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A DEVICE FOR USE IN PRESERVING A SPECIMEN FOR MICROSCOPIC EXAMINATION

FIELD OF THE INVENTION

The present invention relates to a device used in for preserving and storing a specimen after collection and transfer of the specimen to a microscope slide. In particular, the invention is directed towards a device suitable for preservation of cervical smears prior to microscopic examination. However, it will be appreciated that the device of the invention may be suitable for use in the collection of other suitable types of biological samples and no limitation is intended thereby.

BACKGROUND OF THE INVENTION

Microscopic examination of biological fluids (e.g. blood, urine, etc.) on glass slides is an old and well-known technique used for diagnosing and evaluating the health of an animal or human. Examination of a smeared sample of fluid or cellular scrapings on a glass slide often permits a physician or clinician to analyze a sample and to diagnose a variety of disorders and/or infections. In order for an accurate microscopic evaluation or analysis to be made, it is generally necessary to preserve the sample in some way. This is conventionally accomplished by subjecting the sample to a chemical fixative. The type of fixative is selected according to the type of sample to be analyzed and is well known in the art. Typically, fixatives are sprayed onto a slide or the slide is placed in a container into which a fixative is poured.

This technique of analyzing cellular tissue is widely used for cervical cancer screening. In carrying out the "Pap test" a conventional glass microscope slide is prepared with a smear made up of scrapings and secretion from the cervical area utilizing any one of the methods well known and universally accepted by the medical profession. The smear on the prepared slide is then viewed through a microscope by a trained individual such as a cytologist who endeavors to view the entire smear on the slide to determine if any cancer cells are present in the smear. Inasmuch as the number of malignant cells which are exfoliated greatly increases as the uterine cancer enters advance stages, the

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early stages of the cancer where detection is important requires extremely accurate viewing of the slide since there could be only one or several malignant cells present in the entire smear. On the other hand a "false" positive result is also undesirable as this requires follow up testing and causes a patient undue stress.

Although the steps of tissue collection, transferring the sample to a slide and fixing the sample on a slide are widely practiced techniques, failure to correctly carry out any one of these procedures can adversely affect the quality of the final microscopic examination. First it is important, that the cells are correctly removed and transferred to the microscope slide in a uniform manner. Fixing the slide is also very important so as to preserve the sample in the optimum condition for microscopic examination. Any undue delay in applying a fixative may result in deterioration of a sample. A poorly preserved sample can make microscopic examination difficult and lead to inaccuracies. Where such examinations are used for screening for cancer and other serious conditions, it will be appreciated that accurate analysis can be critical to a patient's health.

Still further, it is important that the sample can be transported from the site of sampling to that of microscopic investigation in a safe and sterile manner.

OBJECT OF THE INVENTION

It is therefore an object of the present invention to provide a device which may be used to simplify collection and storage of biological samples prior to microscopic examination or which can provide the pubic with a useful choice.

SUMMARY OF THE INVENTION

According to a first broad form of the present invention there is provided a device for use in collecting and preserving a specimen on a microscope slide, the device having a slide chamber with an opening at one end though which a microscope slide can be inserted into the chamber, a reservoir for holding a fixative liquid, a frangible member separating the reservoir from the chamber, whereby the member can be ruptured so as to allow the fixative liquid to enter the slide chamber and contact the surface of a slide inserted therein.

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The device of the present invention maybe used in association with collection and preservation of any suitable biological specimen including cellular samples of animal, human or biological origin. The device is particularly suitable for use in the collection of cervical smears.

The device has a slide chamber into which a microscope slide can be placed. A device may have a single chamber or may include a bank of discrete chambers.

The device also includes a reservoir for holding a fixative liquid. The type of fixative is selected according to the nature of the sample to be preserved. Suitable fixatives are known to those of skill in the art and the nature of the fixative forms no part of the invention. The reservoir and slide chamber are separated by a frangible member. The member may be made of any suitable material. The member may be formed from a substantially rigid material such as plastics or glass. The member may be provided with a fold line or other weak point to facilitate rupture. Alternatively, the member may be in the form of a thin membrane.

When the member is ruptured, the fixative liquid can flow into the slide chamber and coat the surface of a slide located therein. The member may be ruptured by manipulation by user. It is preferred that the member is able to ruptured in response to a slide with a sample thereon being fully inserted into the slide chamber. Typically, the member is located at the opposite end of the chamber to the opening and the lower edge of the slide ruptures the membrane.

It is preferred that the slide chamber is able to be used to store the slide in a pre-use position in which the member remains intact. Thus it is preferred that the device includes means for retaining the slide in a pre-use position where the slide is restrained from contacting the member such that inadvertent rupture of the member may be prevented or avoided. The retaining means may be in the form of a projection or the like extending from an inner wall of the slide chamber so as to engage a lower edge of a slide. Extra force may be applied by a user to force the slide past the member or projection. Alternatively such force may rupture or break the member or projection. By requiring additional force to push

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the slide towards the frangible member, inadvertent rupture of the member can be avoided.

In an especially preferred embodiment the device includes a stop member which is engagable with an upper edge of a slide, and it is the stop member which is restrained or engaged so as to restrain the slide from being inadvertently pushed towards the frangible member. The stop member is typically able to be easily removed from the slide for microscopic examination. The stop member is typically formed from a resilient plastics material and has a slot for receiving an edge of a slide.

Typically, the stop member is dimensioned to also be able to seal the opening to the slide chamber such that the stop member can also function as a sealing member.

Typically, the stop member has a segment which can be manipulated by a user to move the stop member from a first to a second conformation. When in the first conformation, the stop member is retained in a first position and an engaged slide is in the pre-use position. When the stop member is in the second conformation, the stop member is not retained in the first position and can be moved towards the other end of the slide chamber such that the engaged slide can rupture the frangible member. The segment may be a projection or flange, hingedly connected to a main body portion of the stop member such that the projection can move from an extended position to a non-extended position. Alternatievly, the projection may be connected to the main body of the stop member through a fault line, such that the projection can be separated from the body.

Typically, the stop member includes a body and a flange hingedly connected thereto, the flange moveable from an extending position in which the stop member is in the first conformation and a non-extending position in which the flange is in the second position.

It is preferred that the stop member can also seal the slide chamber when the stop member is in the second position so as to avoid loss of liquid from the slide chamber.

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The device may also include indicating means to indicate whether the slide is in the pre-use or membrane rupturing position. Where the device includes a stop member which is moveable from a first to a second confirmation, the respective conformation may be easily visible to an operator.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 is a cross sectional front view of a preferred device of the present invention before sample collection;

Figure 2 is an end view of the device of Figure 1 and

Figure 3 is and end view of the device of Figure 1 after sample collection.

DETAILED DESCRIPTION OF THE FIGURES

Figure 1 illustrates a preferred device 11 of the present invention. The device has a housing 12 which surrounds a slide chamber 13. The slide chamber 13 has an upper 14, an intermediate 15 and a lower 16 section. The upper section 14 has parallel side walls 17, 18 and an opening 19 through which a slide 20 can be inserted. The intermediate section 15 has inwardly angled walls 21, 22. The lower section 16 has side walls 23, 24 which are slightly angled towards each other. Wall 24 is of a longer length than wall 23. The lower edge 20a of slide 20 is in alignment with the lower edge 23a of wall 23. The lower edge 24a of wall 24 falls short of the base 12a of housing 12.

A space 25 is defined between walls 23, 24 and outer walls 26, 27 of housing 12. This space 25 defines a reservoir for holding a fixative liquid. When the sample to be collected on the slide is a cervical smear, the liquid is typically 95% ethanol. The liquid is prevented from entering slide chamber 12 by a frangible membrane 28. This membrane 28 extends across the lower section 16 of the housing 12 from the lower end of wall 23 to the lower end of wall 24. It can be seen that the lower edge 20a of slide 20 is close to membrane 28.

The device 11 also includes a sealing member or stopper 30. Stopper 30 has a slot 31 for frictionally receiving and engaging the upper edge 32 of slide 20. This engagement can be seen more clearly with reference to Figures 2 and 3. The stopper 30 can be removed from the slide 20 to allow

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microscopic examination of the slide 20. The stopper 30 has a surface upon which can be recorded patient details, reference numbers or the like.

The stopper 30 not only seals the slide chamber 13 but also assists in retaining slide 20 in the pre-use position such that the membrane is protected from inadvertent rupture.

Figure 2 shows in more detail how the stopper 30 restrains slide 20 from rupturing the membrane 25. Stopper 30 has upper 33, intermediate 34 and lower 35 sections. Slot 31 extends through the lower 35 and intermediate 34 sections. Lower section 35 has parallel walls which abut and seal against walls 17, 18 of slide chamber 13. Lower section 36 terminates in converging walls. The angle of convergence is complimentary with the converging angle of walls 21, 22 of the side chamber 13. Upper section 33 has a pair of flanges 36, 37. The lower faces 38, 39 of the flanges 36, 37 rest upon the upper faces of walls 17, 18 and prevent stopper 30 and the engaged slide 20 from being pushed further into the housing 12.

Flanges 36, 37 are able to pivot upwards to the position shown in Figure 3 when the slide 20 has been removed from the housing 12. It can also be seen in figure 2 that when the stopper 30 is inserted into housing 12, the flanges 36, 37 are prevented from being pivoted outwardly by the upper sections of the housing walls.

In use, an operator grips the slide 20 by stopper 30 and withdraws the stopper 30 and slide 20 from the device 11. Flanges 36, 37 are pivoted or folded outwardly and upwardly until they reach the configuration illustrated in Figure 3. It can be seen that in this position, the flanges are unable to prevent the slide 20 from being pushed sufficiently far into the slide chamber 13 so as to rupture membrane 28. A specimen, such as a cervical smear, is transferred to the slide by conventional means. The slide 20 is then replaced into the device 11. The slide 20 can now be pushed into the slide chamber 13 such that the lower edge 20a of the slide can contact and rupture membrane 28. Rupture of membrane 25 allows liquid to flow from the reservoir into the slide chamber 20 and to contact the surface of the slide.

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The position of the flanges on the stopper provide a ready indication as to whether a slide contained therein has or has not been used.

It can be seen that in the ruptured position of Figure 3, the lower section 36 of stopper 30 seals against intermediate section 15 of slide chamber 13. This prevents loss of fluid from the slide chamber. It also prevents further downward action of the slide 20 towards the base 12a of housing 12. In this way, damage to the lower edge 20a of the slide 20 by contact with base 12a may be avoided.

The volume of the space in the slide chamber 12 with the stopper 30 and slide 20 in their pre-use position and the membrane 28 intact, as in Figure 2, is about the same as the volume of space in the slide chamber 12 after membrane 28 rupture and the stopper 30 and slide 20 are in the position shown in figure 3. Thus, as the membrane 28 is ruptured, the fixative liquid is able to effectively fill the slide chamber. This allows rapid and full coverage of the slide surface with the liquid. This is important for optimum preservation of the sample.

Because the membrane 28 stretches at an angle across the slide chamber 13, the membrane is ruptured almost immediately the stopper 30 and slide 20 are pushed past the position shown in Figure 2. Thus, the slide is being pushed downwards as the liquid is entering the slide chamber 12. This movement of the slide 20 assists in displacement of the liquid from the reservoir and into the slide chamber 12. To allow air to escape from the chamber 13, stopper 30 does not form a seal until the slide is in its final position as shown in Figure 3.

The device of the present invention provides a simplified means of preserving and storing a sample on a microscope slide. The slide can be rapidly placed into the device and the time between sample collection and contact with the fixative minimized. Further, the full surface of the slide is uniformly coated with liquid. Also, the fixative liquid can be stored in an airtight and sterile manner before use. Contact with the air is minimized. Thus can reduce contamination of samples.

Further, the number of steps required to fix and store a sample has been reduced. In the conventional prior art method, an operator would have to hold the slide whilst spraying with a fixative, place the slide in a slide holder and then

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seal the slide holder. With the device of the present invention, all these steps can be simply and rapidly carried out by placing the slide into the device. Fixing and sealing occur automatically. Such automation can reduce the likelihood of poor or incomplete fixation and the time taken between sample collection and fixing. Both occurrences can adversely affect accurate and reliable microscopic analysis.

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* C L M S *

CLAIMS

1. A device for use in collecting and preserving a specimen on a microscope slide, the device having a slide chamber with an opening at one end though which a microscope slide can be inserted into the chamber, a reservoir for holding a fixative liquid, a frangible member separating the reservoir from the chamber, whereby the member can be ruptured so as to allow the fixative liquid to enter the slide chamber and contact the surface of a slide inserted therein.

2. The device of claim 1, wherein the frangible member is located at the other end of the slide chamber and can be ruptured by a bottom edge of a slide inserted into the chamber.

3. The device of claim 2, wherein the frangible member extends across the other end of the slide chamber and is inclined with respect to the lower edge of the slide.

4. The device of claim 2, which includes retaining means for retaining a slide in a pre-use position in which the slide is restrained from rupturing the frangible member.

5. The device of claim 4, which includes a stop member engagable with an upper edge of a slide and the stop member can be retained in a first position in which the engaged slide is in the pre-use position.

6. The device of claim 5, wherein the stop member has a slot for receiving the upper edge of the slide.

7. The device of claim 5, wherein when the stop member is in the first position the stop member seals the opening of the slide chamber.

8. The device of claim 7, wherein the stop member is moveable from the first position towards the other end of the slide chamber to a second position, and during said movement the frangible member is ruptured by the lower edge of the slide.

9. The device of claim 8, wherein the stop member has a first conformation, a second confirmation and is moveable from the first to the second confirmation and when in the first conformation, the stop member is retained in the first

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position and when in the second conformation, the stop member is moveable to the second position.

10. The device of claim 9, wherein the stop member includes a body and a projection connected thereto, the projection being moveable from an extending position in which the stop member is in the first conformation and a non-extending position in which the stop member is in the second conformation.

11. The device of claim 9, wherein the slide chamber has upper, intermediate and a lower sections, the stop member has a lower section having a complimentary shape to the intermediate section of the slide chamber, such that in the second position the lower section of the stop member seals against the walls of the intermediate section of the slide chamber.

12. The device of claim 11, wherein the volume of free space in the slide chamber when the stop member is in the first position is substantially the same as the volume of free space in the slide chamber when the stop member is in the second position.

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