

TRAY FOR SLIDE PROCESSING

FIELD OF THE INVENTION

The invention is in the field of automated processing of biological slides. In particular, the invention is in the field of trays used for holding the biological sample and the slide.

BACKGROUND

Several automated sample processors are known in the art for the preparation of slides with cells taken from biological specimen. For example, U.S. Patent Nos. 5,143,627, 5,282,978, and 6,562,299, and U.S. Patent Application Publication Nos. 2003-0207455 and 2003-0207456 describe several of such automated systems.

In certain automated systems, such as the ThinPrep® TP2000 and ThinPrep® TP3000, available from Cytoc Corp., Marlborough, Massachusetts, USA, the user manually feeds the slides and the vials containing the biological sample to the processor. Once the cells are smeared on the slide, a one-to-one relationship between the sample vial and the microscope slide is established, which needs to be maintained until the slide is reviewed by a medical expert. This one-to-one relationship is often referred to as the “chain of custody.”

In addition to marking the slide with the same identifier, such as the patient name or number, that appears on the vial, users regularly keep each vial in close proximity to its corresponding slide. Normally, this is accomplished by placing a blank slide on top of each vial while the vials are lined up to be processed by the processor. After the slides are smeared, the slides are again kept laying on top of their corresponding vials. This process creates opportunities for mistakes and accidents to create a mix-up. Therefore, a need exists in the art for a container that keeps the vials and their corresponding slides in close proximity to each other.

SUMMARY OF THE INVENTION

Disclosed herein is a carrier for slide processing, comprising a plurality of vial locations, each configured to hold a vial, where the is vial is configured to hold a biological sample; and a plurality of slide locations, each configured to hold a slide; where there are as many of the slide locations as there are vial locations. Also disclosed are methods of using the carrier with an automated sample processor.

BRIEF DESCRIPTION OF THE DRAWINGS

It will be appreciated that the drawings are not necessarily to scale, with emphasis instead being placed on illustrating the various aspects and features of embodiments of the invention, in which:

Figure 1 depicts one embodiment of the carrier of the invention, having slide locations superimposed on vial locations.

Figure 2 depicts the embodiment of the carrier of the invention, where slide locations are superimposed to vial locations, showing the vials and slides in their respective locations.

Figure 3 depicts another embodiment of the carrier of the invention, having slide locations directly adjacent to vial locations.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

The carriers disclosed herein are best suited for use with ThinPrep® TP2000 (Cytoc Corp.) or ThinPrep® TP3000 (Cytoc Corp.). However, the carriers disclosed herein can be used with any of the processors currently on the market or later developed. The carriers of the illustrated embodiments provide for retaining the unique relationship between a sample vial and a prepared slide, while minimizing the

chance for separation of the slide from its corresponding vial or creating confusion or doubt as to the correct relationship.

Thus, in the first aspect, the invention relates to a carrier for slide processing, comprising a location configured to hold a vial and a location configured to hold a slide; and a location configured to hold a filter.

Figure 1 depicts one embodiment of the carrier disclosed herein. The carrier 102 comprises a plurality of vial locations 104 each configured to hold a vial. By way of non-limiting example, each vial location 104 can comprise a hole 104 in the carrier 102. The hole 104 can have a solid bottom, or the bottom can be open. The carrier 102 also comprises a plurality of slide locations 106, each configured to hold a microscope slide, which can be a glass slide or a plastic slide. In some embodiments, the slide is a conventional slide used for carrying a prepared biological sample to be viewed through a microscope.

In some of these embodiments, the carrier 102 comprises a plurality of troughs 108, each separated from another by a wall 110. Thus, the top surface of each trough 108 is lower than the top surface of each wall 110. In some embodiments, all troughs 108 have the same height. In further embodiments, all walls 110 have the same height. Vial locations 104 are located in the troughs 108. Slide locations 106 are configured on walls 110, such that when a slide is placed in a location 106, the slide bridges a trough 108 from one wall 110 to another wall 110.

In some embodiments, such as the one shown in Figure 1, each slide location 106 is superimposed over one vial location 104. Thus, when a vial is placed in a vial location 104, a microscope slide is placed in a slide location 106 such that the microscope slide is located directly above the vial. This juxtaposition of the

microscope slide and the vial provides a one-to-one relationship between the microscope slide and the vial and minimizes the possibility of confusion and mix-ups.

In some embodiments, the carrier 102 is configured to hold an even number of vials, with a corresponding even number of slides. In other embodiments, the carrier 102 is configured to hold an odd number of vials, with a corresponding odd number of slides. In some embodiments, the carrier 102 is configured to hold at least 5 vials. In other embodiments, the carrier 102 is configured to hold at least 10 vials. In yet other embodiments, the carrier 102 is configured to hold at least 15 vials. In other embodiments, the carrier 102 is configured to hold at least 20 vials. In some embodiments, such as the one shown in Figures 1 and 2, the carrier 102 is configured to hold 20 vials. In some embodiments, the carrier 102 is configured to have as many slide locations as there are vial locations.

Figure 2 shows an embodiment of the carrier disclosed herein, showing the microscope slides 206 and the vials 204 placed in their respective locations. Each slide 206 can have a location 208 for a label. Preferably, the label contains at least one identifier, which is the same as an identifier on a label on the vial. The identifier can be the name of a patient, an identifying medical record number associated with a patient, and the like.

While Figures 1 and 2 show one configuration of the respective vial and slide locations 104 and 106 within the carrier 102, other configurations of these locations are possible. Embodiments of the invention are not limited to the configurations shown in Figures 1 and 2, and include all manner of placing these locations on the carrier 102.

For example, Figure 3 shows another configuration of the of the respective vial and slide locations on the carrier 102. In this embodiment, the slide locations 106

are located directly adjacent to the vial locations 104. In some of these embodiments, the carrier 102 does not feature the walls and troughs that were featured in the embodiments shown in Figures 1 and 2.

In some embodiments, not shown in the figures, each slide location 106 features at least one indentation in at least one of its sides as finger access for easy removal of the slide 206 by the user. Other embodiments of the carrier 102 do not feature the “easy finger” access.

In some embodiments, the vial 204 is configured to hold a biological sample. Thus, the vial 204 comprises a container and a lid, where medical personnel obtain the biological sample and put in the vial 204, cap it with the lid, and send it to a laboratory for further processing. The biological sample can be a sample obtained during a cervical examination, urine, blood, saliva, stool, or other tissue.

In some embodiments, such as the one shown in Figures 1 and 2, the vial 204 sits within the vial location 104 such that the cap of vial 204 stays above the top surface of the trough 108. In embodiments, such as the one shown in Figure 3, the vial 204 sits within the vial location 104 such that the cap of vial 204 stays above the top surface of the carrier 102. In other embodiments, the vial 204, including its cap, sink within the carrier 102 such that no portion of the vial 204 raises above the top surface of the carrier 102 or the trough 108. In some of these embodiments, the carrier 102 comprises means for removing the vial 204, such as depressions on the top surface of the carrier 102 or trough 108 where a mechanical arm, or the like, can reach the vial cap and pull the vial 204 out of the respective location 104, or the location 104 has an open bottom where a mechanical arm, or the like, can push the vial 204 up and out of the location 104. In further embodiments, each vial location 104 preferably

features at least one indentation for finger access for easy removal of the vial 204 by the user.

In some aspects, the carrier disclosed herein is used to provide a one-to-one relationship between a biological sample and a prepared slide. The carriers disclosed herein have the added advantage that they keep one slide in close proximity to one vial, each having a defined location on the carrier. The close proximity of the locations on the carrier minimizes the chances of misplacing a slide with respect to its corresponding vial.

Thus, in another aspect, disclosed herein is a method of processing a plurality of biological samples in an automated processor, comprising:

obtaining a carrier comprising:

a plurality of locations each configured to hold a vial, and a plurality of locations each configured to hold a slide, wherein there are as many of the slide locations as there are vial locations;

a plurality of vials each containing a biological sample, each of the vials located in one of the plurality of vial locations; and

a plurality of slides, each slide located in one of the plurality of slide locations.

The method may further comprise:

removing one of the vials from a location on the carrier;

placing the removed vial within the automated processor;

removing one of the slides from a location on the carrier;

placing the removed slide within the automated processor;

attaching a filter to an aspirator within the automated processor, the filter comprising a membrane;

adhering a plurality of cells of the biological sample of the removed vial to the membrane of the filter;

transferring the plurality of cells to the removed slide; and

replacing the removed vial and the removed slide in the carrier.

In some embodiments, the above method further comprises marking each of the vials with at least one unique identifier.

In some embodiments, each of the slide locations in the above method is directly adjacent to one of the vial locations. In some of these embodiments, the location of the removed slide is directly adjacent to the location of the removed vial. In further embodiments, the methods disclosed herein further comprise marking the slide in the location directly adjacent to the vial with a unique identifier identical to the unique identifier of the vial.

In other embodiments, each of the slide locations is superimposed on one of the vial locations. In some of these embodiments, the location of the removed slide is superimposed on the location of the removed vial. Some of these embodiments further comprise removing one of the slides prior to removing one of the vials. In some of these embodiments, the methods disclosed herein further comprise marking the slide in the location superimposed on the vial with a unique identifier identical to the unique identifier of the vial.

The above method can be practiced in various different orders, and not all step need necessarily be performed. The listing of the steps in the order described above is but way of example and the steps of the method may be performed in different orders.

CLAIMS:

1. A carrier for holding a biological sample vial and a slide for processing, the carrier comprising
a plurality of first locations, each configured to hold a vial; and
a corresponding plurality of second locations, each configured to hold a slide.
2. The carrier of claim 1, wherein each second location is directly adjacent to a respective first location.
3. The carrier of claim 1, wherein each of the second locations is superimposed on a respective first location.
4. The carrier of any of claims 1-3, further comprising at least one finger access indentation at each second location.
5. The carrier of any of claims 1-4, further comprising at least one finger access indentation at each first location.
6. The carrier of any of claims 1-5, the vial having a cap, the first locations each having a depth such that the vial cap is positioned above a surface of the carrier when a vial is positioned therein.
7. The carrier of any of claims 1-5, the vial having a cap, the first locations each having a depth such that the vial cap is positioned below a surface of the carrier when a vial is positioned therein.
8. The carrier of any of claims 1-5, further comprising a trough, wherein each of the first locations is located in the trough.
9. The carrier of claim 8, the vial having a cap, and wherein the first locations have a depth such that the vial is positioned above a surface of the trough when a vial is positioned therein.

10. The carrier of claim 8, the vial having a cap, and wherein the first locations have a depth such that the vial cap is positioned below a surface of the trough when a vial is positioned therein.

11. A method of processing biological samples using an automated processor and a carrier, the carrier comprising a plurality of first locations, each configured to hold a vial containing a biological specimen, and a corresponding plurality of second locations, each configured to hold a slide, the method comprising:

placing a plurality of vials in respective ones of the first locations;
placing a plurality of slides in respective ones of the second locations
on the carrier, each slide corresponding to a respective vial;
removing one of the vials from the carrier;
removing one of the slides from the carrier;
attaching a filter to an aspirator within the automated processor, the
filter comprising a membrane;
adhering a plurality of cells of the biological sample contained in the
respective removed vial to the filter membrane;
transferring the plurality of cells from the filter membrane to the
respective removed slide; and
returning the respective removed vial and slide to their respective first
and second locations on the carrier.

12. The method of claim 11, further comprising marking each vial with a respective unique identifier.

13. The method of claims 11 or 12, wherein each second location is directly adjacent to a respective first location.

14. The method of claim 13, wherein the respective second location of the removed slide is directly adjacent to the respective first location of the removed vial.

15. The method of claim 12, further comprising marking each slide with a unique identifier identical to the unique identifier of a corresponding vial.

16. The method of claim 11, wherein each second location is superimposed on a respective first location.

17. The method of claim 16, wherein the location of the removed slide is superimposed on the location of the removed vial.

18. The method of any of claims 11-17, wherein the respective one of the slides is removed prior to the respective one of the vials.