

SpermPro Analysis Software

CASA (Computer Assisted Semen Analysis) Software



Morphology



Motility



Vitality



DNA Fragmentation

Motility

Motility module performs motility analysis of the sperms in the input video. The motility analysis can be performed both on live sample as well as previously recorded sample.

The motility analysis performs a thorough analysis of each sperm by tracing its movement path in the frame.

The module computes the various velocity and displacement parameters of each sperm as described by WHO. The parameters are:

- VCL, curvilinear velocity ($\mu\text{m/s}$). It is the time-averaged velocity of a sperm head along its actual curvilinear path, as perceived in two dimensions in the microscope.
- VSL, straight-line (rectilinear) velocity ($\mu\text{m/s}$). Time-averaged velocity of a sperm head along the straight line between its first detected position and its last.
- VAP, average path velocity ($\mu\text{m/s}$). Time-averaged velocity of a sperm head along its average path.
- ALH, amplitude of lateral head displacement (μm). Magnitude of lateral displacement of a sperm head about its average path.
- LIN, linearity. The linearity of a curvilinear path, VSL/VCL.
- WOB, wobble. A measure of oscillation of the actual path about the average path, VAP/VCL.
- STR, straightness. Linearity of the average path, VSL/VAP.

- BCF, beat-cross frequency (Hz). The average rate at which the curvilinear path crosses the average path.
- MAD, mean angular displacement (degrees). The time-averaged absolute values of the instantaneous turning angle of the sperm head along its curvilinear trajectory.

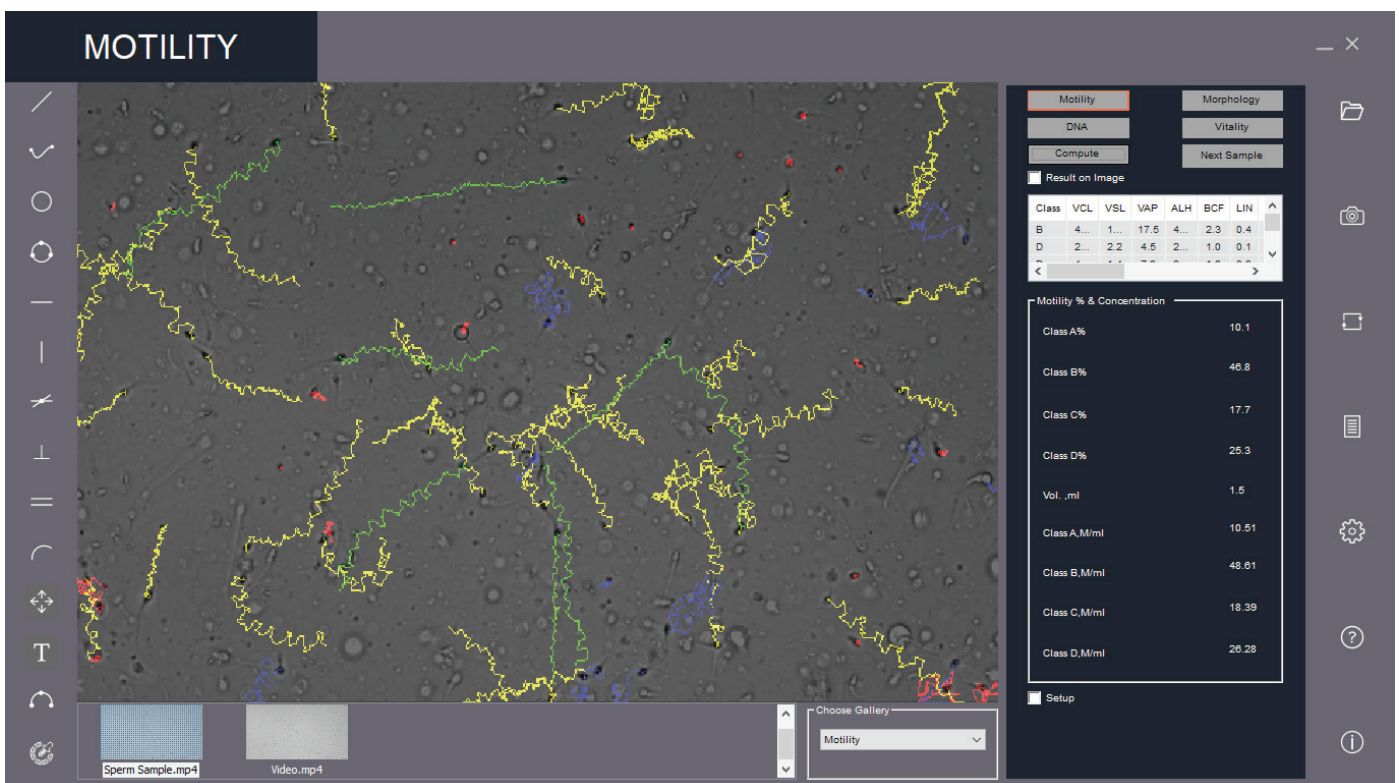
Based on the different velocity parameters the sperm are graded into different classes as per WHO:

- **Class A:** Rapid Progressive Motility
- **Class B:** Slow or sluggish Motility
- **Class C:** Non-Progressive motility
- **Class D:** Immotility

The software records the number of sperms of each classes (in Millions) as well as the concentration of each class of sperm (in Millions/ml). The module also computes the morphological parameters like area, perimeter, length, width, elongation and circularity of the spermatozoa.

The module comes with a flexible adjustment tool that helps to select the sperms in the sample for analysis enabling user to work on both bright field and phase contrast.

Additionally, the software has interactive provision to record the concentration of White blood cell, Immature germ cells and Round cells present in the analysis sample.



Morphology

The morphology analysis module helps perform a parametric study of the spermatozoa. The module helps to compute morphology parameters such as:

- Area of the head
- Perimeter of the head
- Length and width of the head
- Circularity of the sperm head
- Elongation of the sperm head
- The acrosome content in the sperm head

The software enables you to detect various morphology defects as per WHO:

- Head defect
- Tail defect
- Neck and Mid-piece defect
- Cytoplasmic defect

The module records the percentage of each sperm defects with respect to normal sperm and also with respect to the defected sperms.

The module comes with batch processing and multiple sample acceptance enabling the user to analyse multiple sperms at multiple fields in a single record analysis. Flexible tool to add or remove any sperm from the analysis.

The screenshot displays the Morphology software interface. The main window shows a microscope image of spermatozoa with two sperm heads highlighted in yellow and blue. The interface includes a toolbar on the left with various analysis tools, a top navigation bar with 'MORPHOLOGY' and window controls, and a right-hand panel with analysis options and a data table.

Analysis Options:

- Motility
- DNA
- Compute
- Morphology (selected)
- Vitality
- Next Sample

Result on Image:

| SNo. | Area Of Head | Perimeter of Head | Big Ax |
|------|--------------|-------------------|--------|
| 1 | 116.3 | 52.4 | 21.2 |
| 2 | 154.1 | 56.8 | 22.5 |

Setup

Choose Gallery: Morphology

DNA Fragmentation

Sperm DNA Fragmentation test provides additional fertility potential of the semen. The principle of Sperm Chromatin Dispersion is used in this analysis. Based on the dispersion of the spermatozoa it is identified into different classes:

- Big Halo
- Medium Halo
- Small Halo
- Without Halo
- Degraded Halo

Based on the detection of different classes the DNA Fragmentation Index(DFI) is calculated representing the percentage of fragmented sperms (small halo, without halo and degraded).

This module too comes with batch processing and multiple sample acceptance enabling the user to analyse multiple sperms at multiple fields in a single record analysis. Flexible tool to add or remove any sperm from the analysis or alter the detected halo class of the spermatozoa.

The screenshot displays the software interface for DNA Fragmentation analysis. The main window shows a microscopic image of spermatozoa with several labeled regions: 'Medium Halo', 'Without Halo', and 'Halo'. The interface includes a toolbar on the left with various icons for navigation and analysis. The top left corner has a 'DNA' header. On the right side, there is a control panel with buttons for 'Motility', 'Morphology', 'DNA', 'Vitality', 'Compute', and 'Next Sample'. Below these buttons is a 'Result on Image' section with a table of parameters:

| Class | Area | Outer Dia | Inner Dia | Ellipse |
|-------|------|-----------|-----------|---------|
| Me... | 35.5 | 9.8 | 6.7 | 154.4 |
| Me... | 39.5 | 10.1 | 5.4 | 169.6 |

Below the table is a 'DNA Results' section with a summary of the analysis:

| Parameter | Value |
|---------------------|-------|
| Tot. Sperm Analyzed | 10.0 |
| Big Halo | 0.0 |
| Medium Halo | 9.0 |
| Small Halo | 0.0 |
| Without Halo | 1.0 |
| Degraded | 0.0 |
| DFI | 0.100 |

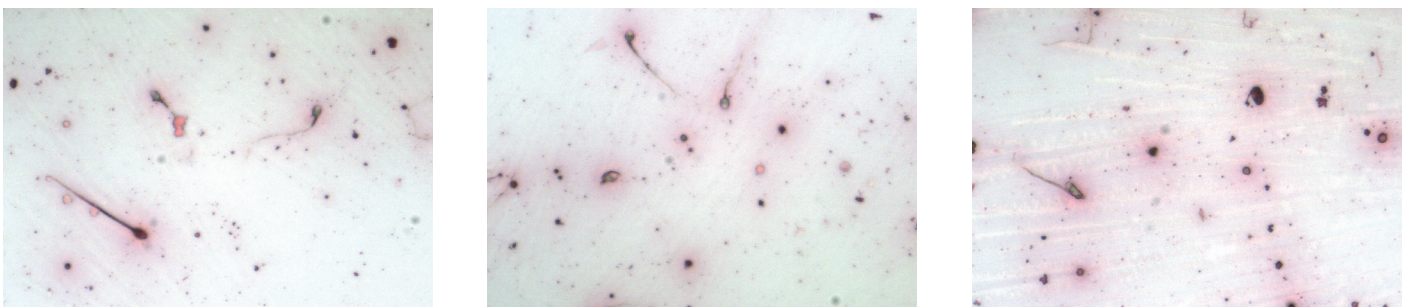
At the bottom right, there is a 'Setup' section with a 'Choose Gallery' dropdown menu set to 'DNA'.

Vitality

Vitality module performs identification of live and dead sperms. It records the percentage of live and dead sperms. The software enables user to add or remove sperm from the analysis. Also has a provision of batch processing and multiple sample acceptance enabling the user to analyse multiple sperms at multiple fields in a single record analysis.



Software Interface

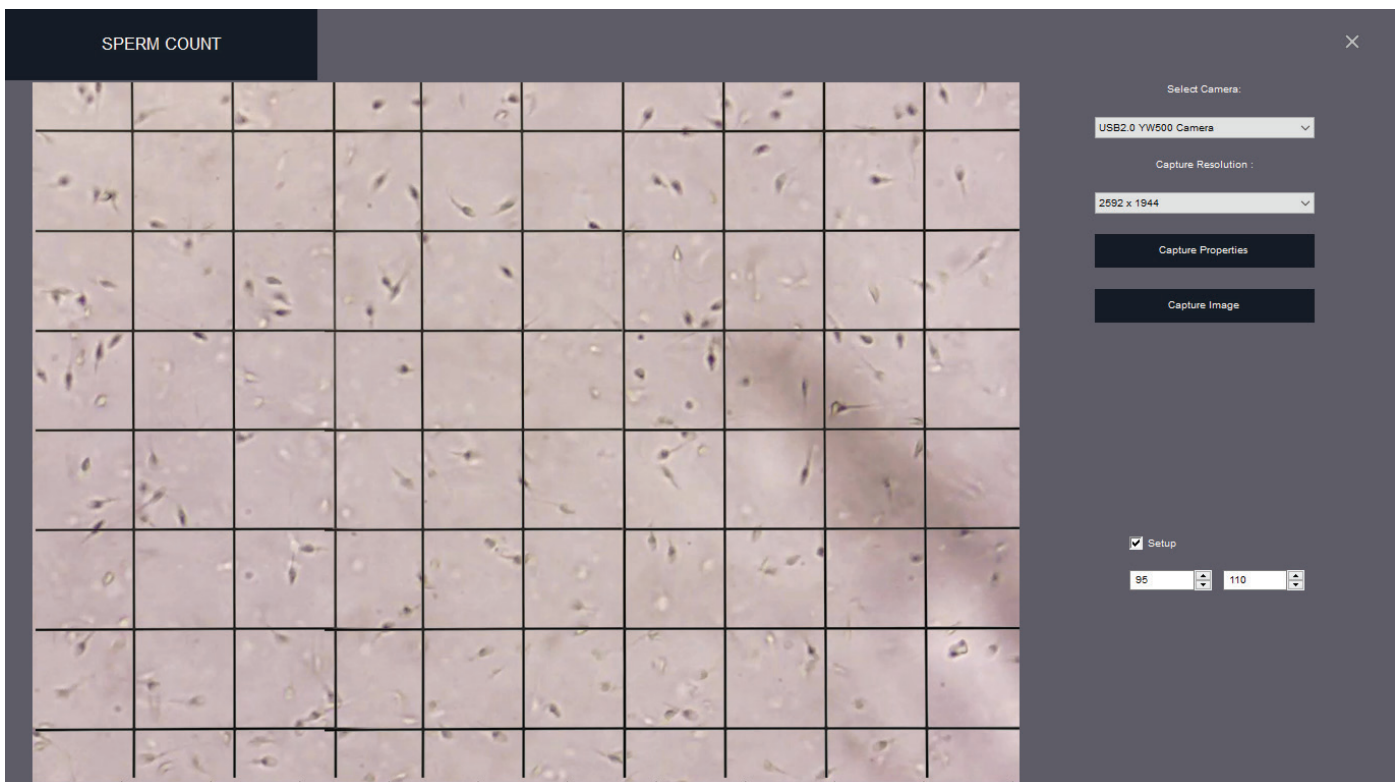


Sample Image

Sperm Count and Concentration

Sperm Concentration is the number, in millions, of spermatozoa per milliliter of semen. The principle of Makler chamber is used in the counting process. The Makler counting chamber is a simple-to-use device for rapid and accurate sperm count, motility and morphology evaluation, from undiluted specimen. The analysis area subdivided into 100 squares, each one of 0.1 x 0.1 mm. The space bounded in a row of 10 squares is exactly one millionth of mL. Therefore, the number of sperm heads in 10 squares indicates their concentration in million/mL.

The sperm concentration module based on the principle of the Makler Counting Chamber constructs a virtual chamber with grid of dimension 0.1 X 0.1mm. Hence Sperm Concentration is achieved by random selection of 10 boxes in different or same field as per the user requirement. The software has flexibility to adjust the selected sperms for counting as per the phase contrast and lightning conditions.



Report, Statistics, Database

According to WHO (World Health Organization) 2020 guidelines

The Sperm Analysis Software provides an extensive database record for each analysis recording all the parameters of the various tests. An existing record can be updated or deleted or modified as per the requirement.

The report parameters can be modified using the database module as per need. Further the report can be exported to MS Office Excel, PDF, HTML for further modification. The report contains graphs and images of the tests performed.

| SEMEN ANALYSIS | | | |
|---|------------|---------------|----------------|
| Patient | | | |
| Name :- | test | Age :- | 02-12-2021 |
| Wife Name :- | | Doctor :- | |
| Sample Description | | | |
| Parameters | Values | Parameters | Values |
| Place of Collection | | Volume,ml | 2.5 |
| Date of Collection | | Color | Greyish Opaque |
| Time of Arrival | 8:30 AM | Smell | |
| Time of Examination | 9:20 AM | Agglutination | NO |
| Abstinence,Days | 7 DAYS | pH | 7.5 |
| Liquefaction,Min | 15 | | |
| Culture | | | |
| Analysis Results | | | |
| Parameters | Values | Status | Normal Range |
| Total Number,M/ml | NA | | |
| Rapid Motility | 12.0482 | | |
| Sluggish Motility | 19.2771 | | |
| Non Prog. Motility | 36.1446 | | |
| Immotile | 32.5301 | | |
| Vitality | 9 | | |
| DNA Frag. Index | 0 | | |
| Non-Sperm Cells | | | |
| White Blood Cells,M/ml | | | |
| Epithelial Cells,M/ml | | | |
| Morphology | | | |
| Values | Parameters | | |
| Normal Morphology % | 3 | | |
| Abnormal Morphology % | 97 | | |
| Head Defects % | 0 | | |
| Neck & Midpiece Defects % | 66.6667 | | |
| Tail Defects % | 0 | | |
| Comment | | | |
| This Report is not for Medico Legal use. | | | |

| SPERM ANALYSIS IMAGES |
|-----------------------------------|
| <p>Motility Analysis</p> |
| <p>Morphology Analysis</p> |
| <p>DNA fragmentation Analysis</p> |
| <p>Vitality Analysis</p> |

Our Software being Exported to More than 20 Countries



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