

111 年向上院區-1.5T 磁振造影系統規格說明表

序	項目名稱	規格說明	需求	廠商檢核 (標明佐證出處)
1.	磁體及其功能 (Magnet)	1. 磁場強度(Field Strength) ≥ 1.5 Tesla (1.5 T磁體) 2. 患者檢查孔徑(Bore Size) : ≥ 70 公分 3. 磁體長度(Magnet Length) : ≤ 180 cm (為磁體裸長·不含外殼) 4. Homogeneity : (1)10cm DSV ≤ 0.02 ppm (2)20cm DSV ≤ 0.06 ppm (3)30cm DSV ≤ 0.11 ppm (4)40cm DSV ≤ 1.2 ppm 6. 零液氦消耗技術: 須具備 7. Active shim: 須具備 8. Patient-specific shimming (如shim volume): 須具備 9. 檢查床之型式: 需提供可分離式升降檢查床·整個檢查床體可與磁體自由且完全分離·具可與磁體完全分離之輪式可脫離式升降檢查床 (Detachable /Dockable examination table)·若無法達到此功能須額外提供一張得標廠牌相同廠牌之可卸式升降檢查床或原廠病患移送系統·須可連接本規格所配置線圈執行掃描。 10. 掃描床最低高度: ≤ 70 cm 11. 自動移床掃描範圍Scan ranges: ≥ 205 cm 12. 檢查床最大承載(Max. Patient Weight): ≥ 227 kg 13. 在磁體雙側具觸碰式面板·可進行通風、燈光、音量等操控·並可顯示受檢者生理訊號波形、生理監視設備使用輔助資訊及線圈狀態相關資訊等·且須具備triggering system (須提供原廠最完整之功能·含Respiratory trigger、ECG trigger、Peripheral pulse trigger等) 14. 免呼吸帶之respiratory gating技術: 如BioMatrix, VitalEye, PB Navigators	需具備	
2.	梯度系統及其功能 (Gradient system)	1. Amplitude: 各個單軸最大可達 44mT/m (Max. amplitude ≥ 44 mT/m) 2. Slew rate: 各個單軸最大可達 200T/m/s (Max. slew rate ≥ 200 T/m/s) 3. 最小切片(slice)厚度: 二維: ≤ 0.5 mm (2D : ≤ 0.5 mm) ;三維: ≤ 0.1 mm (3D: ≤ 0.1 mm) 4. 最大三軸向 FOV : X 軸 ≥ 50 cm , Y 軸 ≥ 50 cm, Z 軸 ≥ 50 cm 5. 最小三軸向 FOV : ≤ 10 mm 6. 最大收訊陣列(Max.acquisition matrix) : ≥ 1024 7. DWI 單次多 b-value 成像應可選擇 b-value 數目最高 ≥ 16 組, 8. 最大 b 值(Max b value) : $\geq 10,000$ s/mm ² 9. Duty Cycle: 100% 10. 具備靜音掃描技術可應用於頭部以及所有 large joint 或 bone 檢查。 11. Cooling Gradient Amplifier: Water	需具備	
3.	無線射頻系統及其功能 (Radio Frequency System)	1. 發射放大器最大功率(Transmit amplifier max power) ≥ 16 KW 2. 單次掃描單一視野 RF 獨立接收通道數 ≥ 64 independent RF receiver channel	需具備	
4.	操作系統 Operation computer system	(廠商至少須符合以下規格或以出貨時原廠最高規格提供) 1. CPU number : ≥ 4 core 2. CPU clock rate : ≥ 3.5 GHz or comparable 3. Host memory ≥ 32 GB 4. Hard Disk ≥ 480 GB 5. Memory for recon image processor : ≥ 64 GB 6. Reconstruction time (256x256 Full FOV) : $\geq 50,000$ 2D FFTs/second 7. Simultaneous Scan and Reconstruction 8. 可傳輸同步測量與顯示週期性生理訊號·如:心電圖、脈搏、呼吸 9. 具備多國語言·檢查過程中自動語音錄製導引·並具備錄音功能 10. 可外接 DVD-R 影像儲存功能及硬碟儲存功能 11. 螢幕 ≥ 23 " LCD 12. .DICOM 3.0 Send / Receive/ Query /Retrieve/ ModalityWorklist/Print/ Storage/MPPS	需具備	

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5.	原廠影像工作站系統 Post Processing Workstation	<ol style="list-style-type: none"> 1. CPU number : ≥ 4 core 2. RAM ≥ 6 GB 3. Hard disk ≥ 128 GB 4. Monitor ≥ 19" LCD 5. Storage (儲存) 可外接 DVD-R 影像儲存功能及硬碟儲存功能 6. DICOM 3.0 Send / Receive/ Query /Retrieve/ ModalityWorklist/Print/ Storage/MPPS 7. 影像重組需包含 MPR, MIP, MinIP, SSD 或 VRT 8. 動態磁感應灌注分析 Analysis tools for DSC perfusion (如 BrainStat), 可提供下列 hemodynamic information: <ol style="list-style-type: none"> i. Bolus Arrival Time (BAT) ii. Time To Peak (TTP) iii. relative Cerebral Blood Volume (rCBV) iv. relative Cerebral Blood Flow (rCBF) v. Mean Transit Time (MTT) vi. Time to maximum value of the residue function (Tmax) 9. Mean curve analysis 10. 乳房分析軟體包含之參數如 Wash-in, Wash-out 或 Signal enhancement ratio (SER), Maximum slope of increase (MSI) 11. 2D/3D distortion correction 或主機具備此功能 12. Evaluation software for images analysis of blood and cerebrospinal fluid (CSF) flow. 計算流速參數或主機具備此功能 13. Dynamic contrast enhance study 動態顯影技術 DCE 分析·如 Ktrans、Kep、VE、iAUC 或 iAUGC·須具備 Tofts & standard model 如: GenIQ 或 MISTar 等(上述功能如原廠無同等軟體應提供第三方已商業化之軟體及配合硬體如: GenIQ 或 MISTar 等·且軟體授權不得限制使用效期) 14. 心臟後處理分析軟體·如 T1/T2/T2* mapping, ECV, Tissue Characterization、RV、LV 功能分析、Perfusion, 2D Flow, MPR 等·(如 Circle cvi42·且軟體授權不得限制使用效期) 	需具備	
6.	影像接收線圈及其功能(RF Coils and technology)	<p>整合型全身造影功能: 投標廠牌必須提供最新全身造影技術如 Tim 4G RF Tech、GEM RF Tech 等·並可跨越表面線圈開啟接收單元於同一造影範圍內執行影像掃描·功能需求與規格如下:</p> <ol style="list-style-type: none"> (1)所提供之線圈皆能執行 MRS (2)應具備自動選擇線圈功能 Auto-Coil 技術 (須提供原廠文件佐證) (3)射頻線圈應具備多通道輸出:所附線圈最少在胸、腹部與頭頸部掃描可作 K 空間加速與影像加速(GRAPPA/ARC and SENSE/ASSET) 兩種相容平行造影·皆能 combine with Auto-Calibration 技術(須提供原廠文件佐證) <ol style="list-style-type: none"> 1. Head/Neck Coil ≥ 16 接收通道 2. Posterior Array (PA) x1 ≥ 32 接收通道 3. Anterior Coil (AA) x1 ≥ 16 接收通道;若涵蓋範圍長度 ≤ 54cm·提供兩片體部線圈。 4. 四肢造影功能:須提供 Tim or GEM RF Coil·並搭配 K 空間加速與影像加速(GRAPPA /ARC and SENSE/ASSET) 兩種相容平行造影 5. Shoulder 專用線圈 ≥ 16 channel 6. 需提供硬式 Knee 專用線圈 ≥ 16 channel 7. Large Flex coil x1 ≥ 16 channel 8. Small Flex coil x1 或 Exertmity coil ≥ 16 channel (hand、wrist、elbow 專用) 9. Breast coil 專用線圈 ≥ 16 channel (以原廠設計) 	需具備	
7	應用軟體	<p>所有造影功能軟體 data sheet 為審查依據。除特別註明者外,其餘提供者均需詳列並不得於開標時再補充。Software、pulse sequence 之名稱或依各廠商有所不同·應逐項對應列出。</p> <ol style="list-style-type: none"> 1. 造影參數 <ol style="list-style-type: none"> (1)呼吸調控同步技術 Respiratory trigger (2)心律調控同步技術 ECG gating (3)周邊脈波調控同步 Peripheral pulse gating/trigger 2. 波序 <ol style="list-style-type: none"> (1)TrueFISP/FIESTA 2D & TrueFISP/FIESTA 3D & TrueFISP/FIESTA FatSat (2)Fast-Recovery Fast-Spin Echo, 如 FRFSE 或 RESTORE (3)3D FLAIR 或 Turbo Dark Fluid (4)3D BRAVO 或 FLASH 3. 腦神經造影 Neuro Applications <ol style="list-style-type: none"> (1)High resolution Diffusion weight imaging (ex. RESOLVE or DWIBS or eDWI or FASE DWI)。 	需具備	

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	<p>(2) Diffusion imaging including Diffusion Tensor imaging(DTI) and Diffusion Tensor Tractography · the maximum number of directions of DTI ≥ 128 °</p> <p>(3) Provide both magnitude and phase image (ex. SWIp or SWAN or FSBB) °</p> <p>(4) Arterial Input Function (AIF) correction for calculation of relative Cerebral Blood Volume (rel CBV) · relative Cerebral Blood Flow (rel CBF) · relative Mean Transit Time (rel MTT) · dynamic contrast imaging(DCI) °</p> <p>(5) Spine diffusion °</p> <p>(6) Whole-spine protocols in multiple steps with software controlled table movement °</p> <p>(7) Automatically position and align on the anatomically derived sagittal · coronal · and axial slices of the localizer(ex. SmartExam Brain or READY brain or NeuroLine or Dot engine) °</p> <p>(8) 3D isotropic resolution volume imaging (ex. SPACE or 3D VIEW or CUBE or FASE3D) 須可使用平行加速 · 並至少提供 T1 · T2 · PD2 對比 °</p> <p>(9) High resolution imaging of inner ear and spine and cranial nerves (ex. 3D T2 DRIVE or 3D COSMIC or 3D SSFP/FASE3D) °</p> <p>(10) 螺旋造影技術(BLADE/MultiVane XD/PROPELLER/ JET)imaging technique : I. Motion correction use oversample k-space center technique ° II. Compatible with parallel imaging ° III. With Fat saturation function °</p> <p>(11) 3D image Motion Correction technique (ex. 2D PACE or 3D VANE XD or Navigator or 2D RMC) °</p> <p>(12) 提供 MultiBand SENSE or HyperBand Technique : I. Provides a reduction in scan time by simultaneously exciting multiple slices at multiple locations ° II. More diffusion directions, number of slices or higher temporal resolution without extra scan time ° III. Used for DWI · DTI °</p> <p>4. 血管造影 Angio Applications</p> <p>(1) 3D Contrast-enhanced MRA °</p> <p>(2) Bolus chasing imaging °</p> <p>(3) MRA for Circle of Willis · carotids · neck vessels(ex. 2D and 3D TOF for MRA or Time-SLIP) °</p> <p>(4) Triggered/Gated 2D TOF for non-contrast MRA of abdomen and extremities °</p> <p>(5) Fluoro-Triggered MRA or BolusTrak or Visual Prep °</p> <p>(6) MRAs with MTC pulses °</p> <p>(7) Ramped RF during TOF MR angiography °</p> <p>(8) Cine PCA/CINE Phase Contrast/ Cine 2D-PS °</p> <p>(9) 2D/3D Phase Contrast MRA °</p> <p>(10) 需具自動移動檢查床作週邊血管之 MRA 功能 °</p> <p>(11) Automatic subtraction and MIP °</p> <p>(12) Non-contrast MRA for arteries and veins with inflow IR prepare (IFIR) technique; compatible with whole body application</p> <p>5. 心臟造影 Cardiac applications :</p> <p>(1) Short axis · 4 chamber and 2 chamber views °</p> <p>(2) Black blood imaging °</p> <p>(3) Breath-holding CINE °</p> <p>(4) Late Enhancement cine scan °</p> <p>(5) 3D whole heart MRA (Coronary artery imaging) with free-breathing navigator compensating diaphragm shifts during the acquisition (motion-adaptive respiratory gating) e.g. PACE or Navigators or RMC for 3D Cardiac Imaging °</p> <p>(6) Arrhythmia Rejection 或 k-t SPEEDER °</p> <p>(7) Auto parameters adjustment to current heart rate °</p> <p>(8) Myocardial tagging, Cardiac Tagging °</p> <p>(9) Phase Sensitive Inversion Recovery(PSIR) MDE °</p> <p>(10) Look-Locker Inversion Recovery T1 mapping with motion correction, tissue quantification maps °</p> <p>(11) Graphical selection of ED, ES (ejection fraction), basal and apical slices °</p> <p>(12) Volumetric and regional wall motion analysis (e.g. stroke volume and bull's-eye plots) °</p>	
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	<p>6.體部造影 Body applications :</p> <ul style="list-style-type: none"> (1)Free breathing imaging ° (2)In/Out phase imaging ° (3)Fat/Water only imaging ° (4)Radial/3D MRCP ° (5)High spatial and temporal resolution dynamic Volume examination (ex. DynanVibe or e-THRIVE or 3D LAVA or FFE3D) ° (6)Quantitative evaluation of colorized Wash-in、Wash-out、Time-To-Peak or Signal enhancement ratio (SER) · Maximum slope of increase (MSI) (7)Whole body Diffusion imaging such as REVEAL、DWIBS、eDWI、Body Diffusion ° (8)Liver iron loading image map or T2* map ° (9)肝內脂肪定量技術：Should provide IDEAL-based for triglyceride fat-fraction quantification analysis · 並且在單次掃描可同時得到 T2* decay · 以校正肝內脂肪量化之正確性(ex. LiverLab or mDIXON Quant or 3D IDEAL-IQ or Fat Fraction Quantification) ° (10)需提供 Free Breathing 3D Dynamic scan 技術(ex. GraspVibe or 4D FreeBreathing or DISCO with Navigator or QuickStar) ° <p>7.乳房造影 Breast applications :</p> <ul style="list-style-type: none"> (1)Silicone imaging ° (2)Automatic and manual frequency adjustment ° (3)Fast Dynamic Breast Imaging(ex. VIEWS or BLISS or VIBRANT or FFE3D) ° (4)Fat saturation or water-excited complicates clinical evaluation ° (5)Isotropic 3D measurement (ex. SPACE or VISTA or Cube or FASE3D) ° (6)MR breast Spectroscopy (GRACE 或 BREASE) ° (7)3D fast multi-phase dynamic study for best visualization of focal lesions with high spatial and temporal resolution · and provide single scan 4 contrasts technology · both can scan axial and sagittal direction and auto subtraction (in phase/out of phase/water only/fat only)(ex. TWIST-VIBE or mDIXON XD FFE or VIBRANT-Flex or 3D WFS) ° (8)Single-shot EPI Diffusion imaging (DWI) ≥ 16 組 b-value ° <p>8.骨骼造影 Ortho applications :</p> <ul style="list-style-type: none"> (1)2D/3D 多次觸發 TSE(Turbo Spin Echo) ° (2)High resolution 3D protocol for MR arthrography(ex. SPACE or e-THRIVE or 3D LAVA or FASE3D) ° (3)3D Balanced Gradient Echo(ex.bFFE or FIESTA or TrueSSFP) protocols for T2-weighted imaging ° (4)多層多回波梯度回波序列 (ex. DESS or m-FFE or MERGE or mEcho) ° (5)Multi-echo T2w：擷取及計算用於評估軟骨的 T2 圖 ° (6)DCE for Musculoskeletal Image (ex. TWIST-Vibe or e-THRIVE or 3D LAVA or FFE3D) ° (7)3D Metallic implants artifact reduce techniques：Should provide 3D Multi-Spectral Imaging technique for near metal implants artifact reduction (O-MAR XD or MAVRIC-SL or mART EXP or Advanced WARP) ° <p>9.特殊造影功能：</p> <ul style="list-style-type: none"> (1)單次造影多重對比技術：DIXON method (2 point method). Multiple contrasts · fat-only · water-only and combined fat/water in-phase and out-of-phase images - in one acquisition and can be used in various parts of the body. Must compatible with both FSE (TSE) and FGRE (FFE) sequence ° (ex. DIXON/ DIXON VIBE or mDIXON XD FFE/mDIXON XD TSE or LAVA-Flex/ Flex for FSE or WFS) (2)呼吸同步校正造影技術：1D and 2D Prospective Acquisition Correction or MotionTrak Body or Navigator or 2D RMC ° (3)全景影像組成功能 Whole body images composing techniques from multiple FOV：須提供 MobiView or Pasting or Stitching ° (4)平行造影加速技術：應兼具 reconstruction in the image domain, after Fourier transform 及 reconstruction in the time domain, before Fourier transform 兩種技術 · 必須包含 GRAPPA/ARC /EXSPER (k-space based) and SENSE/ASSET/SPEEDER (image based)兩種 ° (5)Synthetic/Computed DWI 技術： 	
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		<p>Generates synthetic b-values from a single DWI scanned series allowing the user to view diffusion contrasts changes in real time after the acquisition。</p> <p>(6)磁敏感加權造影技術及相關分析套件： Susceptibility Weighted Imaging(ex. SWIp or SWAN or Stitching FSBB)需提供 both magnitude and phase image。</p> <p>(7)時間解析血管造影： 須提供 4D MRA/Time resolved MRA(ex. TWIST or 4D-TRAK XD or TRICKS or DRKS)。</p> <p>(8)Arterial Spin Labeling (ASL)： a.須提供 3D ASL Technique。 b.須提供 quantitative CBF mapping (交貨時該軟體若仍未商品化，未來若已商品化需免費無償提供安裝)</p> <p>(9)功能性 fMRI 掃描序列 (BOLD Imaging)： Blood oxygen level dependent (BOLD) contrast-sensitive single-shot EPI sequences.</p> <p>(10)壓縮感知技術：Compressed Sensing 技術須可用於 Brain,body,MSK 造影時使用</p> <p>(11)不施打顯影劑 3D 血管攝影： Non contrast medium MRA ex. NATIVE SSFP/SPACE · TRANCE (TRANCE · b-TRANCE) or Inhance (IFIR · 3D velocity · Deltaflow) or Time-SLIP/FBI</p> <p>(12)頻譜造影分析及後處理套件 Spectroscopy PRESS Single voxel a.2D/ 3D CSI b.須包含 Head MRS, Breast MRS (SpectroView or BREASE)需可搭配各式線圈</p> <p>(13)多層激發技術：同步激發多層切面，並以 k-space 平行加速進行 in plane and through plane 加速。(DWI、DTI、TSE) (以原廠設計)</p>		
8	週邊設備	<p>1.RF Shielding 射頻屏蔽(含檢查室內裝修工程)</p> <p>2.磁振造影室空調與冰水系統</p> <p>3.監測電視系統*壹組(可錄影包含四鏡頭)</p> <p>4.UPS for computers*壹台(≥ 3kVA)</p> <p>5.防磁雙管注射器*壹組</p> <p>6.磁振造影相容病患生理監視器(附生理監視器專用台車)及可於控制室操作(功能含 NIBP.SPO2.ECG)</p> <p>7.防磁滅火器*貳臺</p> <p>8.MRI 檢查室防磁點滴架</p> <p>9.防磁輪椅</p> <p>10.防磁推床</p>	需具備	
9	Option	<p>1. AI 影像處理應用軟體：如 SmartSpeed、AIR™ Recon DL、AiCE 或 Deep Resolve</p> <p>2. 立柱型金屬探測器</p>	選配 (另報價)	
10	其他	輻防警示裝置(依院方規定)	需具備	

廠商檢核章

請確認上表規格之廠商檢核欄位，皆有標明佐證出處或寫出差異處，謝謝