SPECIFICATIONS OF IMAGING & ANALYSIS FOR CYTOGENETICS FULLY MOTORIZED SYSTEM

Motorized Upright Fluorescence Microscope with FISH spot counter. Metaphase finder, Karyotyping and FISH

PART A: Motorized Upright Fluorescence Microscope:

1) Fully motorized Upright fluorescence microscope with apochromatically corrected beam path for Fluorescence analysis.
2) Motorized Research microscope stand with Z step resolution 10 nm or better with adjustable height stop and torque of focusing. Objective specific focusing speed adjusting for scanning and capture.
3) Microscope should have built in TFT/ LCD monitor to display the microscope parameters and controls the motorized functions like light manager, contrast manager, motorized nosepiece, etc.
4) Motorized Microscope should have integrated light and contrast manager.
5) Revolving Motorized Septuple nosepiece for accommodating upto 7 Objectives.
6) 100-watt halogen illumination for Transmitted light applications and 100-watt mercury illumination for reflected/fluorescence applications.
7) Objectives 5x (N.A:O.16), 10x (N.A:O.3), 20x (N.A.:O.8), 40x(0.75) and 100x oil (N.A: 1.4) should be quoted.
8) Motorized scanning stage for fast and convenient scanning with slide holder for minimum 7 slides.
9) Trinocular phototube with 15^0 inclination and a high field of view of minimum 25 mm should be offered with 1Ox focusable eyepieces.

PART B: Cytogenetic Imaging Workstation:

Camera:

1) Ultra High-resolution camera with 4000 x 3000, 10 Megapixel, 12 Bit, minimum one inch monochrome camera with minimum pixel size 3.45 μm x 3.45 μm and exposure time between 80 μs and 270 μs with global shutter should be offered.

Automated FISH spot counter:

1) High speed interphase / Tissue nuclei scanner system with high numerical aperture low magnification objective.
2) Automatic acquisition of FISH signals in up to 12channels from different focal plane and reproduction of extended focus images to read clear signals against background.
3) Identification and counting of spots with their position.
4) Graphical presentation of every process. User trainable and customizable classifiers.
5) Results to be stored with images and should be displayed in gallery or in convenient histogram and scatter plots.
6) Centered relocation of interphase nuclei at different magnification for observation. User customizable keyboard features for faster analysis of signal patterns.

Metaphase Scanner:

1) High speed metaphase scanner system of at least 12 adjacent fields per second, scan speed of less than a minute per slide.
2) Scanning of metaphase in both Transmitted light and florescence light mode. Unattended metaphase searching up to 8 slides, should be upgradable to 80 slides or more with autoloaders.
3) Real-time analysis of grayscale images. Fast and adaptable search algorithm, Three-level statistical classification method for reliable metaphase recognition, User trainable classifier, Focus tracking for each metaphase by advanced autofocus algorithm.
4) Fast monitoring and evaluation of found metaphases by image gallery with interactive scoring. Precisely centered relocation at different magnifications, Graphic presentation of search progress, automated search protocols and evaluation list with transformed coordinates for relocation on other microscopes.
5) User defined scanning area for faster scanning on screen aberration scoring from live image. Automatic light level adjustment during scanning.
6) Automatic centering of object prior to high magnification captures integrated and customized classifiers for scanning.
7) Automatic oil dispenser and automatic image capture under oil immersion objective to be included.

Karyotype software:

1) Highly accurate Artificial Intelligence (Al)/ Deep Neural Network (DNN) enhanced flexible karyotyping (or chromosomal assignment), available for all common human samples and banding patterns.
2) Precise Al/DNN assisted chromosomal orientation algorithm for all chromosome sizes. User defined automated and assisted complete workflows.
3) Interactive/Automated Al/DNN based removal of non-chromosomal objects and background reduction.
4) Interactive/Automated Al/DNN based whole metaphase separation, including overlapping, touching and clustered chromosomes. Interactive/Automatic metaphase quality detection for automated metaphase separation.
5) Batch process of metaphases (10-100) to karyotypes in single click.
6) Software should automatically karyotype metaphases without human intervention immediately after Metaphase finding and high resolution image capture.
7) Efficient interactive tools for manual correction of automated results.
8) Interactive and automated Karyotyping of Human, Animal and Plant species.
9) Additional analysis interface within the same license key/dongle to ensure faster TAT.
10) Unlimited UNDO and log operations to overcome human errors with time and date record of every processing steps.
11) Chromosome arm ratio should be identifiable to define P and Q arms. One click separation of overlapped chromosomes.
12) Interactive and automated Real time background correction and Chromosome separation. Keyboard shortcut keys for several functions like Chromosome separation (in case of over lapping chromosomes), image enhancement, Background correction, contrast enhancement etc.
13) Interactive and automatic Classification based on built-in classifiers for G-, Q- and R-banding. Ideograms according to ISCN standard for 400, 550, and 850 bands.
14) Additional captures to encompass all chromosomes of widely spread metaphases in one karyotype, Up to 26 images can be incorporated into 1 to have one complete Karyogram in case of polyploids.

FISH Software:

1) Image acquisition in up to 12 color channels with integrated microscope control for motorized microscopes.
2) Extended focus image generation to have a very clear Fluorescence signal against clear dark background.
3) User defined automatic processing functions significantly simplify the image enhancement immediately after the capture.
4) Interactive and automatic integration time control for each color channel. Automatic and interactive background correction and thresholding for each color channel. Mask (exclude/include) function T Transient and permanent zoom, Presentation of individual colors, false colors, and gray levels, Annotation capabilities and Measurement functions.
5) Provision to capture color images using RGB filters for stained samples/slides like H&E, Special Stains, IHC etc.

Report / Archiving Software:

1) Dedicated software for Report generation, analysis, archiving and classifying with institute/university logo or other related images.
2) Scheduled backup and notifies if data are not getting saved. Dedicated software for Report or case data searching and sorting. Editing can be done for a work group or multiple cases.
3) Provides security check so that unknown user cannot modify data. User Defined report generation with graphic interface.
4) Provision in software to extract statistical information of cases/reports like cases per year, results per year, samples per year etc.

Computer:

Intel(R) Core i9 Intel Core i9-10900X (10-Core, 3.7GHz, 4.7 GHz Turbo, 19.25MB, HT, 165W) 16 GB (2x8) RAM DDR4, 10 GB graphics card — NVIDIA Geforce RTX 3080, Monitor 25" TFT or higher with 1920x1080 resolution, 256 GB SSD, Hard disk 1 TB or higher, 3 x PCIe slots and 1 x PCI slot, 4 USB3.O and 4 USB2.O ports, 950W chassis, Original Window 10 Pro 64 bit or higher version.

General Terms and Conditions:

1. Should be CDSCO/ BIS approved.
2. Instrument should be provided with 5 years warranty and thereafter 5 years CMC.
3. Certificate of calibration and inspection from the factory.
4. Installation and Demonstration of equipment should be provided when asked for.
5. UPS of suitable rating shall be supplied for minimum 01 hour backup for the entire system.
6. Should be compliant with safety requirements for electrical equipments for measurement control and laboratory use.
7. List of equipments available for providing calibration and routine maintenance support as per manufacturer documentation service/technical manual.
8. List of important spare parts and accessories with their part number and costing.
9. Equipment should be complete in all aspects to start working from day one.
10. User/Technical/Maintenance manuals to be supplied in English.
11. Onsite application training of staff.
12. Regular and continuous technical support to be provided by retailer/manufacturer with zero down time.
13. Availability of Test Report from Central Govt./NABL/IL Accredited lab to specification. Manufactured by ISO 9001:2008 or latest certificate firm