be shaped to receive a solid member to press the tissue sample. Such a solid member can optionally be included with the tissue mincing tool, whether connected to it or provided as a separate component.

[0008] In one embodiment, a portion of the compartment near the cutting surface has a substantially constant cross-section, such that a comparably shaped solid member may be introduced into the compartment and fill that portion, while pressing the tissue sample into or

through the cutting surface. In another embodiment, the compartment near the cutting surface has a tapered or cone-shaped end. In some embodiments, an interior surface of the compartment is threaded, such that a threaded solid member may be guided into the compartment. In some embodiments, the compartment also includes a gasket, which can provide an improved seal when a solid member is introduced into the compartment. In yet another embodiment, the tissue mincing tool includes a shaft crank for moving the cutting surface towards the tissue sample.

[0009] In an embodiment, the present disclosure provides a kit comprising: a tissue mincing tool as disclosed herein; and a solid member shaped to mate with and to fill the portion of the compartment, the solid member being movable within the portion of the compartment to impel the tissue sample therein through the cutting surface. The present disclosure also provides methods of using any of the above-described tissue mincing tools by impelling the tissue sample through the cutting surface of the tool. The present disclosure provides methods of mincing a tissue sample and optionally injecting an enzyme into the sterile, sealed container, such that the enzyme enhances the digestion of the minced tissue. In an aspect, the present disclosure provides a method of mincing a tissue sample positioned between the solid member and the rotatable cutting surface of the tissue mincing tool as disclosed above, the method comprising: pressing the tissue sample, via the solid member, into contact with and through the rotatable cutting surface of the tissue mincing tool. In another aspect, the present disclosure provides a method of digesting a tissue sample, the method comprising: mincing the tissue sample as disclosed herein and, optionally, transferring the minced tissue to a second sterile, sealed container; and injecting an enzyme, whereby the enzyme digests the minced tissue. In yet another aspect, the present disclosure provides a method of separating cells from a tissue sample, the method comprising: mincing the tissue sample as disclosed herein, and removing undigested tissue. The enzyme can be a protease, such as collagenase, hyaluronidase, or dispase, separately or in combination. These steps can optionally be incorporated into a method of separating cells from the tissue sample by mincing and/or digesting the tissue sample and removing fragments larger than about 40 microns (*e.g.* fragments retained by a filter having a pore size of about 500 microns, or fragments retained by a filter having a pore size of about 300 microns, or fragments retained by a filter having a pore size of about 250 microns, or fragments retained by a filter having a pore size of about 150 microns, or fragments retained by a filter having a pore size of about 100 microns, or fragments retained by a filter having a pore size of about 70 microns, or fragments retained by a filter having a pore size of about 40 microns). These larger fragments, referred to herein as "undigested tissue," can be removed by filtering or sedimentation. These methods are effective for purifying cells from any of a variety of

1. A tissue mincing tool comprising:

a compartment for a tissue sample;

a solid member actuatable by a handle and moveable within the compartment;

a rotatable cutting surface at one end of the compartment; and

a sterile, sealed container,

wherein the compartment is arranged to position the tissue sample between the solid member and the rotatable cutting surface and actuation of the handle in one direction causes the solid member to move only towards the rotatable cutting surface,

and further wherein the rotatable cutting surface separates the compartment from the sterile, sealed container, such that a tissue sample that is pressed, via the solid member, into contact with and through the rotatable cutting surface is deposited as a minced tissue within the sterile, sealed container.

2. The tissue mincing tool of claim 1, wherein the rotatable cutting surface is dimensioned to mince the tissue sample into fragments having an average cross-section no greater than four square millimeters.

3. The tissue mincing tool of claim 2, wherein the average cross-section is no greater than one square millimeter.

4. A tissue mincing tool according to any one of the preceding claims, further comprising a second cutting surface for reducing the average cross-section of the fragments.

5. A tissue mincing tool according to any one of the preceding claims, wherein the rotatable cutting surface comprises an automated cutting system.

6. The tissue mincing tool of claim 5, wherein the automated cutting system comprises semi-automatic scissors.

7. A tissue mincing tool according to any one of the preceding claims, further comprising at least one mincer screen positioned in proximity to the rotatable cutting surface.

8. ____The tissue mincing tool of claim 7, wherein the at least one mincer screen is moveable towards the tissue sample.

9. A tissue mincing tool according to any one of the preceding claims, further comprising a suction cup for stabilizing the tissue mincing tool during operation thereof.

10. A tissue mincing tool according to any one of the preceding claims, further comprising a fluid conduit in communication with the sterile, sealed container, and a filter disposed within the fluid conduit.

11. A tissue mincing tool according to any one of the preceding claims, wherein the sterile, sealed container comprises at least one sealed access port permitting the sterile introduction of a fluid into the container.

12. A tissue mincing tool according to any one of the preceding claims, wherein an interior surface of the compartment is threaded.

13. A tissue mincing tool according to any one of the preceding claims, further comprising a gasket for sealing the compartment.

14. A tissue mincing tool according to any one of the preceding claims, wherein a portion of the compartment near its end has a substantially constant cross-section.

15. A tissue mincing tool according to any one of the preceding claims, wherein a portion of the compartment near its end is tapered or cone-shaped.

16. The tissue mincing tool according to claim 14 or 15, wherein the solid member is shaped to mate with and to fill the portion of the compartment

17. The tissue mincing tool of claim 1, further comprising a shaft crank for moving the rotatable cutting surface towards the tissue sample.

~~18. The tissue mincing tool of claim 1, wherein the cutting surface is rotatable.~~

~~19~~18. The tissue mincing tool of claim 1, wherein the rotatable cutting surface is moveable towards the tissue sample.

~~20~~19. The tissue mincing tool of claim 1, wherein the tissue mincing tool comprises a series of rotatable cutting surfaces at the one end of the compartment.

~~21~~20. A method of mincing a tissue sample positioned between the solid member and the rotatable cutting surface of the tissue mincing tool of claim 1, the method comprising:

pressing the tissue sample, via the solid member, into contact with and through the rotatable cutting surface of the tissue mincing tool.

~~22~~21. A method of digesting a tissue sample, the method comprising:

mincing the tissue sample according to the method of claim 20~~21~~ and, optionally, transferring the minced tissue to a second sterile, sealed container; and

injecting an enzyme, whereby the enzyme digests the minced tissue.

~~23~~22. The method of claim ~~22~~21, wherein the enzyme is a collagenase.

~~24~~23. A method of separating cells from a tissue sample, the method comprising:

mincing the tissue sample according to the method of claim ~~21~~20; and

removing undigested tissue.

~~25~~24. The method of claim 23~~24~~, further comprising diluting the tissue sample, wherein the undigested tissue is subsequently removed by filtering.

~~26~~25. The method of claim ~~25~~24, further comprising sedimenting a filtrate generated by the filtering.

~~27~~26. The method of claim ~~26~~25, further comprising re-suspending sedimented cells and filtering the re-suspended sedimented cells.

~~28~~27. A method according to any one of claims ~~21~~20-~~27~~26, wherein the tissue sample comprises Wharton's Jelly stem cells.

~~29~~28. The method of claim ~~28~~27, wherein the tissue sample is substantially free of blood vessels.