SUMMARY

In an aspect, the present disclosure provides an apparatus for collecting a biological sample, the apparatus comprising: a housing configurable from an open position to a closed position; a sample collection port configured to collect the biological sample when the housing is in the open position; one or more fluid pathways configured to draw in the biological sample from the collection port; a membrane, disposed within the housing, wherein the membrane comprises a preservative, a structural member disposed within the housing and configured to hold the membrane within the housing; a mechanical actuator, configured to dispense the biological sample from the one or more fluid pathways onto the membrane when the housing is moved from the open position to the closed position; and a desiccant; wherein a portion of said membrane is configured to separate cellular material from the biological sample when the biological sample is introduced onto the membrane, wherein the housing is further configured to allow the fluid pathways to be viewed when the housing is in the open position; wherein the one or more fluid pathways comprise a capillary tube, wherein the apparatus further comprises a reagent (i) coated on an inner surface of the capillary tube or (ii) comprised in the membrane, wherein the mechanical actuator comprises one or more plungers which are configured to be inserted into the one or more fluid pathways, and wherein the sample collection port is inaccessible when the housing is in the closed position.

A sample collection device can be used to collect, meter, and heparinize a body fluid sample. Fluid collected from a patient is first introduced into the device via a sample port, such as by directing blood droplets from a fingertip into a well. In some configurations, metering capillaries then extract blood from the sample port and deposit it onto a storage media via capillary action. In addition, one or more plungers, coupled to a closeable housing, may further encourage dispensing fluid from the metering capillaries and onto the storage media. The plungers may be attached to one or more movable housing pieces, such that when the housing is moved from an open to a closed position, the plungers are forced through the capillaries.

Some embodiments of the device include a stabilization agent arranged to engage the fluid as the one or more plungers dispense fluid onto the membrane. The stabilization agent may be heparin and/or

EDTA. The stabilization agent may be coated or deposited onto an interior of at least one of the capillaries or the plungers or the storage membrane. This configuration may also include a desiccant located adjacent the membrane.

In some arrangements, an assay region may also be located between the capillaries and the membrane, such that the stored reagent is mixed with the fluid when the housing is moved from the open position to the closed position.

A raised ridge portion may be provided adjacent the well. The ridge provides a convenient place to wipe a patient's finger to encourage blood droplets to better flow.

The housing may also include one or more windows positioned on the housing in a location such that at least a portion of the capillaries and / or sample media are visible through the window.

A first housing section and second housing section may engage and slide along a center support section, to allow moving the housing from the open position to the closed position, and thus push the plungers through the capillaries. In that configuration, the center support section may include an opening for the insert element that defines the sample well.

CLAIMS

1. An apparatus for collecting a biological sample, the apparatus comprising:

a housing configurable from an open position to a closed position;

a sample collection port configured to collect the biological sample when the housing is in the open position;

one or more fluid pathways configured to draw in the biological sample from the collection port;

a membrane, disposed within the housing, wherein the membrane comprises a preservative,

a structural member disposed within the housing and configured to hold the membrane within the housing;

a mechanical actuator, configured to dispense the biological sample from the one or more fluid pathways onto the membrane when the housing is moved from the open position to the closed position; and

a desiccant;

wherein a portion of said membrane is configured to separate cellular material from the biological sample when the biological sample is introduced onto the membrane,

wherein the housing is further configured to allow the fluid pathways to be viewed when the housing is in the open position;

wherein the one or more fluid pathways comprise a capillary tube,

wherein the apparatus further comprises a reagent (i) coated on an inner surface of the capillary tube or (ii) comprised in the membrane,

wherein the mechanical actuator comprises one or more plungers which are configured to be inserted into the one or more fluid pathways, and

wherein the sample collection port is inaccessible when the housing is in the closed position.

2. The apparatus of claim 1, wherein the housing comprises two or more pieces, and wherein the structural member contains the sample collection port, supports the two or more pieces, allows the

two or more pieces to move relative to each other along a length of the structural member from the open position to the closed position.

3. The apparatus of claim 1, further comprising: an area in or adjacent to the sample collection port having a hydrophobic property

4. The apparatus of claim 1, wherein the mechanical actuator comprises two or more plungers, and wherein two or more of the two or more plungers are activated in parallel upon closing the housing.

5. The apparatus of claim 1 wherein the preservative comprises a sugar.

6. The apparatus of claim 1, further comprising: a barcode or other identifying indicia.

7. The apparatus of claim 1 further comprising: a preservative or stabilizing reagent, disposed within the fluid pathways.

8. The apparatus of claim 1 further comprising: one or more capillary tubes positioned between the sample collection port and the membrane, the one or more capillary tubes configured to dispense the portion of the biological sample from the collection port onto the membrane upon actuation of the mechanical actuator.

9. The apparatus of claim 1 further comprising: an area in or adjacent to the sample port having a hydrophobic property.

10. The apparatus of claim 1 further comprising: a dried reagent configured to be placed in a path of the biological sample as it is dispensed to the membrane.

11. The apparatus of claim 1 further comprising: a locking mechanism, configured to lock the housing as it is moved from the first to the second position.

12. The apparatus of claim 1 wherein a portion of the housing is configured to allow a volume of the sample within the one or more fluid pathways to be viewed when the housing is in the open position.

13. The apparatus of claim 1 wherein the desiccant is contained within the housing.

14. The apparatus of claim 1, wherein the housing defines an isolated internal air space above the membrane, and wherein the membrane and the desiccant are in contact with the isolated internal air space.

15. The apparatus of claim 14, wherein the housing defines an isolated internal air space above the membrane when the housing is in the closed position, and wherein the membrane and the desiccant are in contact with the isolated internal air space when the housing is in the closed position.

16. The apparatus of claim 1, further comprising a locking mechanism configured to prevent the housing from being reopened after it is in the closed position.

17. The apparatus of claim 16, wherein the housing further comprises an opening in an external surface of the housing, and wherein locking mechanism comprises tines configured to be inserted into the opening when the housing is in the closed position.

18. The apparatus of claim 1, further comprising a capillary support element contacting the one or more fluid pathways, wherein the one or more fluid pathways comprise capillary tubes, wherein the capillary support element aligns the one or more plungers with the capillary tubes for actuation when the housing is moved from the open position to the closed position.