Corrigendum - IV

Name of Tender:

Request for Proposal to Establish & Operate Oncology Suit on outsource basis for diagnosis and treatment of cancer patients in the Medical College Associated Hospitals. Under the phase I the Oncology Suit is to be established on outsource basis in Gandhi Medical College Bhopal for treatment and diagnosis of Cancer Patients.

Sr	Name & Designation of Participant	Pre Bid Query of Participant	Tender Clause/ Condition	Pre Bid Resolution in the Tender Condition
1	Virendra Singh Director ASHA Cancer Care	CT Scan Machine 128 Slice with CT Simulator. MRI 1.5 Tesla Machine	CT scanner 64 slice with Upgrades for Radiotherapy Simulator.	The Standard specifications of major equipment to be installed in the Oncology Suite on outsource basis in Annexure II **are amended and should be read:-** The Equipment required for Oncology Suit are • CT Scan Machine 128 Slice with CT Simulator. • MRI 1.5 Tesla Machine • High Energy Medical Linear Accelerator for Intensity Modulated Radio Therapy

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Annexure II

Minimum Equipment Specifications

Specification required for State of the art 64 Rows detector 128 Slice CT Scanner

S.no	Tender Specification	Compliance Yes/No	Detailed specification of State of Art 128 Slice CT Scanner.
	128 SLICE CT SCANNER		
	Tender Specification		
	FOR 128 SLICE CT SCANNER for ALL PURPOSE SCANNING INCLUDING CORONARY ANGIOGRAPHY		
1	Installation of top of a line Spiral Multi-Slice CT Scanner with capabilities of generating 128 slices per 360 degree in body and Cardiac Scan.		
2	**Mandatory Essential features:**		
I	**Scan Time**		
	The scan time for one gantry rotation of complete 360 deg. Should be 0.5 sec or better		
II	**Detector**		
	a) Detector should have facility to generate 128 slices simultaneously in one rotation		
	b). Each detector row must have more than 650 elements		

	c). The detectors shall be large area detector with coverage speed of 5 cm/sec per rotation for all appplications.		
III	**Matrix Size**		
	a) Display Matrix of 1024 X 1024 or more.		
	b) **Reconstruction Matrix of 512 X 512,**.		
IV	**Slice Thickness for Spiral Mode:**		
	a). 128 slice generation with minimum thickness of 0.625 mm or less		
	b). Any variable slice thickness from 0.6mm-10 mm		
V	**Gantry:**		
	a) Gantry Aperture: 70 cm or more		
	b) Gantry Tilt: +/-30 deg		
	c) Scan Field of View: 50 cm or more		
VI	**Scanning Capability:**		
	a) True 3 -Dimensional Cone beam correction technique shall be available in all modes of acquisition such as axial, spiral, 64 slice or more mode, and also in various application studies for whole body and cardiac.		
	b) The ECG gated acquisition shall have high accuracy of real time monitoring and adapting continuously Heart rate changes into the ECG trigger delay during each scan. Prospective ECG gated axial Cardiac scanning mode should also available as standard.		

	c) The acquisition shall be 64 slice or more modes for all studies including cardiac. Step & shoot or an equivalent algorithm during cardiac scanning for dose reduction will be an essential requirement.		
	d) Dose modulation shall be available for all types of studies including ECG gated tube current modulation.		
	e) Pediatric and infant base protocols shall be available based on the infant weight.		
	f) Real time contrast monitoring acquisition which allows intermittent monitoring of IV contrast enhancement in an area of interest. The contrast flow is monitored by Low-Dose scans until the contrast enhancement reaches the preferred point and then the user initiates the scan prescription.		
	g) Latest Iterative reconstruction technique launched by company used for low dose scanning should be offered as standard.		
VII	**Resolution**		
	a) The High contrast Resolution should be at least 15 lp/cm for 128 slice mode		
	b) The low contrast resolution should be at least 5 mm at 3.0 HU/3 % contrast. Dose to be given in mGy for Standard Algorithm at 10 mm slice thickness as well with with iterative dose reduction technique at 10 mm slice thickness. Measurement to be based on 20 cm CATPHAN. Lower dose will be preferred		

	Desirable features as detailed under:		
3	**Pitch:** to be freely selectable in auto mode and also manual Helical Pitch (nominal): 0.35 to 1.5. higher pitch scanner will be given preference		
4	**Patient Couch:** The table should have a metal free scan able range of at least 150 cms		
5	**X-Ray Generator:**		
	The Generator should be of high frequency type and having output of 50 KW and more with max current of 300 mA or more. Mention kV selections		
6	**X-ray Tube:**		
	Tube of high heat storage capacity 6.0 MHU or more.		
	Peak Heat dissipation rate of Anode should be at least 800 Khu/min.		
7	**Operator Console:**		
	a) It should have one large number of 18" or 19" or more high resolution LCD monitor with a display 1024 X 1280 matrix or more. Dual monitor console one for scanning and one processing will be given preference.		
	b) The System should be user friendly with all functions menu driven. It should be modern user interface.		

	c) All functions including scanning image reconstruction film documentation, archiving, transferring, Direct MPR ;Angiography, maximum intensity projection, volume rendering, 3D SSD, CTAngio , vessel measurement, small volume quantification, Virtual endoscopy software for visualization of vessels and air filled structures and Colonography software for virtual endoscopic, colon study, Cross-sectional cuts of mandible/maxilla and Brain & Body Perfusion, Lung Nodule Assessment should be possible on this operating console and on the independent workstation simultaneously.		
8	**Computer System & image processor**		
	a) 64 Bit/32 Bit main CPU with at least 8 GB RAM memory or better.		
	b). High speed CPU using Quad Core or better running at 2.5 GHz or better, Multi core processor will be preferred		
	c). Hard disc of 500 GB Or more.		
	d). Image storage of 150,000 or more of 512 matrix		
	e) CD archive with 600 or 700 MB capacity Discs		
	f) Image Processor: Operating system shall be windows or Linux based. Antivirus protection for Windows based system is must to be provided.		
	g) The image reconstruction time should be at least 20 images /per second (or frames per second FPS) or better for all types of acquisition modes including Cone beam correction, Neuro Imaging studies and 512 matrix. and standard pitch		

9	**Workstation**		
	a) State of the art multimodality workstation with software licenses for all functions including reconstruction film documentation, archiving, transferring, Direct MPR ,Angiography, maximum intensity projection, volume rendering, 3D SSD, CTAngio , vessel measurement, small volume quantification		
	b) It shall be independent fully and be DICOM 3.0 compliant for multi modality study review.		
	c) The computer shall be the latest state of art processor working on latest windows or Linux base platform for ease of use.		
	d) It shall be a high speed CPU with a speed of 2.5 GHz or better and with an independent Hard disc storage capacity of 300 GB or more.		
10	**Spiral/Helical Technique:**		
	a) Scan length of at least 80 sec continuous more, higher specifications will be given preference.		
	b) Should have facility of Multi-spirals bi-directional spirals and back-to-back spirals.		
11	Software: DICOM 3.0 capability		
	a) Software for cerebral perfusion study with stroke protocol		

	b) MIP, Volume MIP, CT Angio software with quantitative vessel analysis, Virtual endoscopy software for visualization of vessels and air filled structure		
	c). Volume rendering technique with axial cross reference imaging along with measurement tools on volume rendered image 3D, 3D Small volume measurement package MIP Slab viewer		
	d) Calcium Scoring software for coronary arteries.		
	e) Complete cardiac package with ECG gated studies (prospective and retrospective tagging)		
	i Cardiac review with analysis functions such as Ventricular motion, short axis/ long axis view, central stenosis analysis, regional wall motion studies.		
	ii Coronary angio,		
	iii Auto coronary tree extraction		
	iv. One touch volume rendering of the whole heart,		
	v. ECG gated dose modulation,		
	vi Cardiac study reconstruction must be high speed of atleast 20 images per second		
	viii Prospective ECG Gating cardiac scan		
12	**Special Features required**		
	a) The CT scanner should be able to perform **dual energy applications** for neuro based subtractions angiography,		

	Renal stone assessment, Gout Assessment and metal artifact suppression.		
	b) The CT scanner should be able to reduce **coronary motion blur using latest techniques**; the same should be specified with details of techniques used by the vendors.		
	c) The CT scanner should be able to perform joint studies, free breathing patients scan for body/abdomen. **Highest coverage on dymanic mode scanning protocol and applications will get preference.**		
13	**OTHERS**		
	a) Software for Remote Diagnostics Service over a telephone line		
	b) ECG Gating gadgets.		
	c) System must be PACS interface ready without any new hardware or software.		
	d) Fully DICOM 3.0 compliant including:		
	i) DICOM Modality worklist, with automatic procedure selection		
	ii) Capability from HIS- RIS interface. .		
	e) Dose saving protocols must be available including:		
	i) automatic tube current selection suited for selected exam		
	ii) Dynamic on the fly tube current modulation while scanning.		
	iii) ECG gated dose modulation to reduce dose during undesired cardiac phases.		
	iv) Dose displays such as CTDI volume, DLP , Dose efficiency		

14	**Hard Copy Unit:**		
	A Dry Camera with Digital Interface and control integrated with main console and workstation, Camera should print on 14" X 17" film size , at 500dpi and a Colour Laser Printer for Printing Coronary Scans.		
15	**Patient Accessories**: All patient positioning accessories, restraining straps including coronal head holder , head rest should be included		
16	**Accessories:**		
	Dual Head Pressure Injector		
	Full system UPS for entire CT systems		
	A separate multi-modality work station for the Department of Radio-Diagnosis of the Medical College should be provided. The Vendor has to provide proper LAN from the machine to the room in the Department of Radio-Diagnosis of the Medical College. The Vendor has to provide an Dicom base real time image transfer to the Department of Radio-Diagnosis of the Medical College		

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Detailed Technical Specification of 1.5 Tesla MRI Machine

1.01	Magnet weight		Should be less than 6 tons with 100% topped up liquid helium, table and gradients coils.	**Detailed Technical Specification of 1.5 Tesla MRI Machine QUOTED BY BIDDER**
1.02	Homogeneity		This should be measured with Volume R.M.S. method.	
			The typical ppmw specs at the clinical site should be better than or equal to following ppm data.	
			The # of plane-plots used for homogeneity measurement should be odd number to represent stringent points.	
1.03	Auto shim system		Should be preferably superconducting 1st order auto shim for patient specific homogeneity adjustments.	
1.04	Magnet enclosures/cover and other design aspects		§ Should be flared on both ends with flare diameter >1.2 meters.	
			§ Total magnet length with covers should not exceed 1.85 m including magnet covers.	
			§ The magnet bore should be well ventilated.	
1.05	Patient table control panels		Should be on both side of the patient table.	
1.06	Off center FOV shimming		Should be possible	
1.07	Laser lights		Axial, Sagittal, Coronal reference planes should be provided.	
1.08	Helium refill interval		Should be preferably more than 36 months.	
1.09	Helium tank capacity		Should preferably be more than 1500 liters	

2	**Patient Table**			
2.01	Please specify the type		Dockable or fixed.	
2.02	Scannable range and accuracy		Should be > 150 cm and ± 0.05 cm respectively.	
2.03	Patient Load		Maximum patient load should be at least 150 kg.	
2.04	Stepping capability for peripheral Angiography.		Multi stepping capability should be standard for full spine coverage and peripheral Angio.	
3	**Gradient system**			
3.01	Gradient amplitude and slew rate		Should be >= 30 mT/m per Axis and >=100 T/m/s per Axis. (the current specs is vendor specific)	
3.02	Advanced mechanism for control of the Gradient waveforms.		Should have Feedback and feed-forward controls to minimize the errors in the 'requested' and 'output' waveforms.	
3.03	Slew Rates in each orthogonal plane		³ 100 T/m/s	
3.04	Duty cycle		100%	
3.05	Smallest Field of view should be		10 mm in 2D and 3D	
3.06	Echo train Length (also called Turbo Factor) for Fast Spin Echo and EPI.		Should be 256 for both or higher	
3.07	Shortest TE in 3D-Gradient Echo with		Less than or equal to 0.5 ms for	
	128 x 128 measurement matrix.		§ Improved Signal to Noise ratio	
			§ Reduce susceptibility	
			§ Reduced Echo spacing for single shot Fast Spin Echo	
			§ Suppress T2 contamination	
3.08	Shortest TR in 3D-Gradient Echo with		Less than or equal to 1.1 ms for	
	128 x 128 measurement matrix.		§ Reducing Time of acquisition	

			§ More Slice coverage in single shot sequences	
			§ Increased volume resolution in CE-MRA	
4	**RF System:**			
4.01	Digital and bandwidth 1 MHz/channel			
4.02	RF Power Amplifier		Should be compact and highly efficient	
4.03	Number of channels		16 independent channels with 16 number of Analog to Digital Converters (ADC's).	
4.04	Number of cabinets		This system electronics should be compact	
5	**Coil Package**:			
	RF coils form an important part of imaging chain.			
5.01	Integrated body coil / resonator		Quadrature and Transmit/receive Body coil module should be standard.	
5.02	Brain and Neuro vascular imaging		Should be at least8-ch brain and 8-ch NV imaging.	
5.03	Imaging of CTL spine			
5.04	Imaging of thorax, abdomen and pelvis		Should be possible with 8-ch imaging quality. The design of the coil should enable seamless imaging of, not only head-neck-spine, but also body without having to reposition the patient from spine to abdominal imaging.	
5.05	General Purpose Flex coil, 5" coil and 3" coil		This coil set should be standard for small FOV applications such as orbits, wrists etc	
5.06	Wrist coils		4-ch may be quoted as an option	

6	**Host Computer and Operating system and Recon engine**			
6.01	Host CPU		Should preferably be QUAD CORE	
6.02	RAM		Should be at least 8 GB	
6.03	Operating system		This should preferably be open source code such as Linux.	
6.04	Recon engine Computer		Should be at least DUAL CORE with 8 GB memory	
6.05	Recon time		At least 1,000 images per second at full FOV and 256 x 256 matrix	
6.06	Simultaneous scan and recon		This should not restrict itself to parallel scan and measurement but also run to parallel to computationally intensive processing such as MPR, Volume Rendering, interactive MIP, network processes, filming & archival.	
7	**Image Storage**			
7.01	Hard Disk		> 300 GB For storage ³400,000 images in 256 matrix	
7.02	Optical disc (rewritable)		For storage of ³30,000 images in 256 matrix per disk.	
7.03	DVD storage and archive		This should be standard on the host computer	
8	**Standard pulse sequences**			
8.01	Spin Echo techniques		Preferrable	
8.02	Inversion Recovery including FLAIR		Preferrable	
8.03	T1 – FLAIR		Preferrable	
	Fast SE 2D and 3D		Preferrable	

8.04				
8.05	Single shot FSE for MRCP		This should have Echo Train Length of 512	
8.06	Gradient Echo 2D and 3D		Preferrable	
8.07	Fast Gradient Echo with Echo Planer read out		This allows multiple views per TR. Especially suitable for multi-slice myocardial perfusion technique.	
8.08	Dual Echo Fast Gradient Echo		To deliver out of phase and in-phase body images in breath-held scans.	
8.09	Single shot Echo Planer Imaging with at least 256 ETL		Preferrable	
8.10	Multi-shot EPI.		Preferrable	
8.11	2D Fatsat FIESTA or fatsat BFFE, or Fatsat True FISP		This should be standard for applications in Body (with Fatsat) for applications in functional Cardiac Imaging.	
8.12	3D FIESTA, 3D BFFE or 3D True-FISP		Preferrable	
9	**Standard Scan parameters**			
9.01	Display Matrix		1024 x 1024	
9.02	Measurement Matrix		Maximum 1024.	
9.03	Slice thickness in 2D		Minimum 0.5 mm	
9.04	Slice thickness in 3D		Minimum 0.1 mm	
9.05	Echo Train Length (Turbo Factor in Fast Spin Echo)		More than 500	
9.07	Half Fourier Imaging		Preferrable	
9.08	Vector ECG gating including one set of patient lead wires, one carton of adult-size electrodes and one fiber optic peripheral gating probe.		Should be standard with	
			§ Multi-slice single-phase	
			§ Multi-slice multi-phase	
			§ Single-slice multi-phase	

			§ Should be able to calculate patient's best trigger window	
			§ Should calculate and display BPM on LCD panel provided near the operator's console.	
9.09	Peripheral trigger		Preferrable	
9.10	Pulse / Respiratory trigger		Preferrable	
10	**<u>Standard</u> Clinical application Packages**			
	Besides the standard pulse sequences stated above, following application packages should be included in the main offer.			
10.01	Real Time Interactive Imaging		With ³ 16 frames/s.	
10.02	Comprehensive MR Angio.		Preferrably have 2D-3D TOF, 2D-3D PC, Magnetization Transfer and Ramped-RF (TONE) as standard.	
10.03	Fluoro Triggered MRA		This should allow switching from a 2D contrast enhanced MRA to a 3D CE-MRA technique	
10.04	<u>Peripheral Angiography</u> using integrated body coil and multi-step table movements and automatic bolus chase and post-processing on workstation.		§ Multi-stepping capability for the table should be quoted as standard for Peripheral Angio using integrated Quadrature transmit / receive body.	
			§ Single and multi-station protocols for 3D CE-MRA preferrable	
10.05	<u>Cardiac Package</u> for basic anatomical imaging with VCG gating should allow		§ Double and triple IR techniques	
			§ FIESTA, True FISP or Balanced FFE sequence.	
			§ CINE sequences	
			§ VCG triggering for	

			Cardiac imaging with trigger-delay window selection up to 50%	
10.06	High efficiency – high resolution Liver Imaging in short breath-hold		Preferrable	
	(LAVA or equivalent)			
10.07	Technique similar to Propeller to minimize patient motion during T2 and FLAIR.		Without resorting to parallel imaging which causes drop in SNR and without navigator that causes increase in scan time.	
10.08	Diffusion weighted imaging using single-shot EPI and also FSE.		§ Should offer ADC maps with color-coding of areas of decreased diffusion.	
			§ Maximum b value should be 6;500s/mm^2 or more	
			§ Creation of composite image i.e. superimposition of decreased diffusion over a T1 weighed image should be possible.	
10.09	Diffusion Tensor Imaging		This should have > 155 directions sensitivity for improved characterization of the diffusion anisotropy.	
10.1	Perfusion imaging (brain)		Comprehensive Perfusion package should be standard with user-friendly software for negative and positive enhancement integral.	
			Calculation of Mean Time to Enhance, difference function and signal enhancement ratio.	
10.11	Whole body T1, STIR and T2 imaging		Standard protocols for whole body screening should be available including MR pasting program.	
10.12	2D Single Voxel and Multi-voxel Proton Spectroscopy		Should be standard and must allow:	
			§ Storing of spectroscopy data in patient study.	
			§ Automatic water	

			suppression	
			§ PRESS (point resolved spectroscopy) sequences Quantitative analysis of signal intensities of H_2O, NA-residues, Choline and myoinositol.	
			§ Ratio of signal intensities of the H_2O, NAA, Cho and ml (myilnositol) to that of Cr (creatine)	
			§ Overlay over clinical images	
			§ Color metabolite maps	
10.13	Multi-echo T2-mapping / Cartigram in ortho applications		Preferable Color T1 mapping for assessing the collagen in the knees.	
10.14	Automatic prescription of the slices in brain imaging		This technique should be standard in your offer.	
11	**Standard Accessories and other requirements**			
11.01	Laser camera		DICOM 3.0 Laser camera	
11.02	MR pressure injector - From a reputed supplier with a well established local base		The injector control panel preferrably should be located near the MR console	
11.03	Suitable UPS for the computer		Should be included	
11.04	Suitable chiller		Should be standard	
11.05	RF cabin		Full RF cabin with interior design.	
11.06	Power consumption			
11.07	MR Compatible patient monitor		For non-invasive monitoring.	
11.08	Phantoms		For Image Quality audits and monitoring	
12	**Other accessories**			
12.01	Independent workstation for and			

	MR, Vascular and CT post processing analysis.		MR specific program such as FuncTool or equivalent	
			Post processing of the 3D CSI	
			Post processing of DTI	
			MR Pasting	
			Preferrably advanced Cardiac Analysis such as flow, Bull's eye, Ejection Fraction, Cardiac Output, Stroke Volume, LV analysis and Patient Report Generation data output to a standard HP Laser Printer (paper and not films). (This is similar to GE's ReportCARD)	
			It should, in addition to the DICOM, support html, PDF, JPEG, PNG, MPEG and AVI and QuickTime formats.	
			Standard image storage should be preferrably > 1 million in 256x256 matrix.	
			Processor speed should be > 3.2GHz	
12.02	Color Laser printer		For printing images and protocols on paper.	
			Should be less than 6 tons with 100% topped up liquid helium, table and gradients coils.	

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