SPECIFICATIONS FOR A NEW STATE OF ART

16 SLICE 'ALL PURPOSE' C. T. SCANNER

A) Scanner Design X-Ray generator and tube:

1. Scanner: Whole body spiral CT scanner (16 slices) of latest technology.
2. X-Ray Generator.

a) It should be high frequency generator with output of 24 KW.
b) KV range should be 90 to 130 KVP.
c) mA should be 180 mA or more.

3. X-Ray tube:

a) X-Ray tube anode heat storage capacity of at least 2 MHU.
b) Peak anode heat dissipation rate of at least 300KHU/minute.
c) X-Ray tube should be supplied with unconditional complete warranty of 2 years.

4. Gantry and scanning table:

a) Gantry aperture of at least 65 cm.
b) Gantry tilt of +/- 30 deg or equivalent digital tilt is available with the system.
c) Scan field of view 40 cm or more.
d) Scanning table load of at least 150 kg.
e) Metal free scan able range of scan gram/topogram at least 120 cm.
f) Facility of emergency manual traction.
g) Table should have carbon fibre table top or equivalent.
h) 3D laser lights for positioning.

5. Detector System:
   Solid state detectors to acquire min. 16 slice at a time, free from frequent calibration.
6. High Contrast Resolution of at least 13 Lp/cm or more for axial and helical scanning.
7. Scan time: Minimum scan time for 360 degree rotation should be equal to or less than 1 sec.
8. Slice thickness should be sub mm to 5 mm or more.
9. Spiral mode Specifications:

a) Continuous data acquisition with over-lapping slices.
b) Gapless spiral of at least 90 cm or more.
c) Max. Helical for single cont. spiral of at least 90 sec.
d) Bolus triggered and bolus chase spiral acquisition should be available.

10. Image Processing System:

a) Main CPU should be at least 32 x 2 bit or more with RAM of at least 2 GB.
b) Image reconstruction matrix of at least 512x512.
c) Display matrix of at least 1024x1024.
d) High resolution Medical grade LCD monitor of 19" or more.

11. Image Storage and raw data storage of at least 100 GB.
12. Image Archiving on CD R/W/DVD. Supply 100 CD R/W or 50 DVD. In addition CD/DVD archival with inbuilt DICOM format is required.
13. Image transferring/Networking: Should have DICOM interface for transferring images/information in DICOM standard and should permit communication between devices of various manufacturers.
14. Standard Software: Routine software for image evolution and display. Should have minimum 3 ROI, angle, distance measurements, histogram, profile,

symmetry and comparison, variable multiple image display with independent window setting, image annotation and labeling etc. should be provided.

15. ADDITIONAL SOFTWARE: All the software is to be available with the system main console/workstation.

a) 3D display programmed for the three dimensional display of surfaces, real time 3D VRT, MPR, MIP 3D SSD/MPVR should be provided.
b) CT based DSA is required for neuro scans.
c) Real time reforming of secondary views. Real time reconstruction should be possible in different planes, cine display, zooming etc.
d) CT angiography with 3D capability and volume rendering capability.
e) Virtual endoscopies with vol rendering tech.
f) CT perfusion for head and body.
g) Contrast monitoring software for marching of scan timing to peak bolus phase chase.

Additional Workstation: One additional workstation should be of latest version DICOM 3 ready and should be having all the above mentioned softwares & inbuilt perfusion processing software, post processing, image reconstruction in 3D and direct filming facilities from the workstation with CD/DVD writer & USB port should be provided. It must be having the additional workstation with EBW/MMWP/AW/Tera Recon & others.

16. <u>ESSENTIAL ITEMS TO BE INCLUDED WITH THE UNIT</u>

1. PRESSURE INJECTOR latest model single head with remote control, standard make with 50 compatible disposable syringes.
2. The firm should supply DICOM dry imager atleast 500 PPI/DPI for film size upto 14" x 17", non sensitive to light.
3. deleted.

III OTHER ITEMS:

a) Lead glass 100 x 150 cm or more with lead component as per AERB requirement.
b) Two sets of patient positioning accessories.
c) deleted.
d) Line interactive UPS system of good brand like Tata Liebert/APC/Emerson, others for full system with SMF batteries for the complete system and provision of light in console and gantry room with backup of 15 min or similar rating DG set.
e) Integrated intercom and automatic patient instruction system should be provided.
f) 2 LED view box of two films and three films size (1 each).

IV **The machine should have been launched in the last 5 years, India or Globally.**

V. Standards and Safety –

It should be US FDA/European CE approved product.

TECHNICAL SPECIFICATION OF STATE OF THE ART LATEST GENERATION 1.5 T SUPER CONDUCTING MAGNETIC RESONANCE IMAGING SYSTEM (MR)

S.NO.O	Specifications
1	**Operational requirements**
1.1	Whole Body 1.5 Tesla Magnetic Resonance Imaging system optimized for higher performance in Cardiac and Neuro-radiological examination with short superconducting magnet, high performance gradients and digital Radio Frequency. All capabilities as detailed below should be integral part of the quotation and none of these essential requirements should be as optional.
2.1	**Magnet System**
A.	1.5 Tesla active shielded super conducting magnet.
B.	The length of magnet should be not more than 200 cm and the bore should be wide i.e. 60cm or more with flared openings.
C.	It should have facilities of better illumination, ventilation and designed to avoid patient claustrophobia
D.	The magnet should be shielded from the external interferences
E.	The homogeneity of the magnet should be mentioned in relation to 10.20.30 cm DSV. Give details of the number of planes, plots and number of measurement per planes, to measure the homogeneity
F.	Global and local auto shimming should be available.
G.	Automated patient specific on line shimming should be available.
H.	Specify the weight of the magnet including the gradient and cover etc.
I	The front panel of Gantry should display table and patient position
2.2	**GRADIENT SYSTEM**
1	Actively shielded Gradient system with strength of at least 33/m or more with slew rate of 120mT/m/msec or more.
2	The duty cycle should be 100 percent. Please give details.
3	The Gradient system should have provision for eddy current compensation
4	Specify Field of View in all three axes
5	Minimum TE & TR in 2D/3D should be specific for all sequences.
6	Minimum Slice Thickness in 2D & 3D should be specific in relation to the sequence.
7	Echo Train Length in both Spin Echo and Gradient Echo should be at least 255 or more
8	The measurement matrix should be from 128X128 to 1024X1024 in both 2D and 3D imaging as well
2.3	**RF SYSTEM**
1	RF system should be fully digital & solid state with transmit power of at least 10 kW
2	RF system should have at least minimum of 16 independent RF receiving channels with each having bandwidth of 1MHz or more

3	Should have necessary hardware to support Phased array coils.
4	Specify frequency stability and amplifier resolution
5	RF system should be compatible with parallel imaging techniques. It should be able to support time reductions with compatible coils in 2D/3D imaging in Body/Neuro imaging up to acceleration factor of at least 4.
2.4	**RF COIL**
1	The main body coil separate integrated to the magnet must be Quadrature / CP. In addition to this coil following coils should be available.
2	Phase Array Head coil. It should be at least 8 Elements or more
3	Multichannel Neurovascular coil with at least 16 Elements.
4	In case above two coils do not suffice in combination for complete Neuro vascular study from Aortic arch to Circle of Will, please quote separate coil in addition to above two coils for this study.
5	Phased Array Spine Coil for thoracic and Lumbar spine imaging for whole spine study. It should have at least 10 elements.
6	It should be possible to do Head and Spine (Whole Spine) imaging together without changing the coil. It should be possible to do the same either with combination of coils or a dedicated coil to achieve the same should be available.
7	Phased Array Body coil, capable of doing abdomen, pelvis, MRCP and peripheral imaging. It should have at least 16 elements. Please specify the time reduction factor with parallel acquisition techniques.
8	Flexible Coil – Large FOV – Specify
9	Flexible Coil – Small FOV – Specify
10	Dedicated Knee Coil – 8 channels or more
11	Breast Coil capable of bilateral breast imaging. Bilateral Breast Coil with at least 4 elements with fully functional spectroscopy.
	Note: Total coils should be 8 including integrated Quadrature body coil. All the above coils should be taken as individually for all the applications asked for.
25.	**PATIENT HANDLING SYSTEM**
1	Please specify the table type
2	The table should be fully motorized with computer controlled table movements in vertical and horizontal directions
3	The position accuracy should be at lease +/- 1mm or better
4	The table should be able to withstand patient load of 150 Kgs.
5	The table should have facility for manual traction in case of emergency
6	The table should have patient auto alarm system.
7	The CCTV system with LCD display to observe the patient.
8	The table should deliver the protocols for automatic bolus chasing in Peripheral Anglo with automatic table movement.
9	The table should be dockable or the system should be available with MR Compatible/dock able trolley with removable table top

2.6	**Host Computer / Main Console and Image Processor**
1	Computer system should be at least in the industry, fast and efficient. It should have at least 8 GB RAM.
2	The system should have image storage capacity of at least 2,00,000 images in 256X256 matrix.
3	The main Host computer should have at least 19 inch TFT/LCD type color monitor.
4	The main console should have integrated MR compatible music system of the patient.
5	The system should have CD/DVD archiving facility on the main console.
6	Additionally 500 high storage CD's or 1000 high storage DVD's of compatible writing speed to be provided
7	One workstation with 19 inch or more LCD monitor to be provided for the application as listed under item 2.8(in addition to console)
2.7	**APPLICATION SOFTWARE/HARDWARE**
1	The system should have basic sequences package with Spin Echo, inversion Recovery. Fast spin echo and Gradient Echo with echo train length of 255.
2	The application software for image smoothing and edge sharpness etc for improvement in image resolution techniques.
3	Single and Multi shot EPI imaging techniques
4	MR Angio Imaging: Should have 2D/3D TOF, 2D/3D PC, MTS and TONE CEMRA for head, spine and body applications.
5	Fat and water excitation – Please specify the application packages.
6	Diffusion Weighted Imaging with b value range up to 7000 with a facility to generate the ADC map with the acquired b value. The system should have facility for online automatic generation of ADC maps
7	Please specify the motion correction algorithm/package for high-resolution motion free Diffusion weighed imaging with multishot/ segmented EPT techniques. It should be possible to have FLAIR diffusion with generation of corresponding ADC maps.
8	Perfusion Imaging to enable large anatomy coverage of the brain and in line calculation of the resulting hemodynamic as well as physiological parameters. The perfusion analysis should have capability to calculate color display of rMTT,rCBV,rCBF, corrected CBV, permeability constant and volume leakage. Please quote ASL (Arterial Spin Labelling) as standard.
9	BOLD imaging: BOLD technique with automated 3D motion correction. Z-score, correlation analysis with color overlay on anatomical image. It should be possible to have Real Time Processing of BOLD imaging date on the main console for the complete reconstruction.
10	The System should have facility for quantification of the CSF flow date on the main console and / or the workstation
11	The system should have the Hydrogen, Singh Voxel spectroscopy, Multivoxel multislice 2D, 3D spectroscopy and also the Chemical shift imaging in

	2D/3D. The complete processing/ post processing software including color metabolite maps should be available.
12	The system should have facility to do head to Toe imaging without shifting the patient at one go for metastases study and Whole Body diffusion with background suppression and without any loss of SNR.
13	The system should also be available with prostate and breast spectroscopy Package
14	The System should perform DTI at least in 32 directions with possibility of processing with depiction anisotropy mean diffusivity and other DTI metrics. Provide the fibre tracking software with overlays on various conventional images.
15	The system should have the software for whole Body Diffusion weighted imaging.
2.8.1	Workstation with latest advanced post processing software with complete DICOM functionalities as the main console with 19 inch TFT/LCE colour monitor with Hard disk of at least 2,00,000 image storage in 256X256 matrix and 8GB RAM.
2	Image documentation should be possible from the main console as well as the workstation.
3	The workstation should have availability of Processing of Real Time BOLD imaging data with colour metabolite mapping, quantification of the CSF flow data, vascular analysis package and volume rendering technique.
5	The system should be with software package like mDIXON / DIXON or equivalent package for fat and water suppression. The system be with LAVAXV, TRICKXV, PROPELLER or equivalent software with the vendor
2.9	**Dry Chemistry Laser Imager with**
1	Resolution 16 bits/500 dpi or more with minimum three online ports for Films.
2	Support Multiple Film Sizes: One of which must be 17”X14”
3	DICOM Ready (attach conformance statement)
3.0	**Power Supply**
3.1	Online UPS of 100 KVA rating along-with Voltage regulation should be supplied for complete system (including Chiller) with minimum 15 minute backup
3.2	MRI compatible Multi Para Monitor - 1 No
3.3	Anaesthesia Workstation
4.0	**The machine should have been launched in the last 5 years, India or Globally.**
5.0	Standards and Safety – It should be US FDA/European CE approved product.