Labotronics

Human Semen Analyzer

LB-10HSA

Index

Sr.no	Title	Page no
1.	Safety Measures	2
2.	Introduction	4
3.	Features	4
4.	Specifications	5
5.	Applications	5
6.	Instrument Introduction	6
7.	Installation	7
8.	Working Principle	9
9.	Software Operations	10
10.	Maintenance	22
11.	Troubleshooting	23
12.	Accessories	26
13.	Appendix	27

1. Safety Measures

1.1 Required safety regulations

- The indoor power supply system in the system studio should be a standard three-core power outlet whose protection ground junction (terminal) is connected with the protective ground conductor of the power supply system. Suppose no protection ground junction (terminal) connects with the protective ground conductor of the power supply system in the power outlet. In that case, the consumer should use a metal wire with a cross-sectional area of no less than 1.0 mm2, one end connected with a protective earthing termination column, and the other end with the land.
  Note: The consumer should operate the suppression of ground wire under related standards or the guidance of an experienced electrician.
- There is strong electricity in the equipment, do not open it by yourselves!
- If power fails suddenly during operation, startup power again, and the interval should be no less than three minutes or no response.
- The apparatus should be placed in a clean and ventilated room, needing a dry and clean environment, avoiding putting chemicals, electrical electromagnetic and strong electricity with the equipment together.
- Do not move or shake the equipment when it on position.
- Avoid frequent switches, or easily damaged. When equipment is not in use, shut down the power, unplug the outside power, and cover the cloth cover. A long time out of use, clean it, put it on the box, and regularly open the electricity to run. (Generally, once a month)
- Equipment packaged in paper / wooden boxes should be placed up , to avoid the damp , collision , extrusion , and sunshine in transportation. It can be transported by air, road, rail and ship.

1.2 Requirements for environment protection

The instrument and accessories should be handled according to local laws and regulations at the end of their life, and the same for the use-process-related waste.

1.3 Signs explanation

Label	Description
	High voltage
	Kindly consult the attachment file

	Don’t discard into garbage cans directly.
	“B” type equipment
	This side up
	Caution against wet
	Pile
	Fragile
	Keep it away from heat

2. Introduction

Human Semen Analyzer LB-10HSA quantifies sperm movement at test speeds ranging from 0 to 200 micrometers per second, with a resolution of 0 to 10 µm. It can process up to 100 image groups for comprehensive evaluation of multiple samples. Our analyzer filters out various impurities to maintain test accuracy. It digitally stores images of sperm examinations for efficient data retrieval and analysis.

3. Features

- Advanced imaging technique
- Includes non-invasive testing
- Features morphological analysis software
- Multiple sperm motion parameters
- User-friendly operation

4. Specifications

Model No.	**LB-10HSA**
Sample Collection Capacity	1 to 2000 or more
Test Speed Range	0 to 200 μm/s
Frame Rate	0 to 75 fps
Resolution	0 to 10 μm
Analysis Time	1 to 5 seconds or longer
Work Temperature	5℃ to 40℃
Relative Humidity	≤ 80%
Atmospheric Pressure	86 to106 Kpa
Number Of Collected Image Groups	Up to 100 groups of images
Microscope Objectives	10x, 20x, 40x, 100x
Power	220V±22V 50Hz ±1Hz
Dimensions	750 × 710 × 620 mm
Weight	35 kg

5. Applications

Human Semen Analyzer automatically identifies sperm, tracks their movement, and analyzes parameters in accordance with WHO standards. It provides detailed quantitative assessments of sperm activity providing essential insights for clinical semen testing and male fertility evaluation.

6. Instrument Introduction

Figure-1

7. Installation

7.1 Normal working conditions

1) **Work temperature:** 5℃ ~ 40℃
2) **Relative humidity:** ≤80%
3) **Atmospheric pressure:** 86Kpa ~ 106 Kpa
4) **Voltage:** AC 220V±22V, 50Hz±1Hz
5) The instrument should be away from the powerful magnetic field.

7.2 Transport and storage conditions

1) **Transport:** The packed instrument can be transported by normal vehicle or according to contract provision. Transportation should be prevented by rain, snow and mechanical collision. Putting or transporting corrosive things is forbidden.
2) **Storage:** The instrument should be packed well and stored in a dry, ventilated, non-corrosive room.

7.3 Basic requirements for the running environment of sperm analysis software

1) Microsoft Windows operating system
2) Pentium class PC, 120MB RAM or above
3) 40 GB free hard disk space
4) CD-ROM drive
5) Medicine-used pseudo colour video capture card
6) Colour ink-jet printer
7) 24-bit (true colour), 1920×1028 resolution

7.4 Software features

1) **Images real-time display:** Display clear and real-time images, facilitating for teaching, observation and consultation of several people.
2) **Dynamic adjustment for images:** It can adjust the brightness, contrast, hue and saturation of dynamic images.
3) **Images save and copy:** The captured images can be saved to another place or copied to other software for use.
4) Several print modes.
5) **Can be used for checking historical cases and statistics:** With easy operation, you can get the patients' information.
6) The printer paper size can be adjusted.
7) **General storage report:** You can save all the information when you use it the next time, you only need to load them.
8) **Can print report:** We can print pictures with characters with high quality.

7.5 Transport and installation

1) Equipment packaged in paper / wooden boxes should be placed up  , to avoid the damp  , collision  , extrusion  , and sunshine  in transportation. It can be transported by air, road, rail and ship.
2) After opening the carton, count the number according to the packing list. And then read the user's manual carefully.
3) Take out the main unit and accessories.
4) Inspect the power supply of the apparatus to ensure one of the ends of the power cord is inserted in the back panel of the host (marked 220V/50Hz) and the other one connects with a special power wiring board within the scope of prescriptive power.
5) Inspect the connection of the apparatus among the various parts, and then switch on the power after ensuring the right connection.
   Note: Do not draw or insert the plug when the machine is powered on to protect the main unit from being damaged.
6) When the installation personnel install the equipment, it should be placed in a clean and ventilated room, a dry and clean environment, avoiding together with chemicals and electromagnetic and strong electrical fields, and the equipment installation location should be convenient for operating.
7) If the host cannot power on, check the fuse (FUSEΦ5×20 3.15A), and cut the connection before check. Then change the fuse with a tool. Refer to the instructions for installation.

8. Working Principle

1) **Microscope camera:** Formed by microscope and CCD, the effect is to enlarge the detected sample signal by microscope and then turn the signal into a television signal with CCD, then send to the image acquisition card of computer and process.
2) **Images capture:** The image acquisition can capture, identify, preprocess, and store the signal sent by CCD and further send the mature signal to the computer for processing.
3) **Computer process:** The analysis software will handle and process the preprocessing signal after being captured. Then the handled parameter will be displayed on the screen and printed by the printer.

9. Software Operations

9.1 How to put the specimen

Put the specimen right under the microscope and adjust the aperture and focal length so that the specimen can be seen clearly. Then collect the pictures.

9.2 Operation of software

9.2.1 Logging In

Figure-2

According to the picture above, the acquiescent username is semensa and no password. If you want to establish any other users and passwords, Kindly press **"enter"**. And the system will enter the next step.

1) **Collect specimen information**
   Interface button function description:

Figure-3

a. Be used for collecting current images, segmenting and modifying threshold value.
b. Save current data/Initialize new data.
c. Start collecting images.
d. Current collection is invalid, delete current collected specimen information.

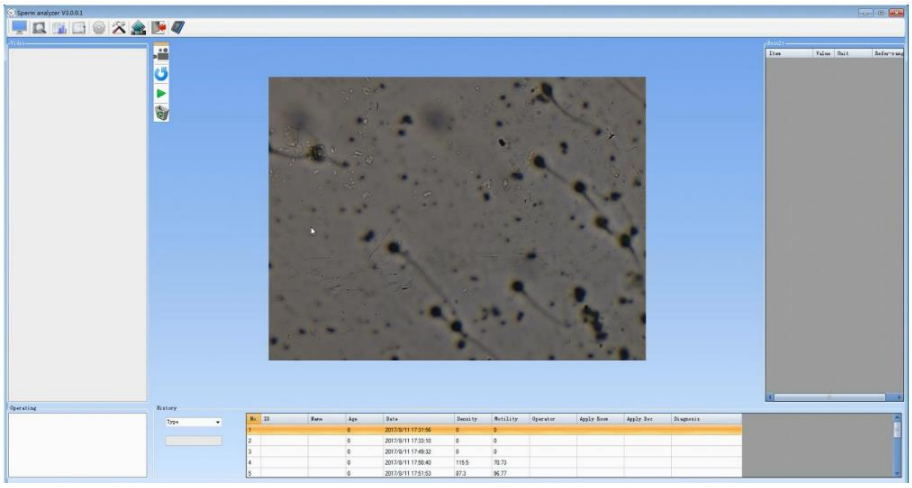

Figure-4

2) Enter the main interface and adjust the microscope to the proper position. After putting the specimen, moving sperm is available in the current camera. Choose a typical vision, click  to collect specimen and prepare for collection operation.
3) When executing the first vision collection, the software will show one-second threshold value segmentation. If you find the current threshold value is not correct, you need to adjust. Click  to set the current threshold value. It is subject to the threshold value when it catches the sperm. Shown as below:

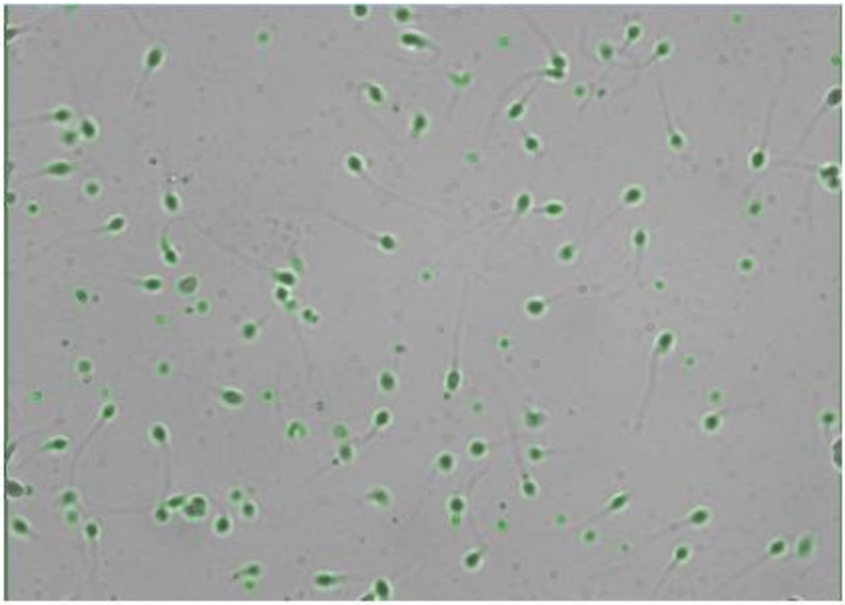

Figure-5

4) If the threshold value is normal, it will remind us of whether to collect a vision image.

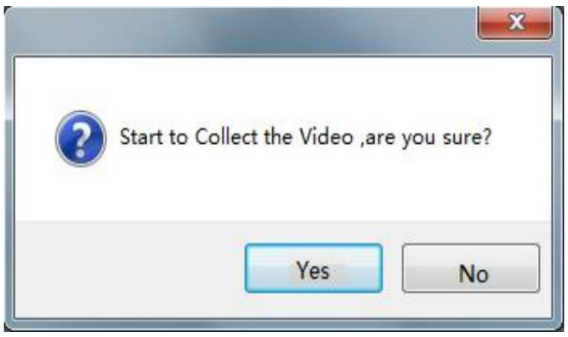

Figure-6

5) <Yes> allow to collect current vision. After the collection, it will remind you whether to continue the collection.

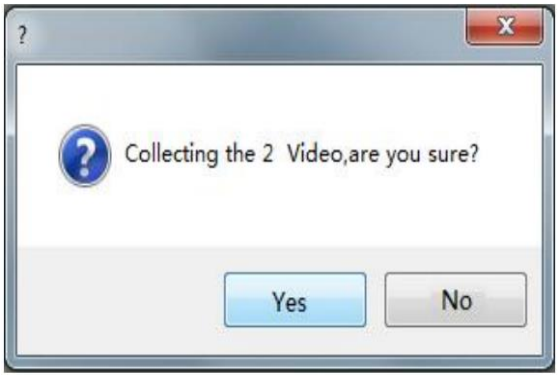

Figure-7

6) Click **Yes** and start preparing the second vision collection:

Figure-8

7) Move the microscope to the second vision and click **OK** to collect the second vision. Similarly, collect the third vision, fourth vision...X vision. There is no limit to the number of collections. At the same time, the software will automatically analyze the collected vision image and show the analysis results.

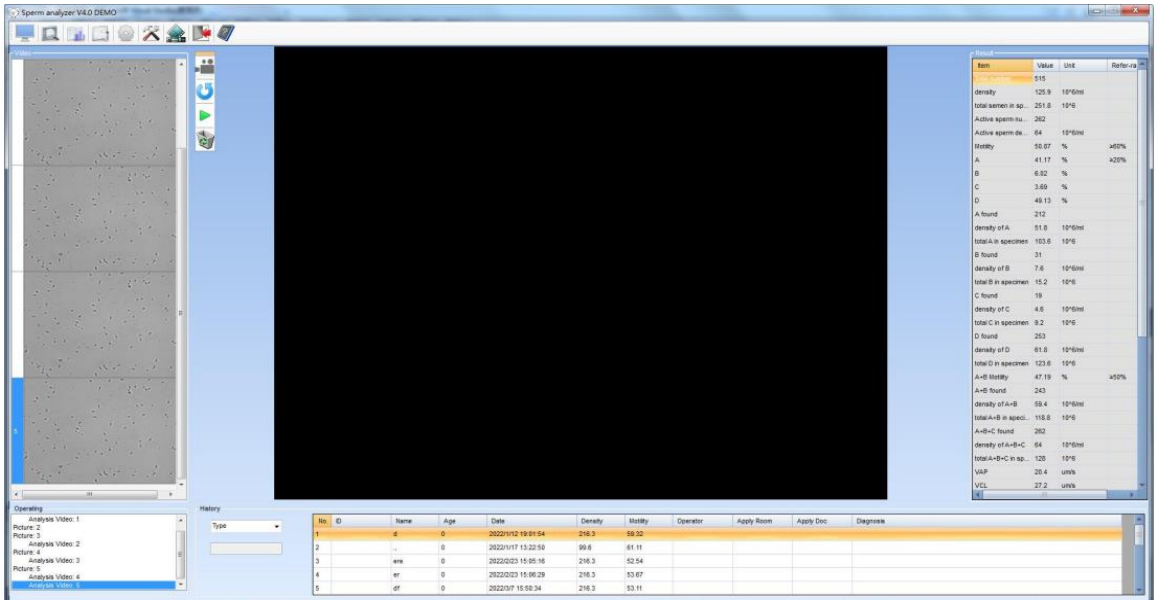

Figure-9

8) After finishing the collection of the current specimen, click  to save the current specimen data to the auditing interface and delete the current interface.
Attention: You can collect several specimens one time and audit together, or you can audit separately.

9.2.2 Audit image

1) Click  the menu to enter the auditing interface.

Figure-10

New: New record
Register: Save registration information
Order: Whether put the record and specimen information in sequence
Sperm No.: Whether to show sperm No.

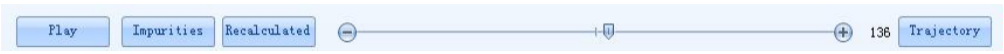

Figure-11

Play: Replay current specimen dynamic trajectory
Impurities: Modify all the sperm to impurities
Recalculated: Recalculate current specimen data
Trajectory: According to a modified threshold value to recalculate the sperm data of current vision. After the execution, click Recalculated to recalculate the current specimen data.

You can directly modify the sperm type in the current specimen image. Choose  , left click the scope of the sperm head, modify the sperm to impurities  , right click the scope of the sperm head, and modify the sperm to IM  . After the execution, click Recalculated to recalculate the current specimen data.

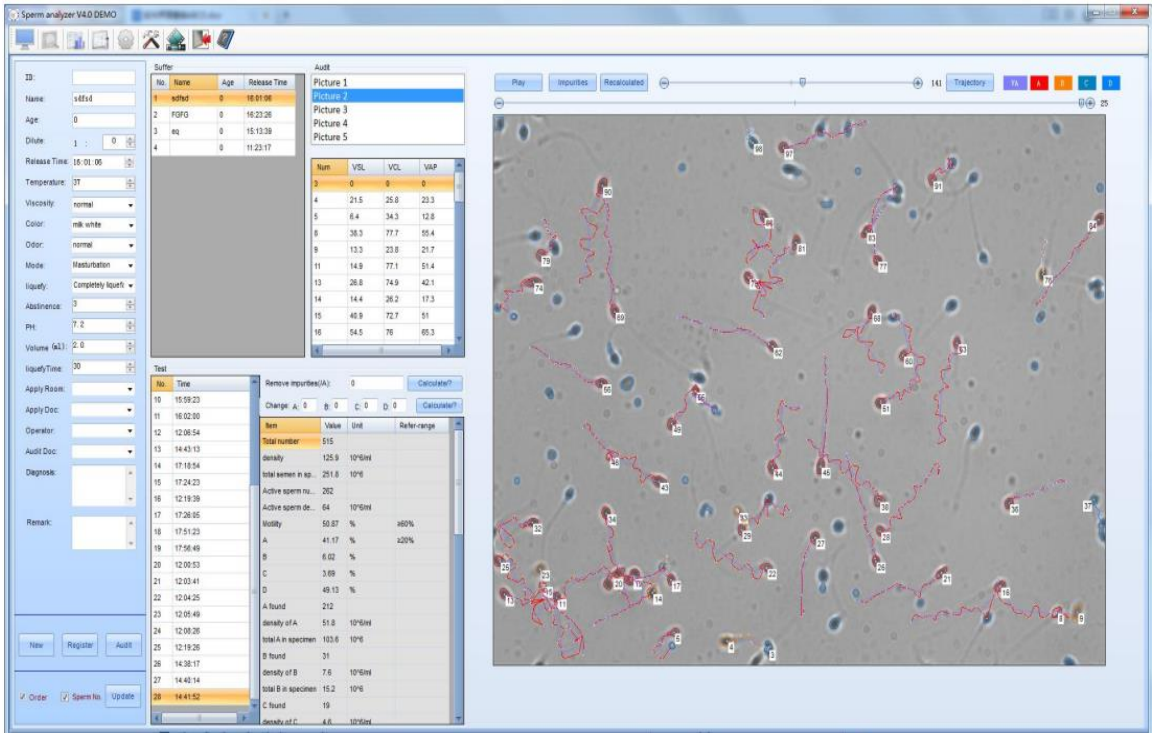

Figure-12

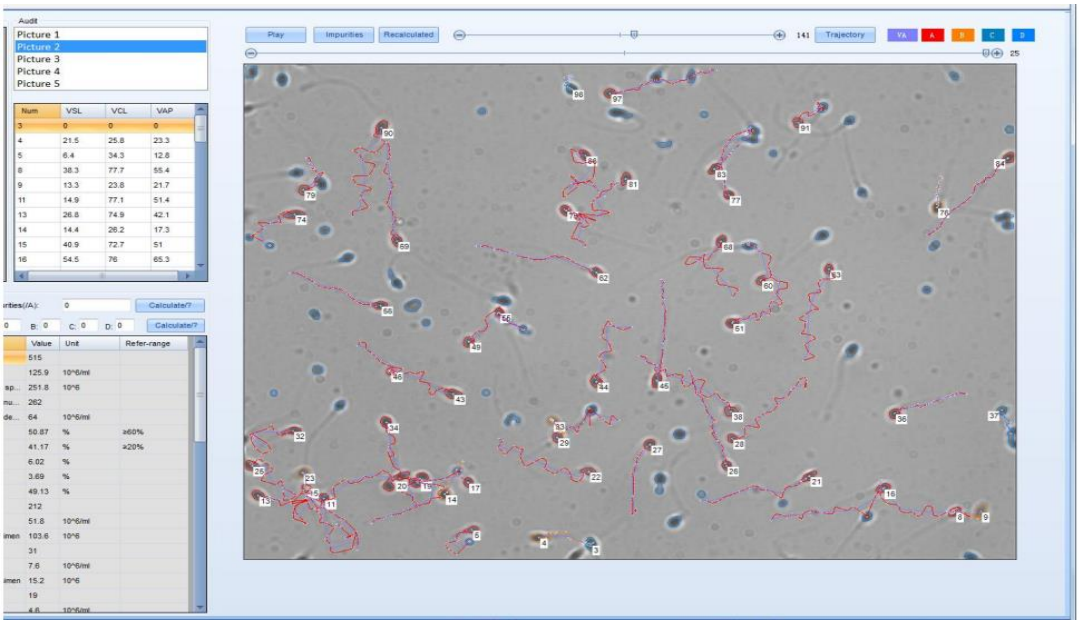

Figure-13

Click New to input record information, register to save the record and choose corresponding specimen information (specimen marked as operation time), or choose Order, double click record information to show corresponding specimen information of the current record. The right half of the window is the auditing interface, it shows the vision number of the current specimen, the movement path of sperm in each vision, VSL, VCL, VAP of each sperm, and final test result of the current specimen. You can freely modify the value data.

Audit: Audit, save and print the data.
Update: Update and display information.

9.2.3 Check record function

Click  button to enter the check record interface.

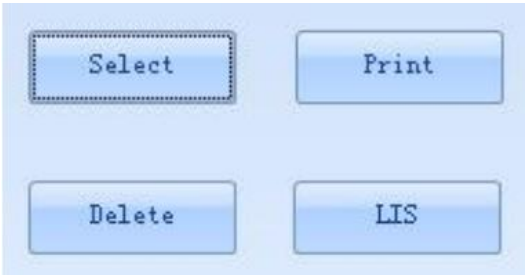

Figure-14

Select: Check records
Print: Print records
Delete: Delete selected records
LIS: Send selected records to LIS server (Need to set LIS function)

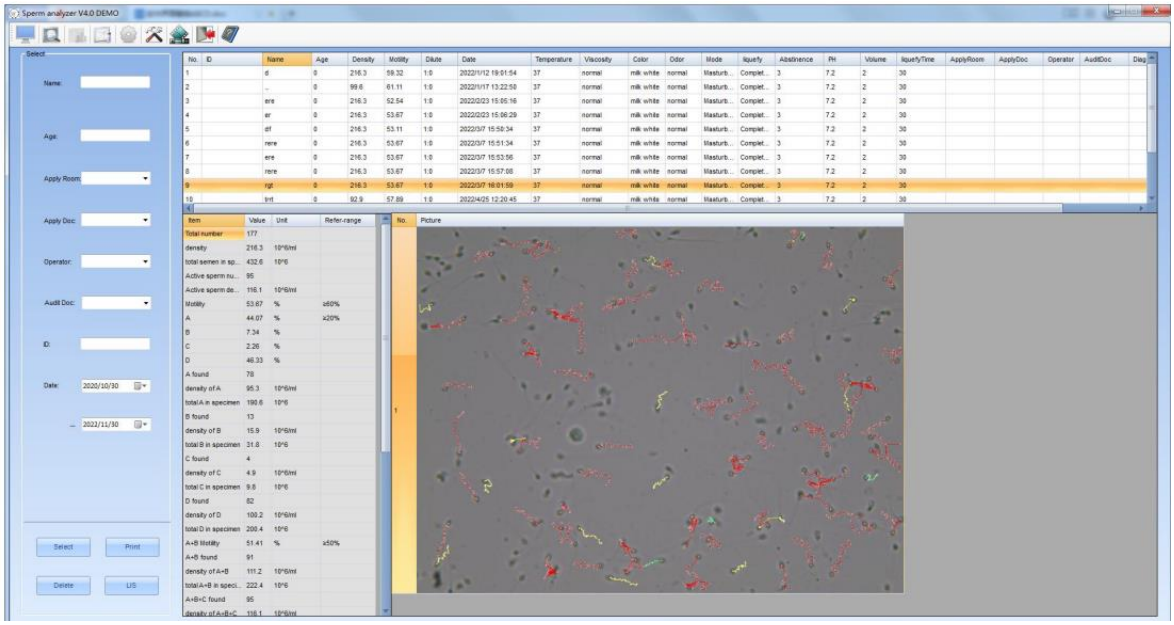

Figure-15

According to the definition to check records, which is flexible. The check record function supports printing, images in the report should be selected manually in this interface. Only the first image can be printed by default.

9.2.4 Calibration setting

Click  button to enter the Calibration Setting.

Figure-16

Calibration: Begin calibration operation
Save: Save present calibration data

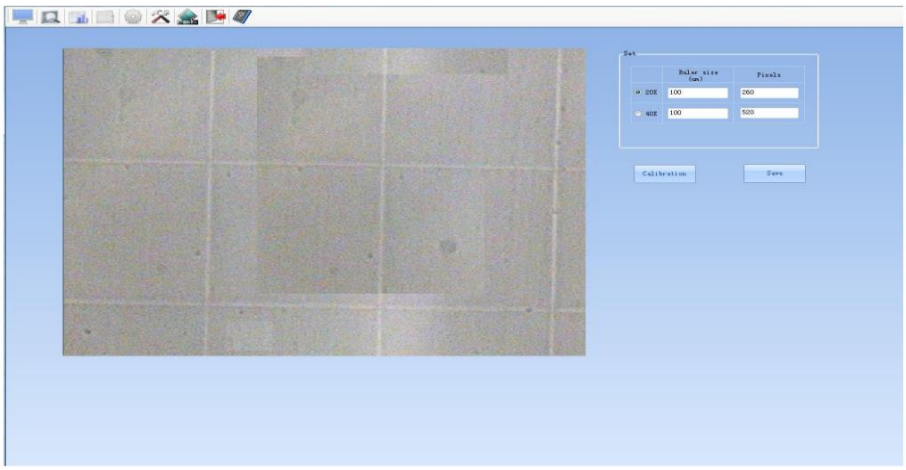

Figure-17

Calibration operation process: Set scale in the microscope, adjust the microscope and use 20 times lens, enter the main interface of the software, and adjust the image to scale display. Click the  button to enter the calibration setting interface, the present image displayed on the calibration interface is the microscope showing scale. Choose 20 times lens to calibrate, click  to begin, move the mouse to the image, begin from a check, press and drag, can see the scale bracing wire. At the same time, Pixels data synchronous updates, after ensuring a single length of the check, input the real length of the check, click  to save.

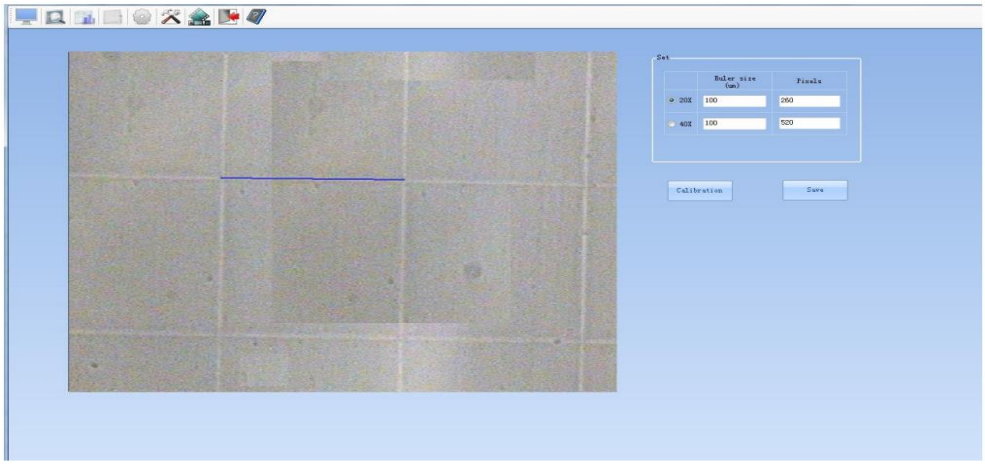

Figure-18

Calibrate 40 times lens calibration in the same way.
Note: Keep the same lens between choosing in calibration interface and the one used.

9.2.5 Setting

In the Setting interface, can add or modify test items (the first 32 items cannot be changed, if want to add an item, should begin from the 33 items), apply section, apply doctor, clinic diagnose, user, password and other information, and can check log in records.

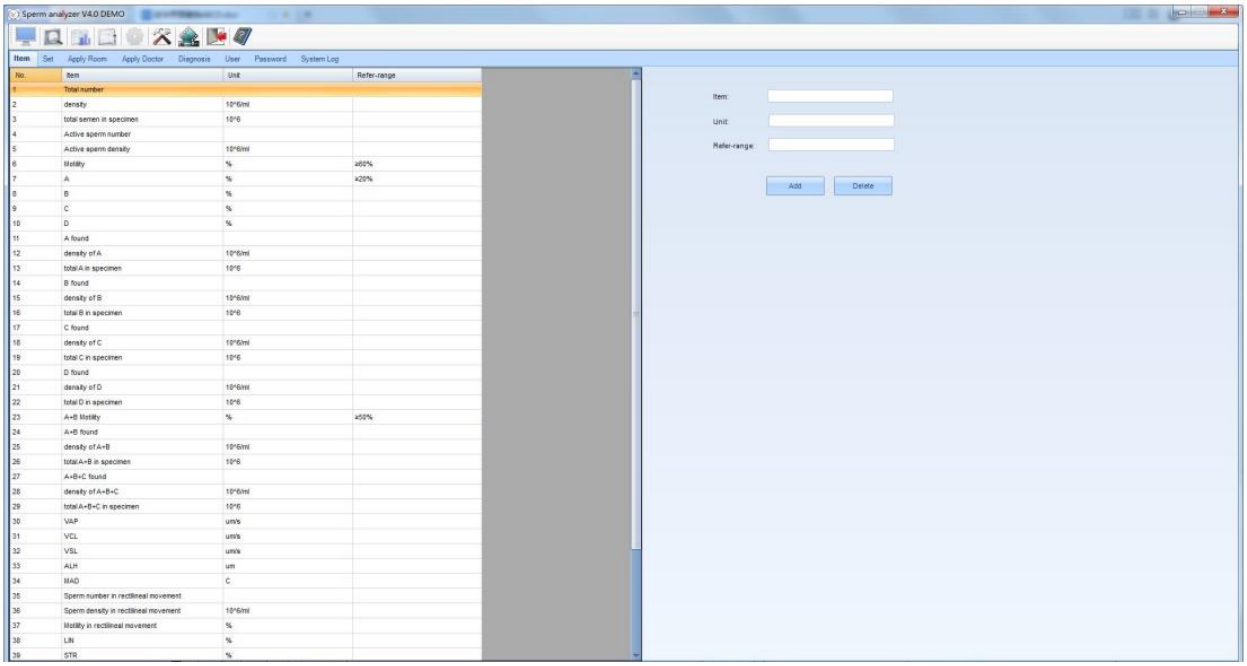

Figure-19

System Setting Interface:
Sperm Motion Parameters:
Sperm diameter (um): Sperm diameter, which is used to filter impurities
Forward scale (SL/CL): Forward scale (linear distance/curve distance), used to judge moving forward sperm.
Colour: Setting the display colour
Video Setting: Select the camera and set the size.
Others:
Pool thickness(um): Set the thickness of counting cells and affect density. The default is the 10UM Volume correction factor. Affect density, the default is 1.
Print Mode: Preview print template, print directly, only check not print.
Run Mode: Demonstration and formal use. In demonstration use, the software offers a typical sperm image and demonstrates the trace to analyze performance. In formal use, the software is used formally.
LIS:
Valid: Use or not Serial
Network: Use serial mode or network mode.

9.2.6 System setting

Click  button to enter the system setting interface. Choose the item that needs to be changed, such as hospital name, report name etc to change, modify and click 

the button to save.

Note: Print all the printable content loaded in the interface, you just need to adjust the position according to the need.

Automatic detection project, a total of 32, if add the independent testing project, start from 33 items. Currently supports up to 45 items.

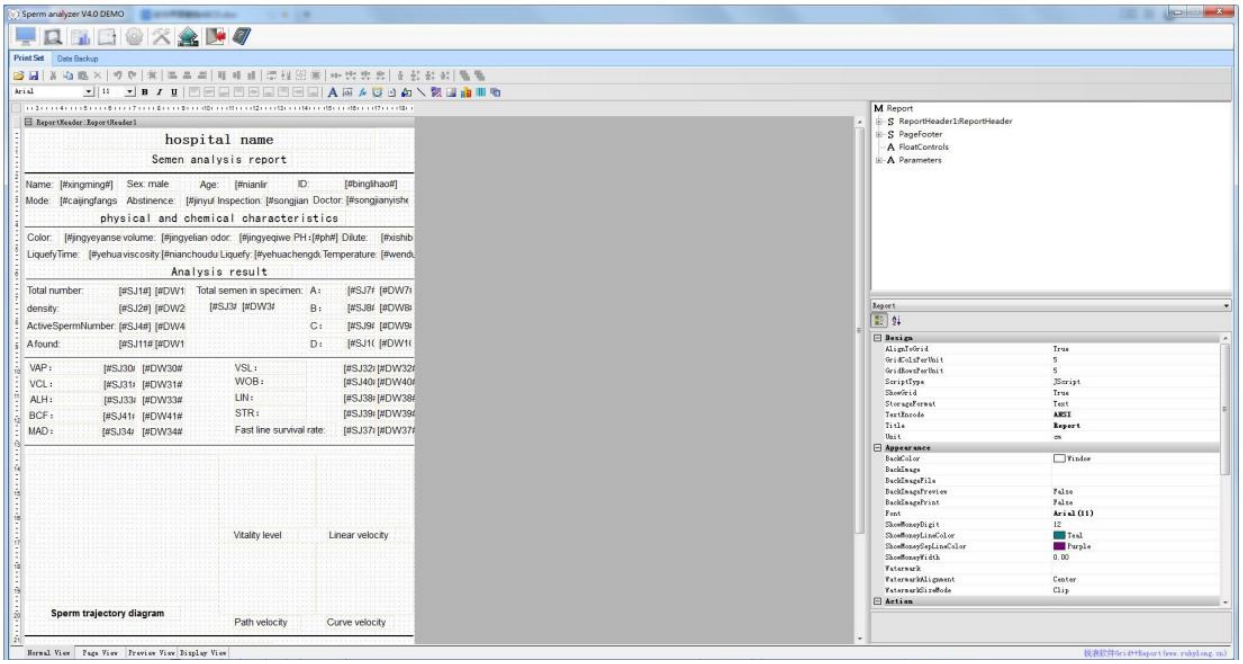

Figure-20

Backup data function

NEW: Built a new database at any time. After the completion of the building, automatically connected to the new database.

Conn History: Connect to the history database, when history data need to be checked, from here to find the historical database and view.

Parameters restore: Reducing the parameters of the last backup.

Parameter backup: After completing new parameter settings, it is recommended to backup.

Figure-21

Click the **NEW** button, build a new database and the name can be changed.

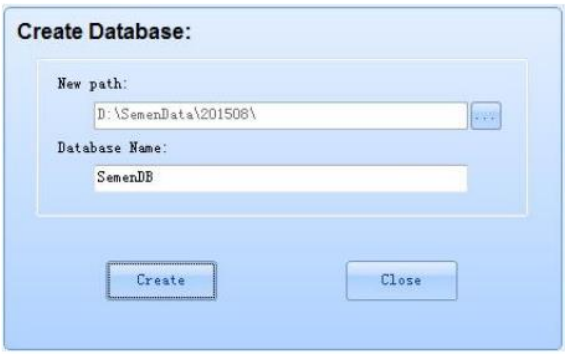

Figure-22

Connect the history database, view the history data, can right-click to delete the history database.

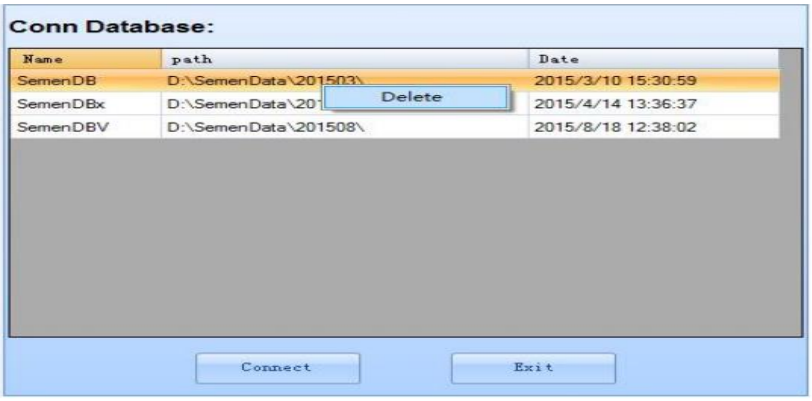

Figure-23

9.2.7 Video setting

Click  button to enter the video setting interface. Can set the exposure, colour, and contrast of the camera.

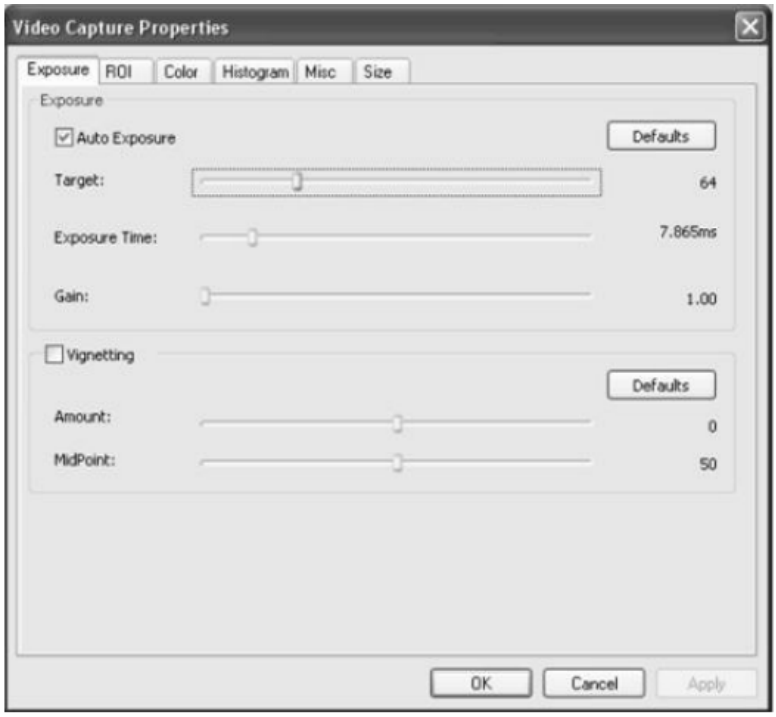

Figure-24

10. Maintenance

1) Check the power supply frequently, if the voltage exceeds the adaptation scope of equipment (AC 198V ~ 242V), use the boot, and regulate the power supply.
2) Check the power line of the equipment regularly, if damaged or fractured, it should be replaced immediately.
3) Unplug the power cord before cleaning the outer surface of the equipment. Wipe it with cotton wool and toothpaste, but not alcohol cleaners and fungicides.
4) After moving equipment, check whether there is a loose connection among components. If loosening, it should be well connected.
5) When the equipment fails, invite the specialized personnel to check and repair it.

11. Troubleshooting

1. **Login Failed**
   If the wrong username or password is, Kindly input the right one.
   Prompt: "Connection failed"
   Possible reason: The database service is disabled its icon is displayed in the system tray in the lower right corner. Double-click this icon and then click the button in the pop-out service manager window. The icon will be after the service startup.

2. **Video display is abnormal**
   a. Once the video, it will pop an error indication
      Reason: Failed installation of device driver routine or no such device after the installation.
      Solution: First, check whether it is included in a system set, if not, reinstall the driver routine. If it's included, double-click and choose.
   b. After the video is activated, the video image area can't display the real-time image that the area is blue or grey, and no error indication. Reason: Analog signal line loses contact. The bonding point may be broken for regular rotation of the line's two sides, or the camera may be powered off. If the problem is in the digital camera, the USB port on the main board may be in power shortage or the quantity of data line is bad. Solution: check whether the power of the analog camera is connected. If not, check whether the bonding points of the signal line are broken. If the points are broken, change the signal line or re-weld them. If the problems are in the digital camera, equip it with a high-quality USB 2.0 data line and fix a PCI-USB2.0 adapter board on the motherboard, then insert the camera into the USB 2.0 part of it.

3. **The driver routine of the digital camera cannot be installed; the indication is an unrecognized USB device**.
   Possible reasons: The USB port is a power shortage or not a real USB 2.0 standard port, which will make the transmission speed not enough. The quality of the USB 2.0 data line is bad.
   Possible solutions: Equip with a high-quality USB 2.0 data line fix a PCI-USB2.0 adapter board on the motherboard, and then insert the camera into the USB2.0 port of it.

4. **No image after the digital camera works for a while, the indicator is extinct.**
   Possible reasons: Power shortage of motherboard or bad USB data line.
   Solution: Equip with a high-quality USB 2.0 data line fix a PCI-USB2.0 adapter board on the motherboard, and then insert the camera into the USB2.0 part of it.

5. **Error appears when input items with too many words in the report and edit window**
   Possible reasons: Too many words input that exceed the specified and the database cannot save.
   Solution: Remove the words.

6. **Some detection items have no data when printing reports.**
   Possible reason: This item in the report template is modified or deleted unintentionally.
   Solution: Enter the template designing state and add or modify this item.

7. **No images when printing report or preview**
   Possible reasons: The print flag of this image is 0 in the image list, or the print dialog in the report template is deleted.
   Solution: Set the print flag to 1 or non-0; add image print dialog in the template.

8. **The images are not clear or with bad quality**
   The brightness is not enough, and the raster is small, which will make images too dark and too much signal noise. Just make the raster brighter. If the light is too bright, or raster bigger, the cell component may be grey and clarity is not enough. Just decrease the raster.
   The image parameter is not right, or the brightness and contrast are not reasonable.

9. **Can not print a report without indication**
   Possible reasons: The newly installed printer is not recognized by the system, or wrong printer driver installation, or the power is off.
   Solution: Make sure the printer is installed correctly and enter the report designing window, click **"print set"** under the "print" menu. Choose the printer again in the printer clicking the drop-down arrow.

10. **No image in printing**
    Possible reason: The image printing flag is 0, or the print dialog in the report template is deleted.

11. **After the item is modified in the report items designing window, it will indicate an error when opening the data managing window or report editing window.**
    Possible reason: The wrong operation in a modifying item and adding a blank report item.
    Solution: Exit and enter the software again, open the report designing window directly, and delete the blank report item.

12. **Once opening the data management window or report editing window, it will indicate an error after adding/dropping report items.**
    Possible reasons: Haven't validated the completeness of the database in time.
    Solution: Load the default item and save, then exit and enter the database window to validate the database. Cancel the hook in the "list" column when adding items, save and exit, then choose the database and validate its completeness.

13. **Pop the "unsuitable parameter" indication when entering the report editing window.**
    Reasons:
    a. Click the **"add report item"** button when adding "submitting doctor" and other items in the report designing window that add an extra blank item.
    b. Did not keep the "test value" item in the end when adjusting the sequence of report items in its designing window.
    Solution:
    a. Delete the wrong blank item in the report designing window.
    b. Move the "test value" to the end.

14. **The sequence of report items is disordered**
    The reason is that the operator clicks the item's heading "edit name" in the report designing window with the mistake. Or maybe the operator clicks the "up", and "down" buttons in the toolbar which are just used for the report item.
    Solution: Choose the item then click the **"up"** or **"down"** item mentioned above and keep the "test value" in the end.

12. Accessories

Standard Accessories

S. No	Accessory Name	Quantity
1	Computer system	1 set
2	Biological microscope	1 set
3	Camera	1 set
4	Analyzer software	

13. Appendix

The related knowledge about semen test

13.1 Cell shape of sperm

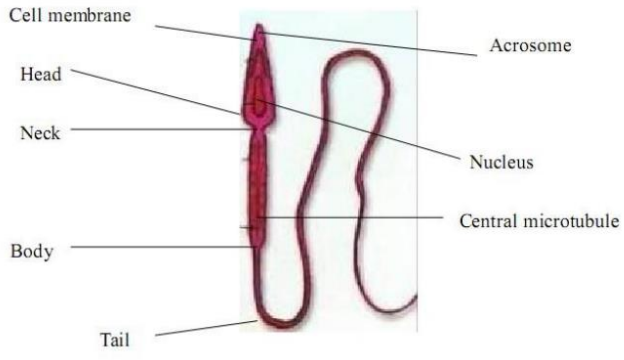

Figure-25

13.2 Semen specimen collection, transportation, and the notes

Semen collection is an important step of semen test; the right collection method will affect the accuracy of the test result.

1) The time to collect semen: forbid sexual intercourse before collection for several days, 3 days for those younger than 25, 5 days for those from 25 to 35, and 7 days for those from 35 to 45.
2) The number of times for collection: because the amount of sperm changes a lot at different times, one time test is not accurate. If the sperm amount is much different between different times, Kindly check for 2 to 3 times with the interval of 1 to 2 weeks.
3) Collection methods
   a. **Masturbation:** The most desirable method. The collector can do it in the laboratory or a calm room with the collector ejaculating into a dry container by masturbation and sending the specimen to the laboratory within 30 minutes to preserve heat. Do not leak any specimen when collecting sperm, which can make the test result accurate. If this method is difficult, Kindly use the semen collection machine.
   b. **Eliminate semen in vitro:** Because this method may lose the first part of semen which just has the highest density sperm, we do not support to use of this method. So, this method is used for the one who can't collect semen by a masturbation and electro massage. Can not use latex or plastic condoms to collect semen, due to talcum powder inside the condom can affect sperm motility. If you do not collect all the semen or if transportation time is too long (more than 2 hours), these specimens cannot be semen analysed.

13.3 Semen appearance

Normal new ejaculated semen just has a strong stimulation smell, showing a grey or milky white colour, and self-liquefaction was translucent milky white. Long time without ejaculation, then the sperm can be slightly yellow. Bright red or dark red bloody semen found in the reproductive system, inflammation, tuberculosis, and tumours. Yellow, brown, and pus-like semen found in Vasiculitis.

13.4 Semen volume

A certain amount of semen is to ensure that the activities interstitial substance of sperm and neutralize the acidity of the vagina secretions, protect the vitality of the sperm. Pathological reduction in the amount of semen is commonly found in seminal vesicle lesions. Reduced to a few drops of semen volume, sperm could not even be eliminated, which is called no semen disease, found in reproductive system-specific infections, such as tuberculosis, gonorrhoea and non-specific inflammation. Excessive amounts of semen can lead to reduced sperm density and sometimes impede fertility, which may be due to pituitary gonadal hormones being too high resulting in many male hormones.

13.5 Semen liquefaction

Semen liquefaction refers to the process by which semen changes from jelly-like to flow fluid after ejaculation. Semen ejaculated by normal Animals is highly viscous that sperm is not active under microscopic observation. After semen leaves the body for 5 to 10 minutes, it starts to liquefy. In 20 ~ 40 minutes, it completes liquefaction. Then the completely normal sperm with vitality can be seen. There are still no liquefied clots or liquefied semen in more than l hours is abnormal, and can inhibit sperm motility, thereby reducing the chances of conceiving. The unliquefied or incomplete liquefied semen may be led by the reduced liquefaction factor secreted by the prostate, resulting in a lack of proteolytic enzymes, or by prostatitis syndrome damaging proteolytic enzymes. If the semen is not jelly-like or shows a low viscosity is also an exception, more common in the vas deferens defects or congenital sac absence.

13.6 Semen viscosity

Semen viscosity measurement is taken after complete liquefaction, observation of liquefacient semen viscosity can use the glass Rod and Viscometer method.

1) **Glass Rod:** The glass rod can be in contact with the semen samples, produce wire when pulling the rod, and form a discontinuous hanging drop. The semen wire length does not exceed 2cm. When the viscosity is abnormal, semen hanging drop can be formed longer than 2cm. Viscosity measurement is divided into three: I-class is 30 minutes of basic liquefaction, take semen with straw showed filamentous mucus wire; Ⅱ grade for 60 minutes of non-liquefaction, you can see thick wire when it is being sucked, feel thick smears; Ⅲ level for 24 hours still cannot be liquefied, it is difficult to use straw draw, high viscosity, smears difficult.

2) **Viscometer method:** The viscosity meter is 93mm, with two kinds of capillary tubes whose diameters of 0.725mm and 0.625mm. Pour the liquefaction semen into the 0.5ml tube (painted on the level of scale) and calculate the time of 0.5ml semen through the capillary with a stopwatch. Normal semen after liquefaction for 30mins can pass through the tube in 36.1 ± l3.4 seconds at room temperature 25 ℃; by 0.625mm diameter is 41.2 ± 11.4 seconds.

13.7 Semen pH value

The semen pH value in the normal range is 7.2-8.0.
Semen pH<7.0, is more common in oligozoospermia or azoospermia, often reflecting the vas deferens obstruction, congenital absence of seminal vesicle, or epididymis disease.
Semen pH>8,0, is common in acute infection, such as vesiculitis and so on.

13.8 Sperm motility rate

The sperm motility rate refers to the percentage of motile sperm in the total number of sperm. Normal ejaculation of semen in 30 ~ 60 minutes, the sperm motility rate should be greater than 70%.

13.9 Sperm activity degree

The degree of sperm activity is divided into two aspects: sperm motility and sperm living rate. Sperm motility refers to the quality of active sperm, which is the qualitative method to determine the ability of sperm motility; sperm living rate refers to the number of normal motile sperm which is the quantitative method to determine the live sperm and dead sperm.

1) **Sperm motility**
   The WHO approach is to divide sperm motility into four: D-class, inactive, no forward movement; C-class, activities, non-performing, forward movement weak; B-class, activity in general, there is moderate forward movement; A-class, activities is good, forward activists.
2) Sperm motility Use the staining of sperm method in vivo to calculate the number of live sperm now.

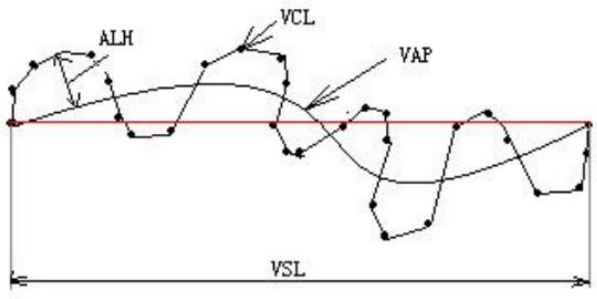

Figure-26

13.10 Meaning of sperm moving track

1) **Straight-line speed VSL:**
   Calculate the speed according to the straight-line distance from the starting point to the end of the track, the larger of linear speed, the faster sperm motility, and the effect is more significant.
2) **VSL**
   The same as the above
   a) VAP
      Calculate the speed according to the trend curve, the path velocity is greater, and the more significant the effect of sperm motility.
   b) ALH
      The swing extent of sperm moving along the trend curve reflects sperm activity from another aspect.
   c) MAD
      The swing angle of the sperm movement along the trend curve
   d) LIN
      It is equal to VSL/VCL, the LIN value is higher, the invalid path of sperm will be less, and the straight-line activity will be stronger.
   e) STR
      STR is equal to VSL/VAP
   f) WOB
      It is equal to VAP/VCL
   g) BCF
      It refers to the swing frequency of the sperm tail.

Sperm density

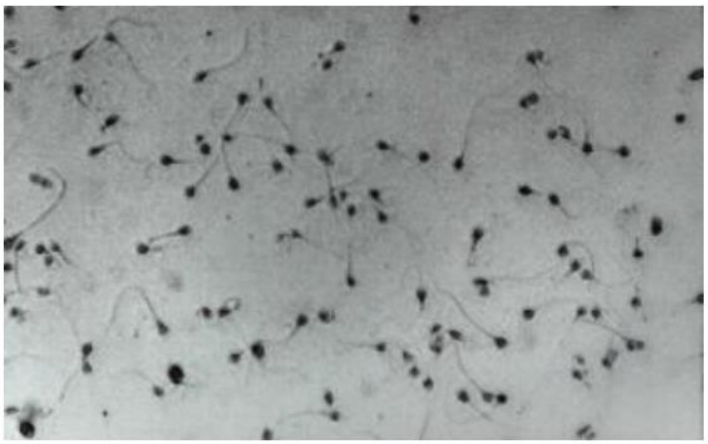

Figure-27

13.11 Sperm morphology

Sperm morphology is used to get a rate of the physiological and pathological variations within the scope of the proportion of sperm which is an important indicator reflecting Animal fertility.

1) Normal sperm morphology: normal sperm is tadpole-like, with three parts including head, body, and tail. Head, slightly flat, oval, regular contour, acrosome clear, acrosomal cap covering l / 3 of the head surface or more, in front of the sperm head, was translucent zone. aspect ratio is 1.5 to 2:1. Aspect ratio value is one of the important data to determine whether it is normal sperm morphology. Middle slender body, less than head-width of l / 3, the outline is regular and straight, with the first longitudinal axis forming a straight line. The tail is slender with a regular appearance instead of curly.
2) Abnormal sperm modality

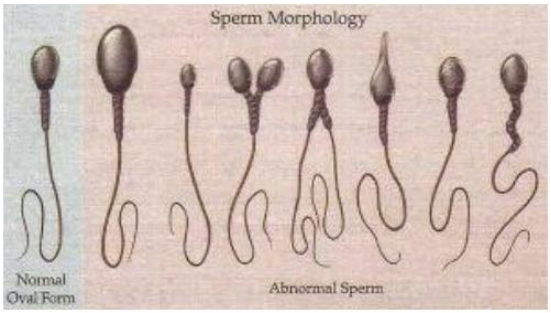

Figure-28

Normal reference values and clinical significance: the abnormal sperm in normal semen should be 10 ~ 15%, and>20% is considered as abnormal. Abnormal sperm morphology is often associated with infection, trauma, Animal hormonal changes or chemical substances, and genetic factors influence. Non-specific infection of the reproductive system can lead to pointed and amorphous head sperm to increase. Varicocele is due to poor venous return causing high temperature inside the scrotum and testicular tissue hypoxia, which can cause swelling of the sperm head or the body. Taking hormones or certain chemicals, semen will appear as immature sperm and other germ cells and sperm cell body cytoplasm droplets. Increased semen sperm agglutination suggests reproductive tract infections or immune dysfunction.

13.12 Semen cytology

Normal semen has a very small amount of red blood cells (occasionally), and white blood cells (<5/HPF), when the reproductive tract has inflammation, tuberculosis, or a malignant tumour, the red, and white cell count can be increased. Routine examination of semen white blood cells is to use fresh semen to smear on a slide directly and test by microscopy to determine the result. This method is often used mistakenly considering spermatogenic cells as white blood cells.

13.13 Biochemical and immunological tests

The seminal fructose can be found in congenital bilateral absence of vas deferens and seminal vesicles, and complete obstruction on both sides of vas deferens or retrograde ejaculation. Semen fructose reduction is common in Vesiculitis and the lack of male hormone secretion, fructose lack may lead to insufficient energy of sperm motility, and even infertility. AsAb examination has important clinical significance for the detection of causes of infertility. The AsAb exists in serum or reproductive tract fluids, can inhibit sperm activity, interfere with the movement of sperm, and impede sperm penetration and sperm-egg binding, so that fertilization occurs obstacles, when the output pipe blocks sperm, testicular injury, inflammation, epididymis, and other reproductive tract infection, it's the autoantibodies for sperm spilling.

13.14 Abnormal semen volume

No semen syndrome, Oligospermia, and more-semen syndrome are all semen volume abnormalities, that belong to semen pathology, likely to cause infertility.

13.15 Hemotospermia

The semen that existing blood is called hematospermia. When the blood volume is too much, the semen will present a red colour or even gore. If the blood volume is not high, the semen will show some bloodshot, and some can only be found some red blood cells in the microscope. The bright red colour of the serum presents continuous sustainable ejaculation. Then the colour will gradually change from bright red to dark brown, and then change to yellow until it disappears**.**

13.16 Hematospermia reasons

Hematospermia causes can be divided into organic, functional, and unexpected three categories. First, organic causes.

1) Anatomic abnormalities, such as Mullerian cysts, such cysts often interlink with the seminal vesicles or the ejaculatory duct, and are often prone to inflammation-caused bleeding, and these cases often accompany vascular malformation.
2) Calculus and calculus of prostate: calculus of the prostate is common. Some small stones or prostate bodies are formed by phosphate and calcium carbonate. When these stones are too many, they can form a small pouch. These stones have a stimulating effect on the glandular mucosa, causing mucosal inflammation, and can lead to bleeding. In addition, the openings in the ejaculatory duct or seminal vesicles can also cause the formation of stones, which can cause bleeding.
3) Infection
    a. **General bacterial infections**: This is generally considered an important reason for the blood sperm, involving the organ may include the urinary tract, prostate, seminal vesicles, and epididymis.

b. **Specific infections:** Tuberculosis, especially tuberculosis in the epididymal should be considered. Sometimes, we should consider certain parasitic diseases.

4) **Tumour:** Including two kinds, benign and malignant tumours. Malignant tumours: for example, prostate cancer.
5) Traumatic factors, such as testicular damage, perineal damage, prostate puncture, or the early resumption of sex life after resection of the prostate.
6) Seminal vesicle amyloid lesions cirrhosis of the liver and so on.

13.17 Sperm dysfunction

Sperm quantity, motility, and activity are certainly important indicators to measure semen quality. The abnormality of these indicators can affect animal fertility in varying degrees. Some of the semen specimens of the above indicators may be normal but still showed animal infertility. This may be caused by sperm dysfunction. Abnormal sperm function cannot be detected by using conventional methods generally. On the contrary, it requires the appropriate method of sperm function tests to test whether the sperm function is normal or not.

13.18 Swimming ability effects of sperm

Recently, people have found that 45%unexplained animal infertility is due to defects in sperm swimming ability. It may be related to sperm metabolism, especially with energy metabolism. Whether the sperm swimming function is normal, by washing or endoscopic method to obtain specimens for observation.

13.19 Semen colour

Semen is formed by sperm and seminal plasma. Sperm accounts take up only a very small part, more than 90% is seminal plasma. Seminal plasma is made up of the secretion from the prostate, seminal vesicle, bulbourethral glands, urethra alongside gland, and such subsidiary gonads. The main ingredients are water, fat, protein granules, pigment granules, lecithin, enzymes, fructose, and other ingredients. The colour of semen is decided by the semen component. Normal sperm is white or slightly khaki, if abstinence is longer, due to physical and chemical properties change, the colour will be yellow more. This is normal. The hematospermia caused by inflammation is mostly pink. If it is due to the rupture of small blood vessels caused by vascular malformations, the blood is bright red and can see blood clots. to find the reasons for symptomatic treatment, the colour can also return to normal.