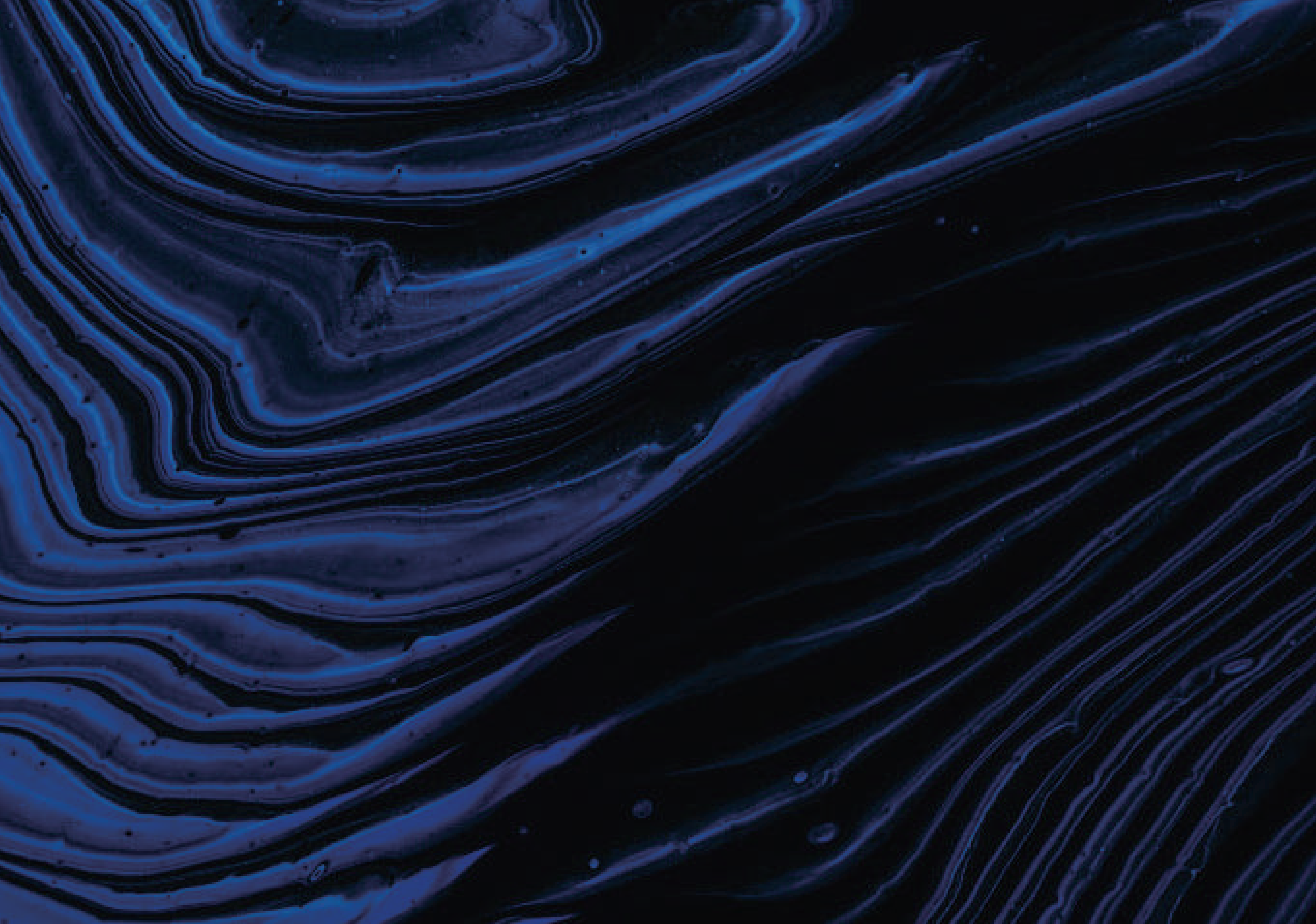
WR-3D

Weight-bearing Radiology 3D X-ray Tomography System Casebook

Volume 3



#『 Foreword 』

On January 5, 1895, German physicist Roentgen discovered X-rays, ushering in the modern medical chapter of imaging. Looking back on the century-old development of X-ray, innovation has never stopped. From analog X-ray machines, indirect digital X-ray machines, direct digital X-ray machines, dynamic X-ray machines, to today's weight-bearing 3D cone beam X-ray machines. X-ray machines have always been developing towards the three core trends of multi-function, 3D and low-dose to meet the growing clinical needs for precise diagnosis and treatment.

Over the past 20 years, Angell Technology has always stood at the top of the global wave of universal digital X-ray technology, leading the technological innovation of the digital X-ray industry. It has successively launched China's first digital detector, China's first dynamic multi-function X-ray machine, China's first weight-bearing cone beam tomography system, and the world's first bedside dynamic multi-function X-ray machine, promoting the deep integration of X-ray radiography technology and clinical diagnosis and treatment.

QOMO's world's first aircraft-type weight-bearing cone beam tomography multifunctional X-ray radiography system (standing cone beam CT) can realize 3D biomechanical imaging of the patient's spine, pelvis, and lower limb bones in the standing weight-bearing position, enabling patients to MPR, VR, and MIP imaging in the weight-bearing position, filling the shortcomings of 3D imaging information in the supine position of CT/MR and other equipment, providing more accurate and true imaging information for precise clinical diagnosis and treatment.

Facing the future, Angell Technology takes innovation as its ambition, adheres to the mission of cultivating oneself, comforting people, and healthy the world. With "a beam of light, insight into life" as its brand value proposition, Angell Technology is committed to becoming a global leader in X-ray innovative technology, promoting progress in science and technology benefits human life and health.

Introduction of WR-3D Weight-bearing Tomography System

Low-dose weight-bearing 3D imaging

Large-area 3D sequential scanning imaging

Automatic measurement of multiple parameters of the full spine and lower limb

FOV
Maximum head-to-foot direction 1450mm
Cross section 350mm

25s single part 3D scanning

Support MPR, MIP and VR reconstruction

Catalog

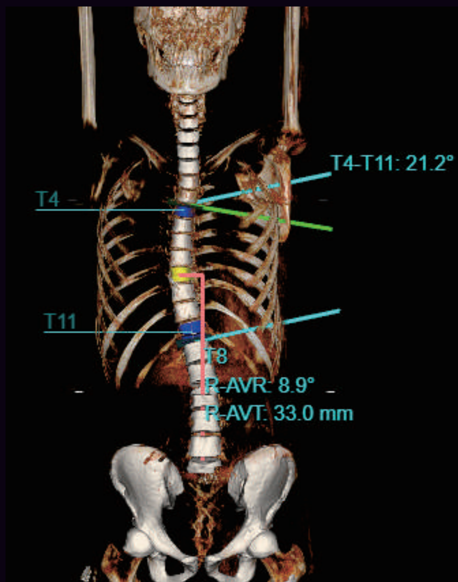
* The functions of full-spine 3D volume scanning reconstruction and measurement (Part 1), full-lower-limb weight-bearing 3D reconstruction function(Part 2), and other weight-bearing 3D reconstruction functions (Part 3) are independent product series, with separate prices for each function application.

Part 1 『 Clinical Application of Full spine 』

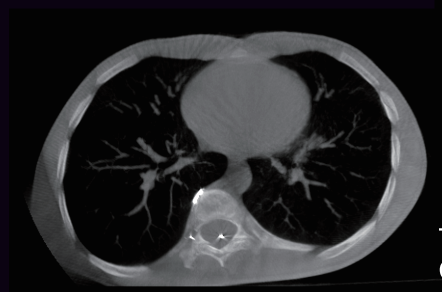
The world's only weight-bearing 3D imaging of the full spine	Automatic measurement of multiple parameters of the full spine	**FOV** Maximum head-to-foot direction 1450mm Cross section 350mm

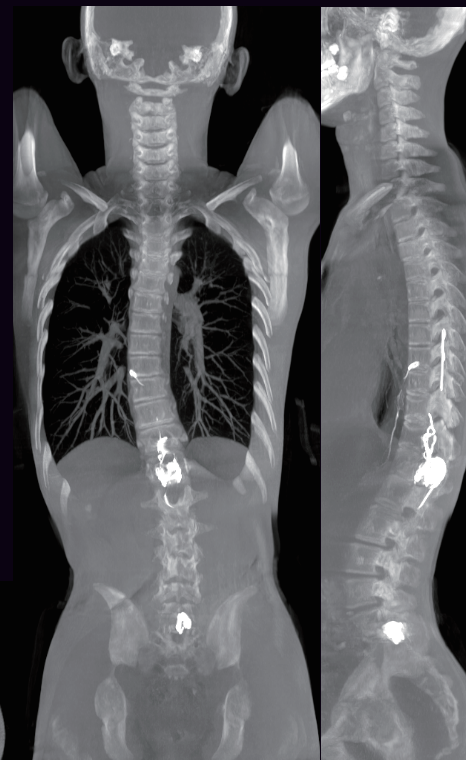
『 3D scan and reconstruction function of the full spine 』

The patient, male, 13 years old, with scoliosis.



Maximum right side scoliosis (T4-T8-T11)	COBB Angle	Right convexity 21.2°
Maximum right side scoliosis (T4-T8-T11)	Upper vertebra	T4
Maximum right side scoliosis (T4-T8-T11)	Apical vertebra (rotation and displacement)	Apical vertebra T8, right rotation 8.9°, right shift 33.0 mm
Maximum right side scoliosis (T4-T8-T11)	Inferior end vertebra	T11





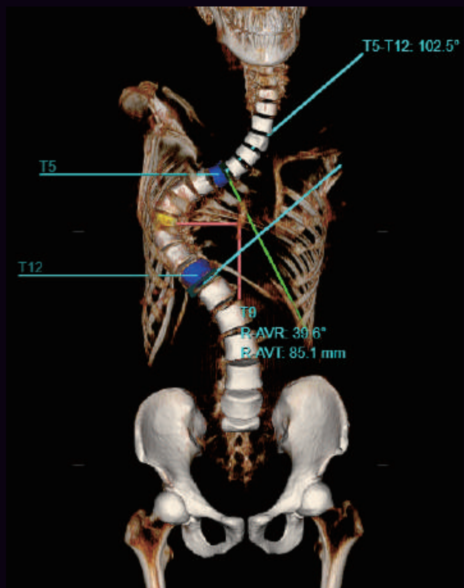
Imaging findings: Multiple linear and mass-like high-density shadows were found in the horizontal spinal canal area of T8 to L2 and L5. Cmbined with the medical history, it is considered to be changed after emboliza-tion of spinal cord vascular malformation.

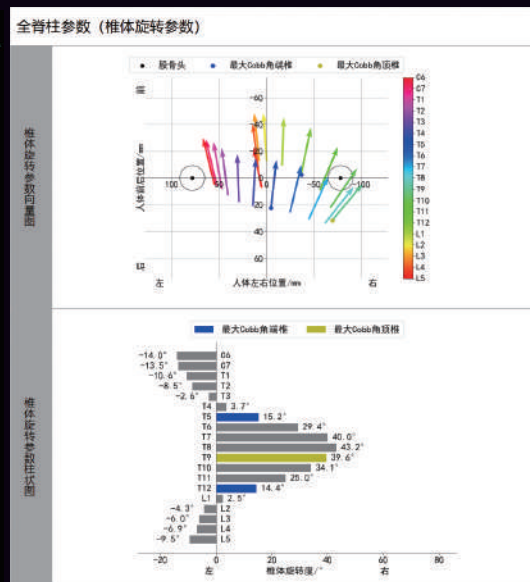
Scan parameters: 110kV/5mA
Scan area: full spine

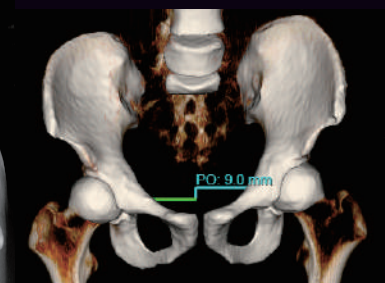
Through 3D imaging measurement of the full spine:
Centered on the thoracolumbar region, it curves left and projects right, with a COBB angle of 21.2 degrees and a right rotation of the apical vertebra of 8.9 degrees. (Scoliosis)

『 3D scan and reconstruction function of the full spine 』

The patient, male, 13 years old, with scoliosis.







Scan parameters: 110kV/5mA
Scan area: full spine

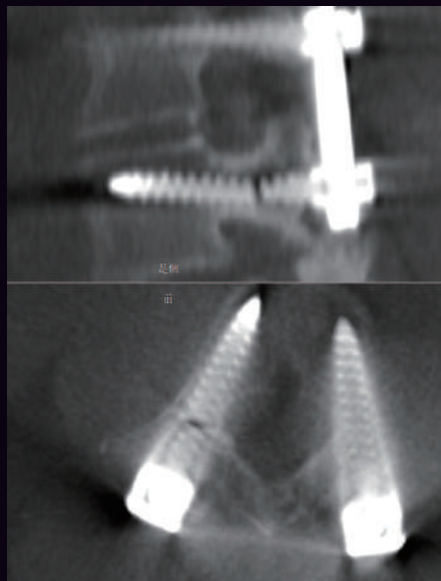
Findings from the full-spine 3D imaging examination:

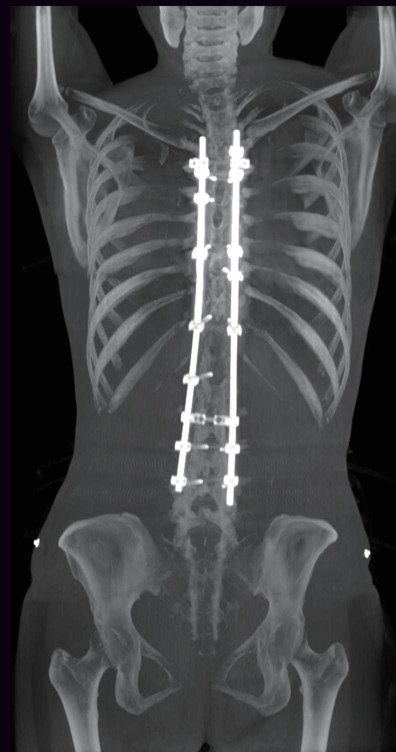
1. Scoliosis, T9 as the apex vertebra, left curvature and right protrusion, COBB angle 102.5 degrees, maximum rotation of the vertebral body 43.2 degrees
2. Thoracic deformity, mediastinal tissues such as the lungs and heart are compressed by the deformity.
3. The pelvis is tilted to the right by 9mm.

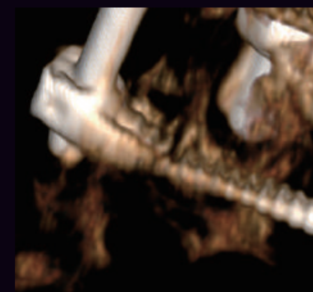
Pelvic tilt PO:	Right tilt 9.0 mm.

『 3D scanning and reconstruction of the full spine 』

Patient, female, 32 years old, postoperative scoliosis.







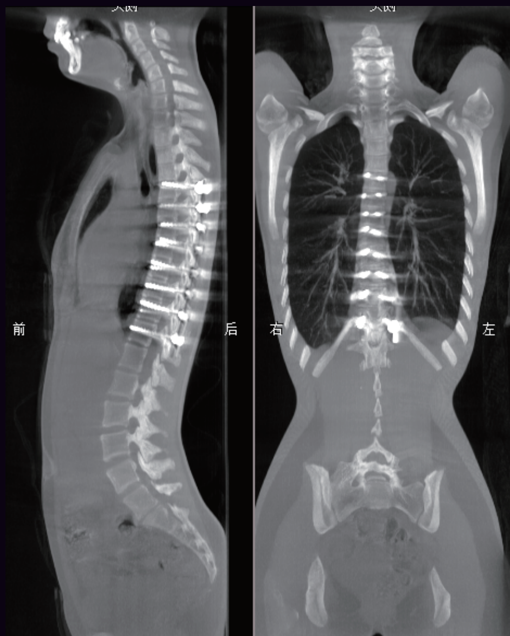
Scan parameters: 110kV/5mA
Scan area: full spine

Findings from the full-spine 3D imaging examination:

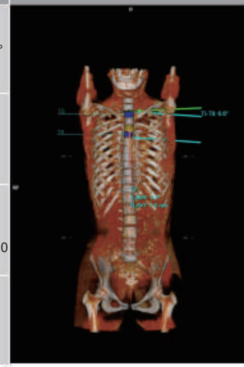
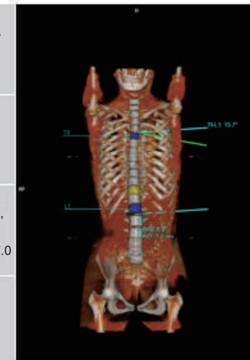
1. Postoperative changes of multiple thoracic and lumbar spine internal fixations, with a fracture of the right internal fixation screw in the L4 vertebra.
2. Discontinuity of the vertebral column at the L5 vertebra, and the L4 vertebra displaced anteriorly by approximately 0.4 cm (spondylolisthesis).
3. In the sagittal view, the physiological curvature of the cervical and lumbar spine is straightened, while the physiological curvature of the thoracic spine is maintained.

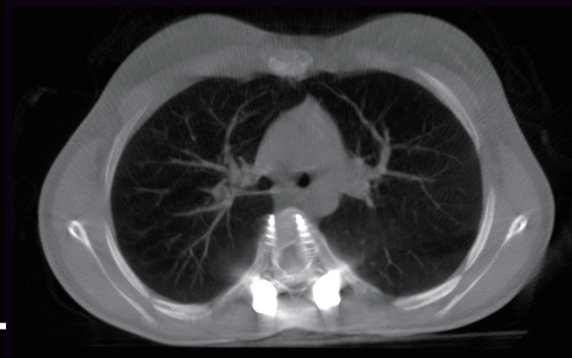
『 3D scanning and reconstruction of the full spine 』

Patient, female, 15 years old, follow-up after full spine surgery.



Scan parameters: 110kV/5mA
Scan area: full spine

Measurement Name		Measurement Value	image
Maximum left thoracic scoliosis (T5-T7-T8)	COBB Angle	Left convexity 6.6°	
	Upper end vertebra	T5	
	Apical vertebra (rotation and displacement)	Apical vertebra T7, left rotation 1.1°, right displacement 1.0	
	Lower end vertebra	T8	
Maximum right thoracic scoliosis (T8-T11-L1)	COBB Angle	Right convexity 13.7°	
	Upper end vertebra	T8	
	Apical vertebra (rotation and displacement)	Apical vertebra T11, right rotation 8.9°, right displacement 7.0	
	Lower end vertebra	L1	

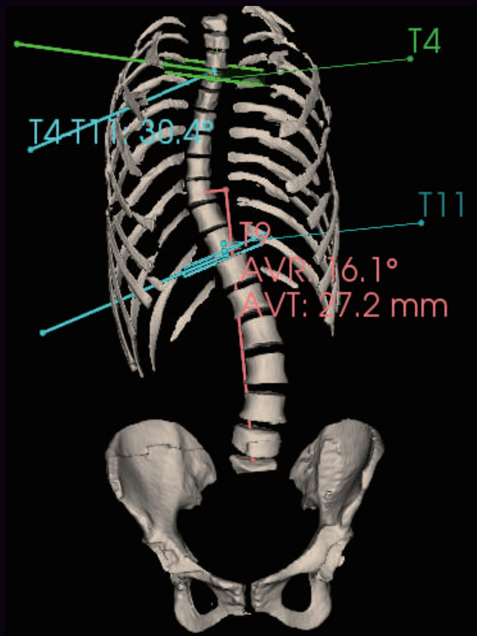


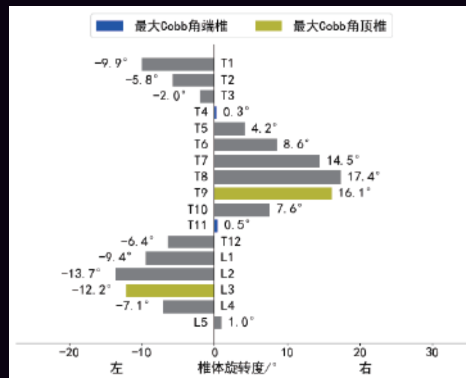
Full spine 3D imaging results show that:

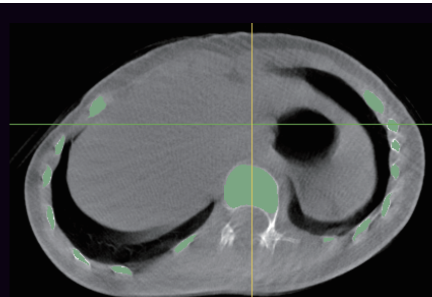
1. The T5-T12 vertebrae changed after i nternal fixation, and the internal fixation was stable, with no clear signs of loosening or breaking.
2. Mild scoliosis in the thoracic and lumbar segments of the spine.
3. The physiological curvature of the cervical spine is reversed, and the physiological curvatures of the thoracic and lumbar spine are present.

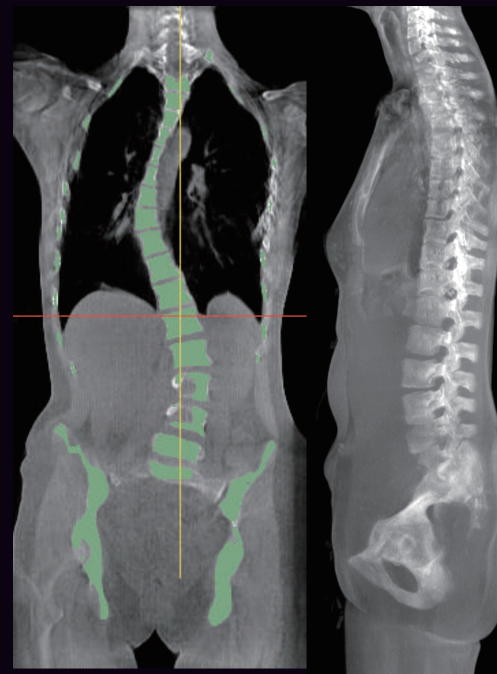
『 3D scanning and reconstruction of the full spine 』

The patient, female, 12 years old, scoliosis









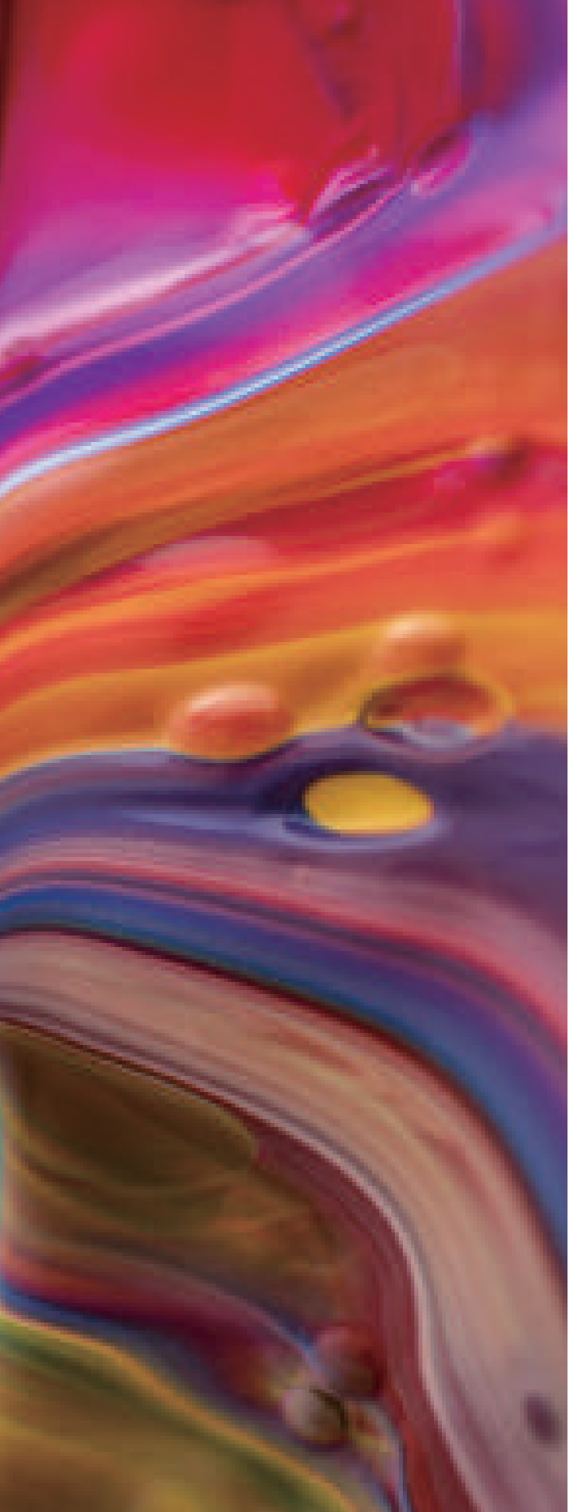
Radiological opinion:

1.The thoracolumbar segment of the spine showed "S" - shaped scoliotic deformity, with the thoracic segment protruding to the right and the lumbar segment protruding to the left.

2.Degenerative of the cervical, thoracic, and lumbar vertebrae, with the physiological curvature of the cervical spine reversed, and the physiological curvatures of the thoracic and lumbar vertebrae becoming rigid.

Scan parameters: 110kV/5mA
Scan area: full spine

Through 3D imaging measurement:
The thoracic and lumbar spine showed "S"-shaped scoliosis: the thoracic spine had a right scoliosis with the T9 vertebra as the most prominent point, the Cobb angle was approximately 30.4°, and T8 rotated 17.4° to the right; the lumbar spine had a left scoliosis with the L3 vertebra as the most prominent point, the Cobb angle was approximately 28.5°, and L2 rotated 13.7° to the left.



Part 2 『 Clinical application of the full lower limb 』

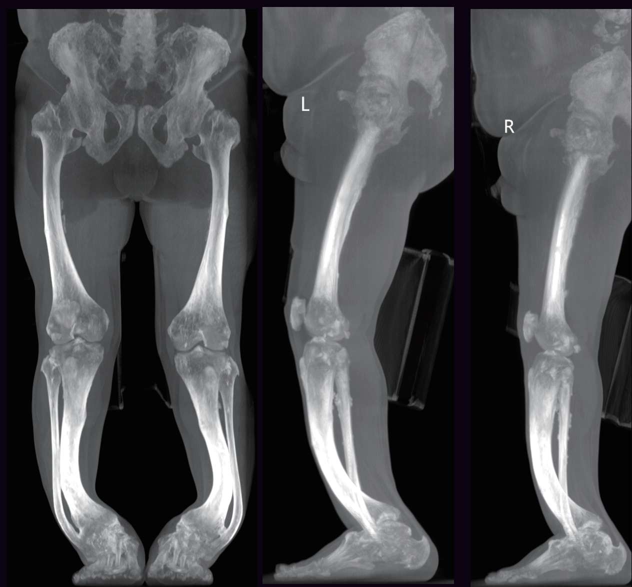
The world's only weight-bearing 3D imaging of the full lower limb

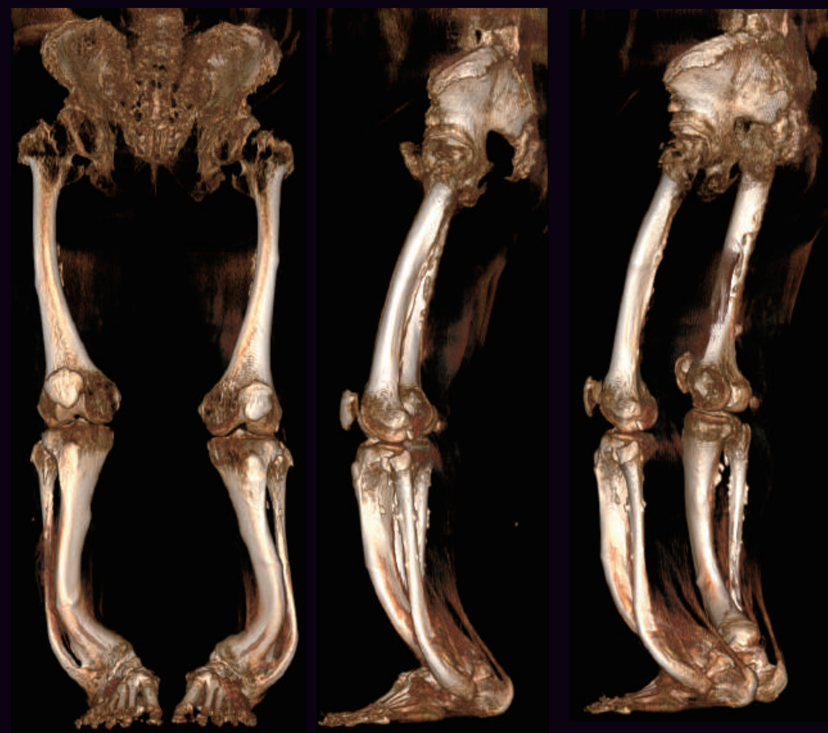
Automatic measurement of multiple parameters of the full lower limb

FOV
Maximum head-to-foot direction 1450mm
Cross section 350mm

『 3D scan and reconstruction of the full lower limb 』

Patient, male, 33 years old, the full lower limb examination.

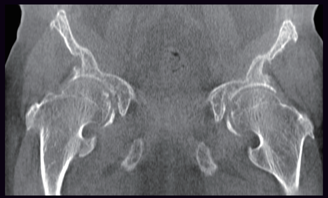


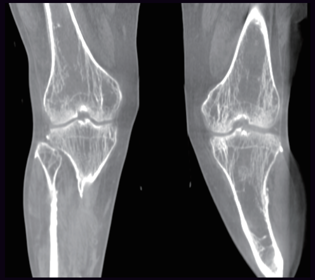


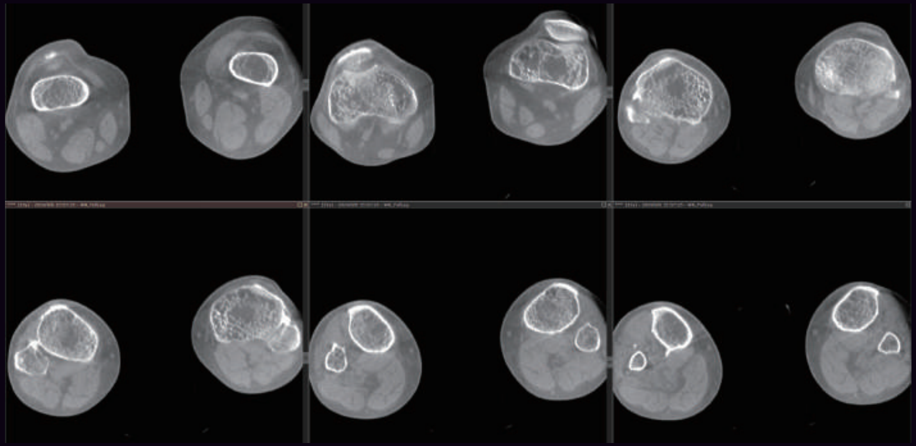
Scan parameters: 110kV / 5mA
Scan area: Full lower limb.

『 3D scan reconstruction of the Full lower limps 』

Patient, male, 33 years old, Full lower limps examination.





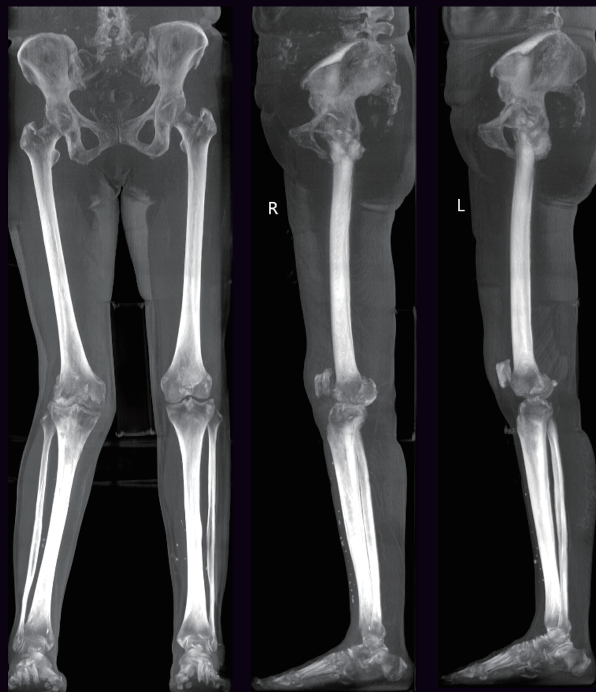


Scan parameters: 110kV / 5mA
Scan area: Full lower limb.

Imaging manifestations:
The bilateral iliac wings are flat, with reduced bone density and sparse trabecular patterns in the bones that make up the pelvis; the bilateral femurs and tibiae/fibulae are short and thick, with reduced bone density and sparse trabecular patterns. The metaphyses are enlarged and widened laterally to form lateral spurs, with a cup-shaped depression in the center of the metaphyses and fuzzy, spur-like calcifications at the edges that appear brush-like; the right hip joint space is absent, the left femoral neck is absent, and there is hyperplasia at both epiphyseal ends. The shafts of the bilateral femurs and tibiae/fibulae are curved and deformed.

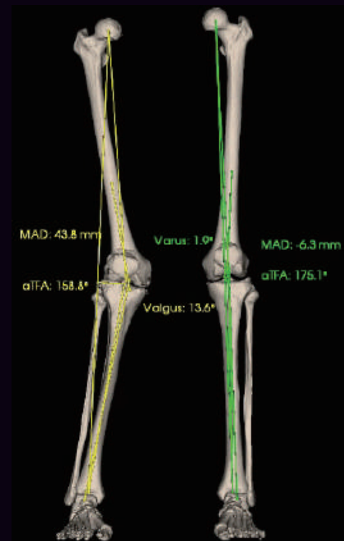
Imaging diagnosis:
1.Bilateral hip degenerative disease
2.Inversion deformity of both lower limbs.
3.Changes in the bones of the pelvis and lower limbs, considering as systemic bone disease, which needs to be differentiated from osteomalacia, rickets, and chondrodysplasia, and needs to be combined with clinical history.

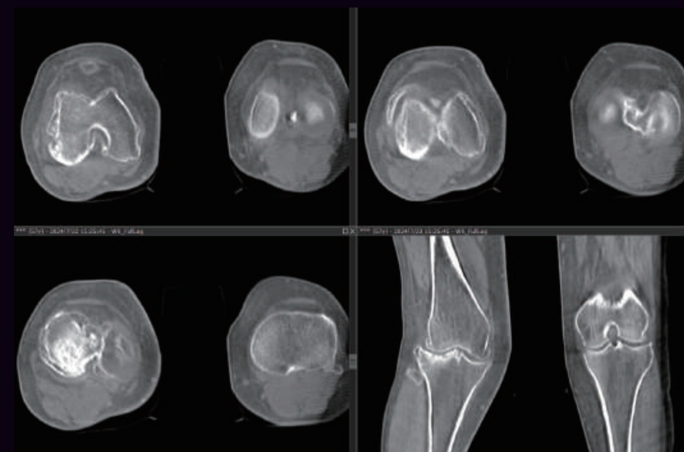
『 3D scan reconstruction of the Full lower limps 』



Scan parameters: 110kV/ 5mA
Scan area: Full lower limps

Patient, female, 57 years old, full lower limb examination.



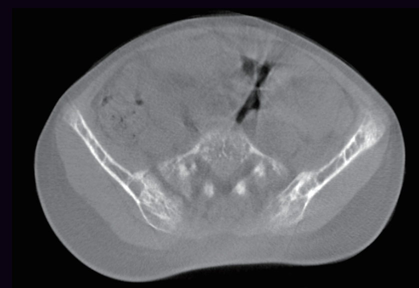


Through 3D imaging measurement:
The right femorotibial angle (aTFA) is approximately 158.8°, and the left femorotibial angle (aTFA) is approximately 175.1°.
The right mechanical axis deviates outward by about 43.8 mm, and the left mechanical axis deviates inward by about 6.3 mm.
The right knee valgus angle is about 13.6°, and the left knee varus angle is 1.9°.

Imaging findings:
1.Abnormal mechanical axis of the right lower limb, with valgus deformity of the right knee joint.
2.Discrepancy in length between the both lower limbs, with the pelvis tilted to the right.
3.Osteophyte proliferation in the right knee joint, hypertrophy of the intercondylar eminence, and disappearance of the medial and lateral compartments of the knee joint.

『 3D scan reconstruction of the full lower limps 』

Patient, female, 13 years old, knee valgus deformity



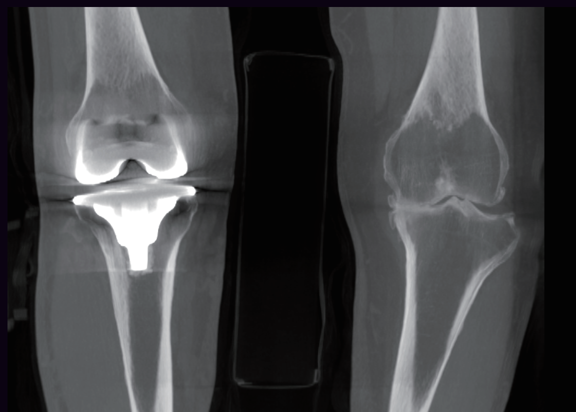
Scan parameters: 110kV/5mA
Scan area: Full lower limps

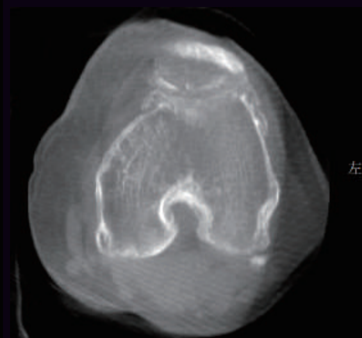
Through 3D imaging measurement:
From the upper edge of the femoral head to the lower end of the tibial joint surface, the length of the left lower limb is about 53.7 cm, and the length of the right lower limb is about 55.8 cm;
The right femoral external angle is 90.3°, the tibial external angle is 92.2°, and the femorotibial angle is 182.5°;
The left femoral external angle is 68.8°, the tibial external angle is 90.1°, and the femorotibial angle is 158.9°

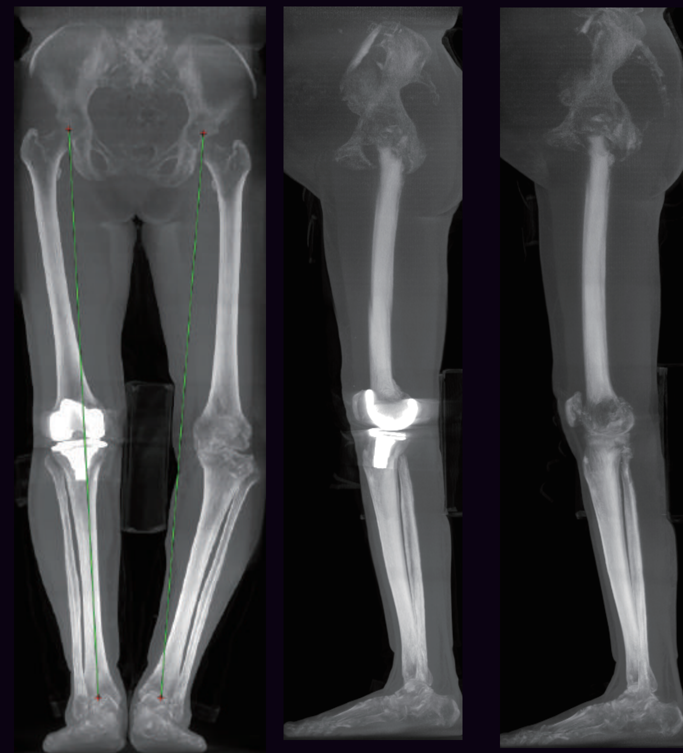
Imaging diagnosis:
1.Valgus deformity of the left knee joint; varus deformity of the right knee joint.
2.Discrepancy in length between the the both lower limbs
3.Changes in the bones of the pelvis and both lower limbs, considering systemic bone disease. Differential diagnosis with osteomalacia, rickets, and achondroplasia is needed.

『 3D scan reconstruction of the Full lower limps 』

Patient, female, 62 years old, postoperative of total knee arthroplasty.



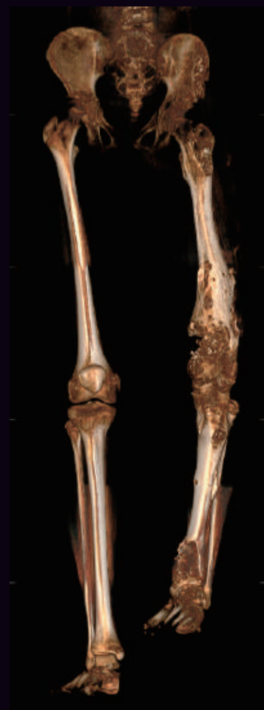




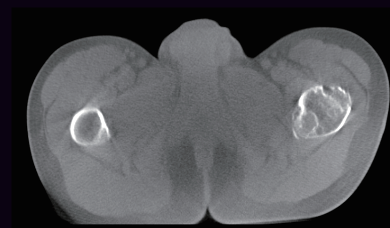
Scan parameters: 110kV/5mA
Scan area: Full lower limps

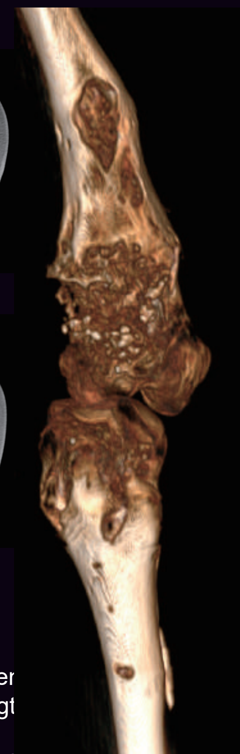
Through 3D imaging examination of the full lower limb:
1.The gap after total knee replacement on the right side was normal, and there was no sign of loosening or breakage of the internal fixation device.
2.On the left side, the medial joint space of the knee has disappeared, with sclerosis and whitening of the joint surface. There is obvious osteophyte formation at the joint margins, forming bone spurs.
3.Abnormal mechanical axis of the left lower limb.

『 3D scan reconstruction of the full lower limbs 』



Patient, male, 12 years old, multiple enchondromas





Imaging findings:
The left femur and tibia are bent and deformed, with shortening, more pronounced in the left femur. Multiple irregular and ovoid bone destruction areas are seen in the left ilium, femur, and tibia/fibula, with expansile growth.
The bone cortex at the edge is swollen and thin, with thin layers of bone hyperplasia and sclerosis. Sand-like shadows with increased density are seen inside, and the bone cortex at the edge of multiple lesions is discontinuous. Multiple drill hole shadows are seen in the left femur and tibia, with sclerotic bone around them, consistent with postoperative changes.

Imaging diagnosis:
1.Multiple enchondromas of the left femur and tibia with postoperative changes after deformity corrective osteotomy.
2.Bone changes in the left tibia, consistent with multiple enchondromatosis (Ollier disease).
3. Discrepancy in length between the both lower limbs.

Scan parameters: 110kV/5mA
Scan area: Full lower limps

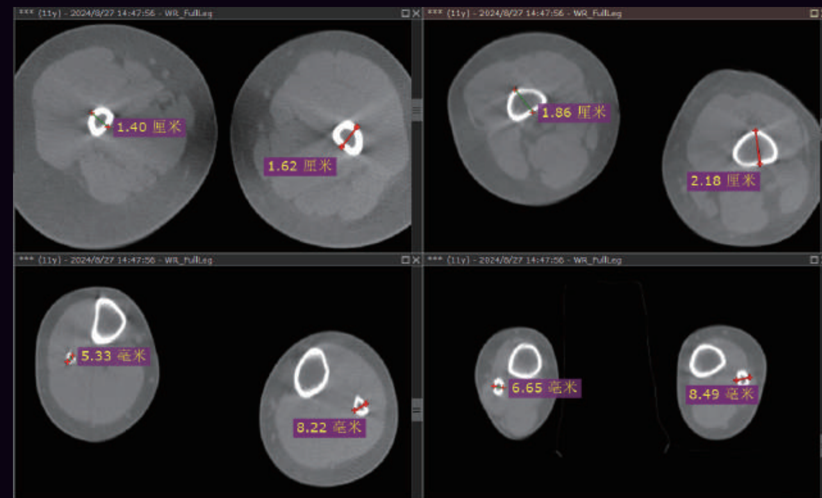
Through 3D imaging measurement:
From the hip joint surface to the ankle joint surface, the ler
of the left lower limb is approximately 65.2 cm, and the lengt
the right lower limb is approximately 74.9 cm;
The left tibiofemoral angle is about 166°, and the right tibiofemoral angle is about 175°;
The pelvis is slightly tilted to the left and downward.

『 3D scan reconstruction of the full lower limbs 』

Patient, female, 11 years old, lower limb scars, postoperative.

The pelvis is tilted to the right. The right femur and tibia/fibula are shorter and slightly more slender than the contralateral side, more pronounced in the fibula; the proximal tibiofibular joint space on the right is significantly widened. There is a small mound-like bony protrusion on the medial edge of the proximal right tibia, with smooth margins.

Through 3D imaging measurement:
The length of the right femur is about 321.4 mm,
The length of the tibia is about 300.6 mm,
The length of the fibula is about 253 mm;
The length of the left femur is about 362.5 mm,
The length of the tibia is about 312.9 mm,
The length of the fibula is about 319 mm.
The left femorotibial angle is about 179.5°,
The right femorotibial angle is about 171.3°.

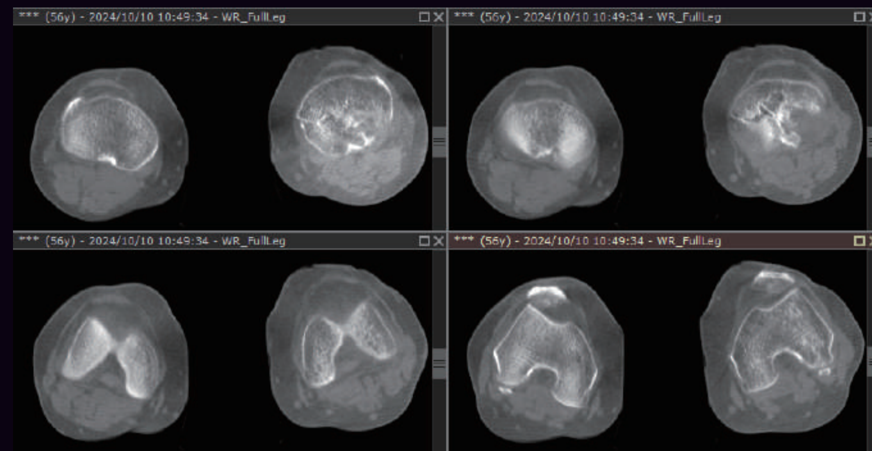


Imaging diagnosis:
1.Discrepancy in length between the both lower limbs, with the right femur and tibia/fibula being shorter and more slender than the contralateral side, more pronounced in the fibula, and dislocation of the right superior tibiofibular joint.
2.Considered mild varus deformity of the left knee joint.
3.Bony protrusion on the medial edge of the proximal right tibia, considered traction sign.

Scan parameters: 110kV/5mA
Scan area: Full lower limps

『 3D scan reconstruction of the full lower limps 』

Patient, female, 56 years old, knee stiffness.



Scan parameters: 110kV/5mA
Scan area: Full lower limps

Imaging findings:
The cortical bone of the left tibial plateau is twisted and discontinuous, with disordered bone structure. The cortical bone of the left tibia is discontinuous, with an irregular, hazy linear fracture line visible. The alignment and position are acceptable. Internal fixation plate and screw shadows are visible, with no signs of loosening or fracture. The bone density of the left knee joint, left tibia and fibula, and left ankle joint is reduced, with sparse trabecular patterns.

Radiological diagnosis:
1.Postoperative of internal fixation of left tibial fracture.
2.Sacroiliitis of the left knee joint is considered.
3.Disuse osteoporosis of the left tibia and fibula, left knee joint and left ankle joint.

Part 3

『 Clinical applications of the hip joint 』

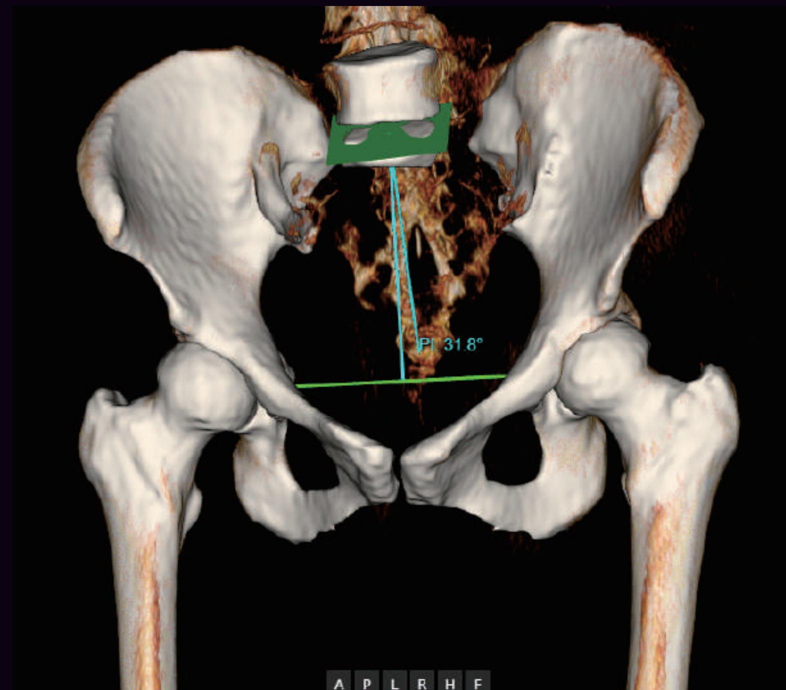
『 Clinical applications of the knee joint 』

『 Clinical applications of the ankle joint 』

Low-dose of weight-bearing 3D imaging	Automatic measurement of multiple parameters of the bone joints.	FOV 350mm

『 3D scanning and reconstruction of the hip joint 』

Patient, female, 57 years old, hip joint issues.



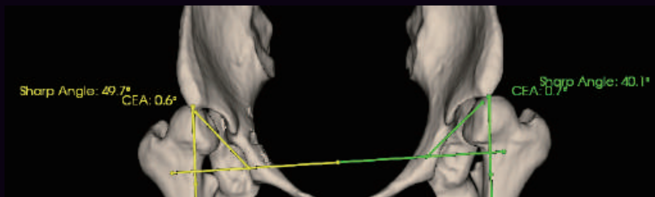
Scan parameters: 110kV/ 5mA
Scan area: Hip joint.

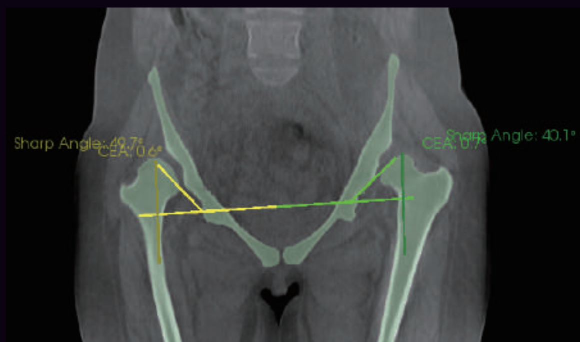
Lip-like osteophytes are seen at the edges of both hip joints, more pronounced at the outer upper edge of the acetabulum; the joint surfaces are smooth, with no obvious signs of proliferative sclerosis; the joint spaces show no significant narrowing.

Imaging diagnosis:
Mild degenerative changes in both hip joints.

『 3D scanning and reconstruction of the hip joint 』

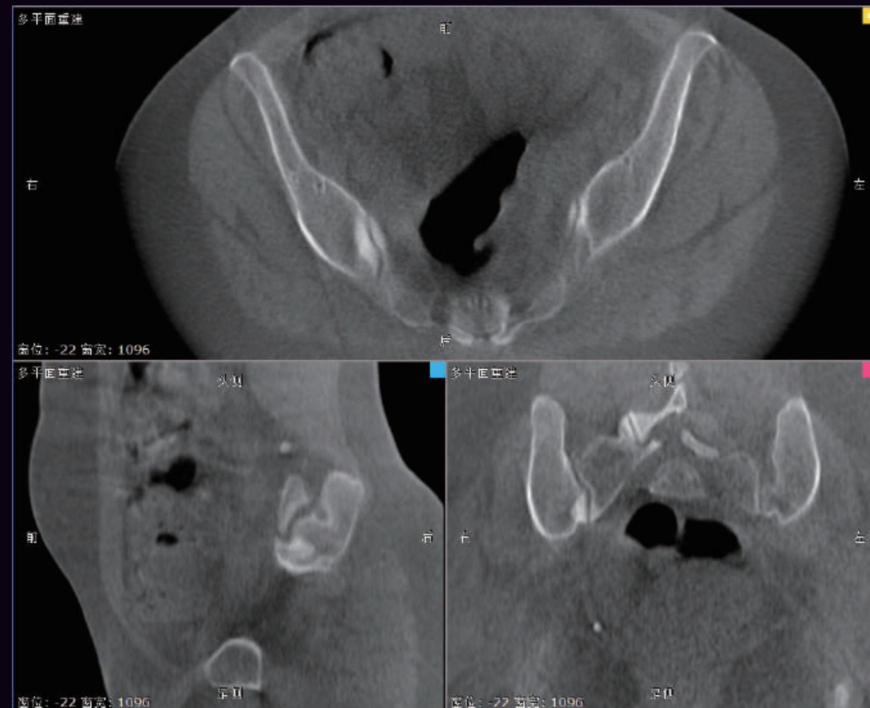
Patient, female, 29 years old, hip joint issues





Scan parameters: 110kV/ 5mA
Scan area: Hip joint.

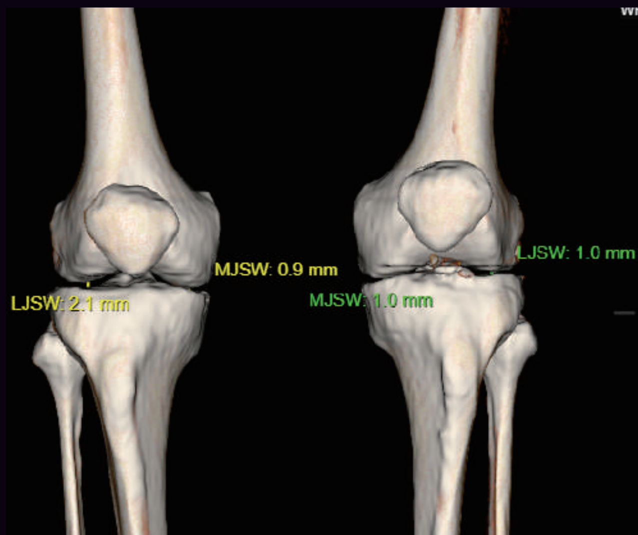
Through 3D hip joint imaging:
Both hip joints are shallower. The left center-edge angle (CEA) is approximately 0.7°, and the right center-edge angle (CEA) is approximately 0.6°. The left acetabular angle is about 40.1°, and the right acetabular angle is about 49.7°. Patchy high-density shadows are seen at the iliac edge of the right sacroiliac joint, with clear margins.

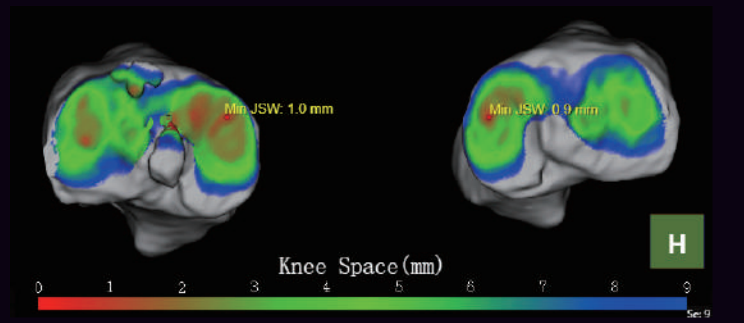


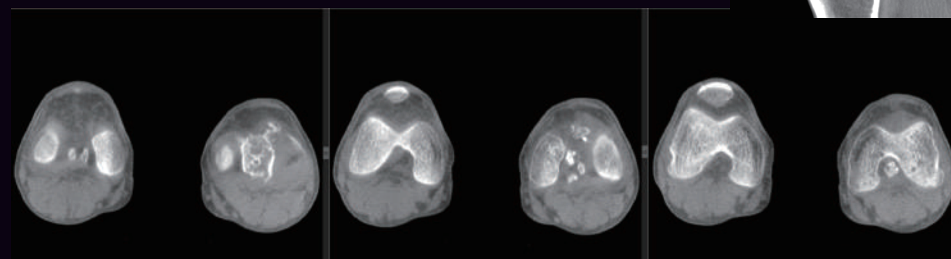
Imaging diagnosis:
1.Shallowing of both acetabular sockets is noted; correlation with clinical findings is recommended.
2.Consider sacroiliitis of the right side.

#『 3D scanning and reconstruction of the knee joint 』

Patient, male, 54 years old, knee joint issues







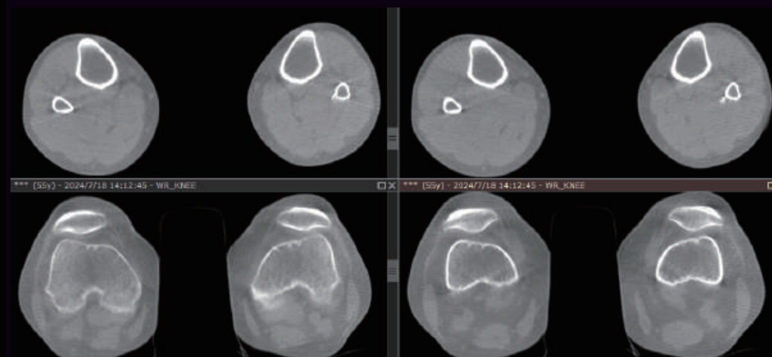
Scan parameters: 110kV/ 5mA
Scan area: Knee joint.

Measurement Name	Measurement Value	
Left knee joint space	Inside: 1.0mm	Outside: 1.0mm
Right knee joint space	Inside: 0.9mm	Outside: 2.1mm

Imaging diagnosis:
1.High-density shadow in the left meniscus (After meniscus repair surgery)
2.Narrowing of the joint spaces bilaterally, with degenerative changes
3.Multiple insect-eaten lesions visible on the left patella (chondromalacia patellae)
4.Multiple insect-eaten lesions on the lower end of the left femur (Bone destruction)

『 3D scanning and reconstruction of the knee joint 』

Patient, female, 55 years old, knee joint issues.



Measurement Name	Measurement Value		image
Left knee joint space	Inside: 1.2mm	Outside: 0.6mm	
Right knee joint space	Inside: 0.5mm	Outside: 0.4mm	

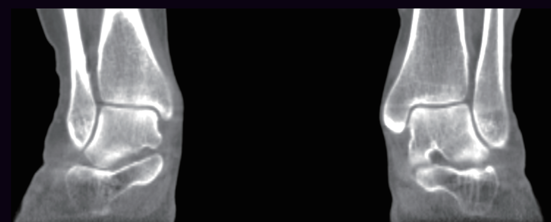
Scan parameters: 110kV/ 5mA
Scan area: Knee joint.

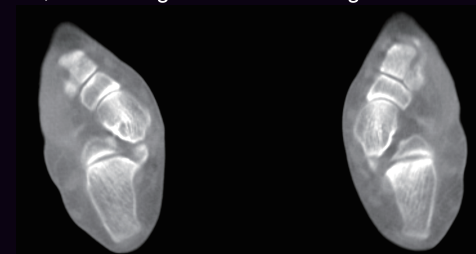
Through 3D knee joint imaging:
Both knee joints show narrowing of the joint space, with the tibial plateau intercondylar eminence becoming more pointed. There is osteophyte formation and sclerosis at the edges of the joint and the patella (degenerative changes in both knee joints). There is a bony protrusion on the medial side of the upper segment of the left fibula, growing away from the joint surface (Possible osteochondroma).

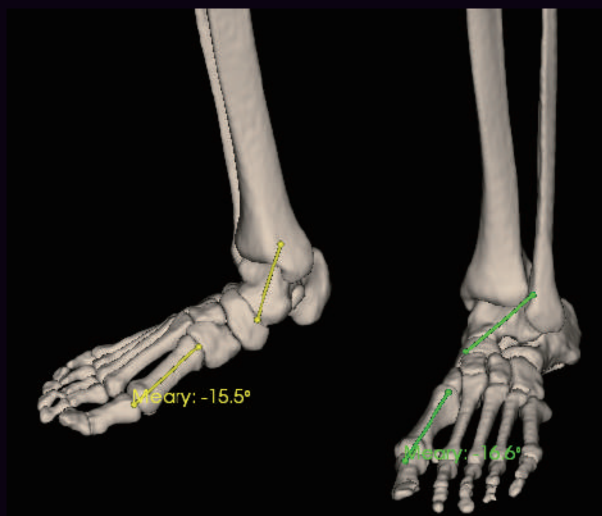
『 3D scanning and reconstruction of the ankle joints 』

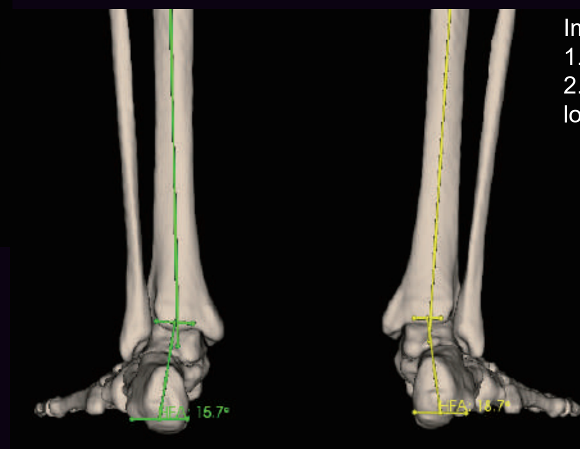
Patient, female, 43 years old, ankle joint issues

Through 3D imaging of the foot and ankle with automatic measurement: The talo-first metatarsal angle (Meary) of the left foot is -16.65 degrees, and the right foot is -15.5 degrees; the hindfoot angle of the left foot is 15.7 degrees, and the right foot is 18.7 degrees.







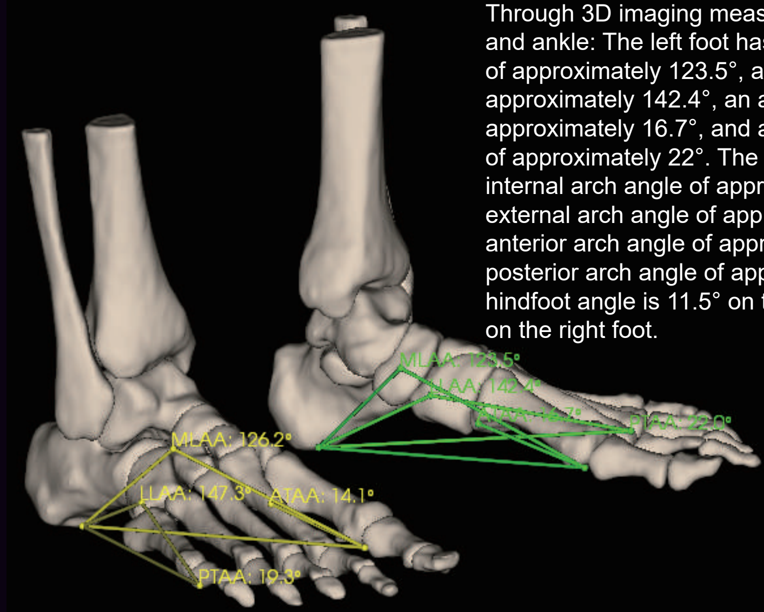


Imaging diagnosis
1.The arches of both feet disappear, with flat feet deformity.
2.The long axis of the calcaneus deviates outward from the long axis of the tibia, with hindfoot varus deformity.

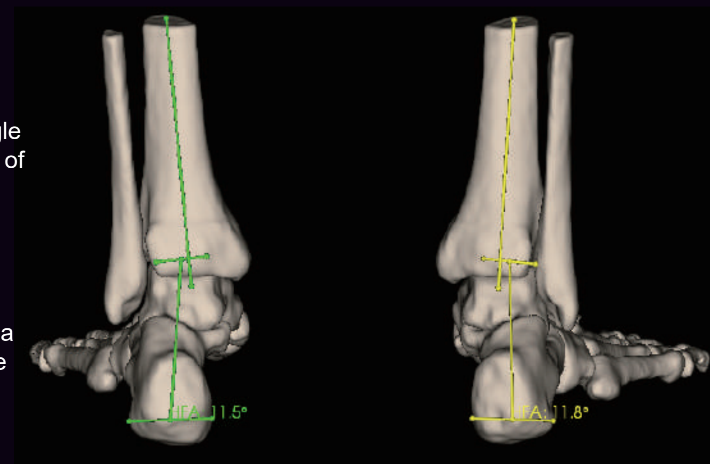
Scan parameters: 110kV/ 5mA
Scan area: Ankle joint.

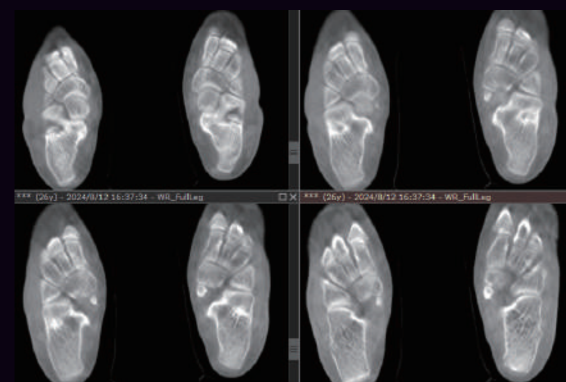
『 3D scanning and reconstruction of the ankle joints 』

Patient, male, 26 years old, foot pain



Through 3D imaging measurement of the foot and ankle: The left foot has an internal arch angle of approximately 123.5°, an external arch angle of approximately 142.4°, an anterior arch angle of approximately 16.7°, and a posterior arch angle of approximately 22°. The right foot has an internal arch angle of approximately 126.2°, an external arch angle of approximately 147.3°, an anterior arch angle of approximately 14.1°, and a posterior arch angle of approximately 19.3°. The hindfoot angle is 11.5° on the left foot and 11.8° on the right foot.



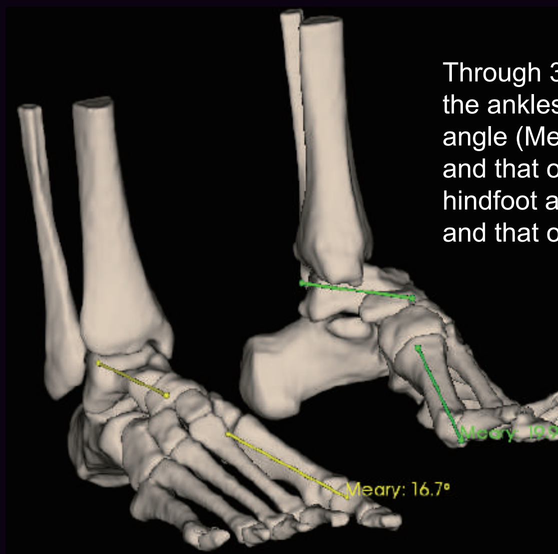


Scan parameters: 110kV/ 5mA
Scan area: Ankle joint

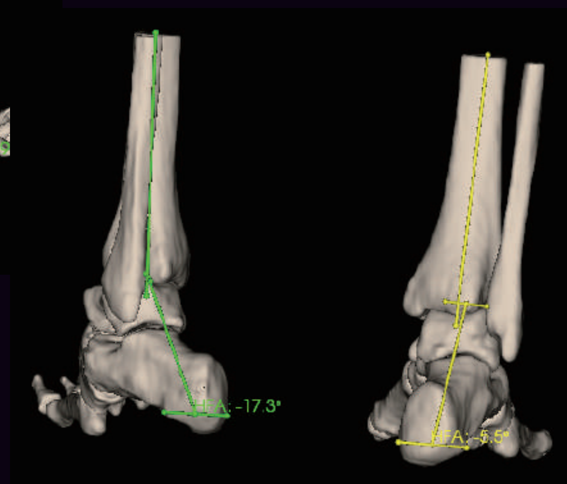
Imaging diagnosis:
1.Consider flatfoot on the right foot.
2.Round - like areas of increased bone density are seen at the posterior edges of the navicular bones in both feet, with clear margins, indicating accessory navicular bones bilaterally.

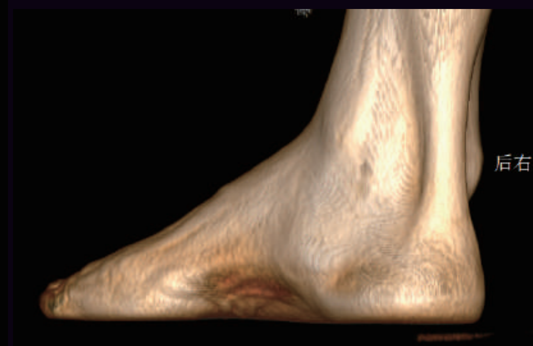
#『 3D scanning and reconstruction of the ankle joints 』

Patient, male, 15 years old, high - arched foot



Through 3D imaging measurement of the ankles: The talo-first metatarsal angle (Meary) of the left foot is 19.9°, and that of the right foot is 16.7 °; the hindfoot angle of the left foot is -17.3 °, and that of the right foot is -5.5 °.





Scan parameters: 110kV/ 5mA
Scan area: Ankle joint

Hindfoot deformity, cavus foot

Part 4 『 Scientific research literature 』

Weight-bearing 3D imaging of the whole body's bone joints

The WR - 3D is able to achieve ultra - large - range weight - bearing 3D imaging, including scanning and reconstruction of the full spine and lower limbs. The image quality meets the 3D diagnostic needs of patients with scoliosis and knee osteoarthritis.

Low - dose weight - bearing imaging

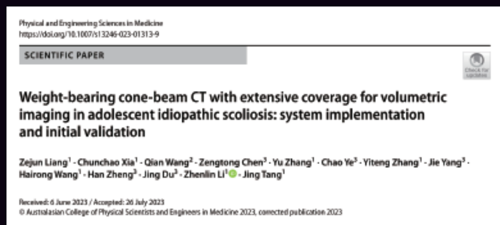
Weight - bearing 3D scanning and imaging is based on CBCT technology, with a dose equivalent to only 10% - 20% of traditional MSCT. For patients who need multiple follow - ups, it effectively reduces the radiation dose to patients.

Automatic measurement 3D preoperative planning

The WR - 3D can achieve automatic measurement of multiple parameters of bone joints, not limited to the 3D Cobb angle and the HKA angle, which facilitates the formulation of scientific 3D preoperative plans and postoperative recovery assessment programs.

『 3D imaging of the full spine by the WR-3D 』

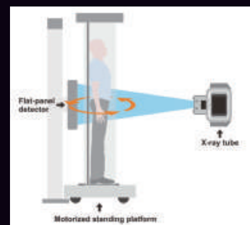
- The WR - 3D realizes ultra - large - range weight - bearing 3D imaging, which makes up for the shortcoming of traditional CT / MR that cannot do.
- The dose of weight - bearing 3D scanning and imaging (CTDIvol = 1.23mGy) is only equivalent to 10% - 20% of that of traditional MSCT.
- The image quality fully meets the diagnostic requirements for adolescent idiopathic scoliosis and has extensive clinical application potential in various musculoskeletal diseases.


Physical and Engineering Sciences in Medicine
https://doi.org/10.1007/s13246-023-01313-9
SCIENTIFIC PAPER

Weight-bearing cone-beam CT with extensive coverage for volumetric imaging in adolescent idiopathic scoliosis: system implementation and initial validation

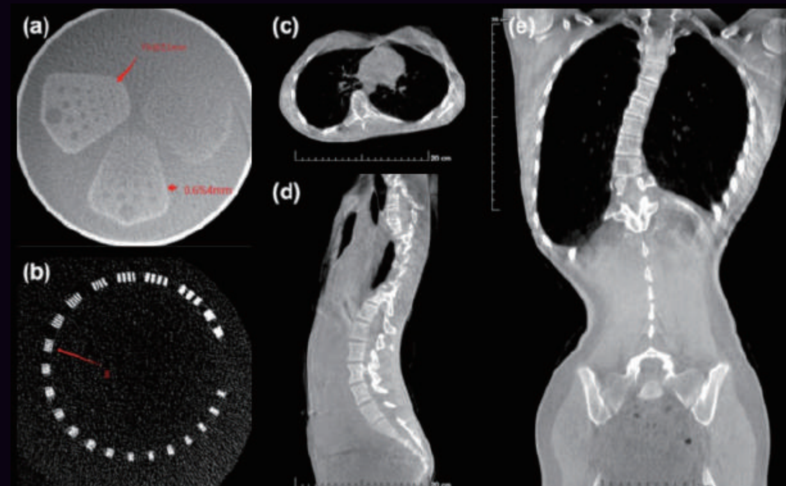
Zejun Liang[1] · Chunchao Xia[1] · Qian Wang[2] · Zengtong Chen[3] · Yu Zhang[1] · Chao Ye[3] · Yiteng Zhang[1] · Jie Yang[3] · Hairong Wang[1] · Han Zheng[3] · Jing Du[3] · Zhenlin Li[1] · Jing Tang[1]

Received: 6 June 2023 / Accepted: 26 July 2023



kV	mA	SID (cm)	Total exposure time (s)	Examination time (s)	Z-axis FOV (cm)
110	6	150	75	90	90

	mAs	kV	$CTDI_{vol}$ (mGy)	Dose comparison*
CBCT	6	110	1.23	/
$MDCT_L$	200	120	13.2	9.32%
$MDCT_A$	75	120	5.7	21.58%

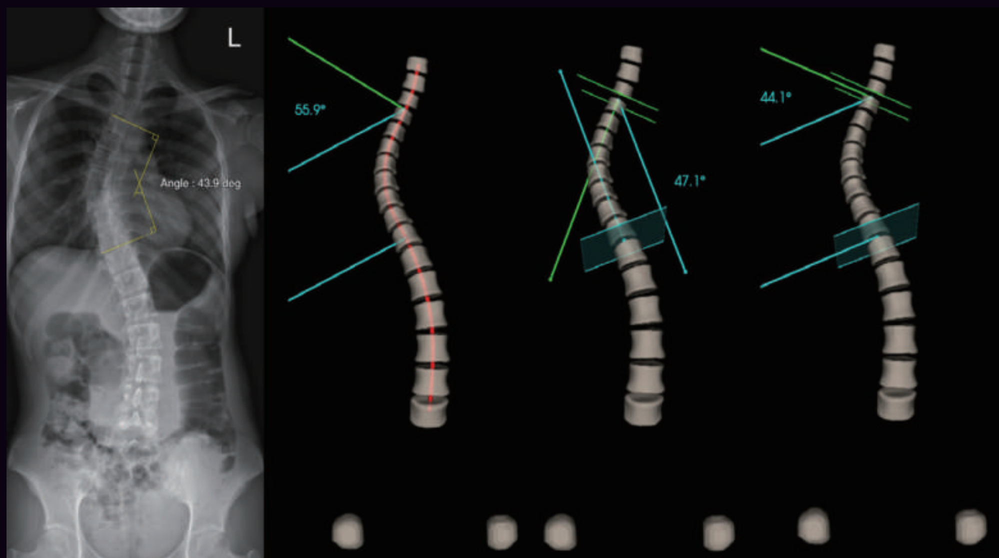


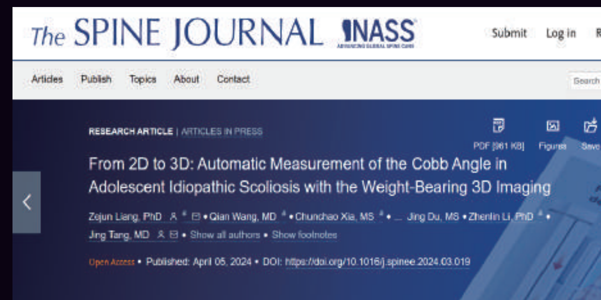
Evaluation factor	Mean score	Standard deviation	Percentage of images with score ≥ 3
Overall image quality	3.98	1.17	86.7%
Image noise	4.42	0.72	100%
Artifacts around the spinal region	3.81	1.21	83.3%
Anatomical coverage	5.00	0.00	100%
Diagnostic confidence	4.47	1.10	90%

△ Acknowledgements to the collaborating institution: West China Hospital, Sichuan University
△ Journal: Physical and Engineering Sciences in Medicine (2023)

#『 3D Cobb angle automatic measurement of the full spine by the WR-3D 』

- Traditional Cobb angle measurement based on the full - length spinal film is greatly affected by patient position and X - ray projection angle.
- Based on the 3D imaging of the full spine by WR - 3D, three types of 3D Cobb angle AI automatic measurement methods are realized. Different measurement methods can provide doctors with clinical information from multiple aspects.
- Since scoliosis is a deformity of the spine in 3D space, doctors need to choose the appropriate measurement method according to the imaging method and clinical context when evaluating.

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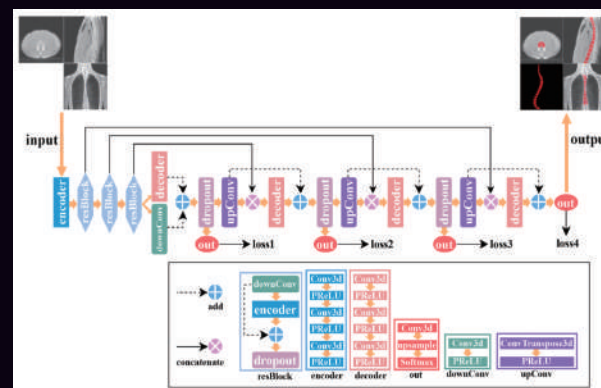
From 2D to 3D: Automatic Measurement of the Cobb Angle in Adolescent Idiopathic Scoliosis with the Weight-Bearing 3D Imaging
Zojun Liang, PhD • Qian Wang, MD • Chunchao Xia, MS • ... Jing Du, MS • Zhenlin Li, PhD • Jing Tang, MD • Show all authors • Show footnotes
Open Access • Published: April 05, 2024 • DOI: https://doi.org/10.1016/j.spinee.2024.03.019



△ Acknowledgements to the collaborating institution: West China Hospital, Sichuan University
△ Journal：The Spine Journal（2024）

『 3D imaging of the full lower limb and automatic measurement of the hip - knee - ankle angle by the WR - 3D 』

- The WR - 3D technology realizes weight - bearing 3D scanning, reconstruction, AI segmentation, and automatic measurement of the full lower limb, which significantly improves the accuracy and speed of hip - knee - ankle angle measurement.
- There is a significant difference between the 3D HKA angle measured by the WR - 3D technology and the HKA angle measured on weight - bearing 2D radiographs.
- Research shows that the 3D HKA angle measured in the weight - bearing position provides a more accurate assessment of the lower limb mechanical axis and joint load.


中国骨与关节杂志

2024, v.13(11) 902-907

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基于深度学习的负重位锥形束CT下肢骨骼自动分割及髋-膝-踝角测量的研究

Deep learning-based automatic segmentation of lower limb bones and hip-knee-ankle angle measurement using weight-bearing cone-beam CT

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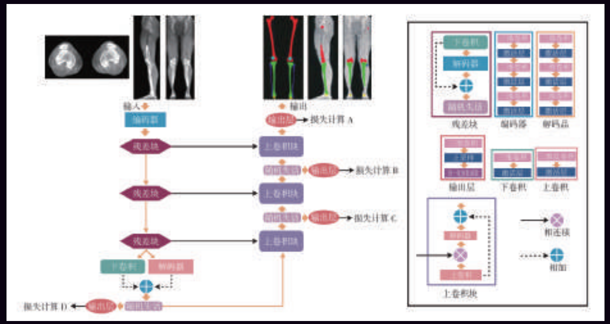
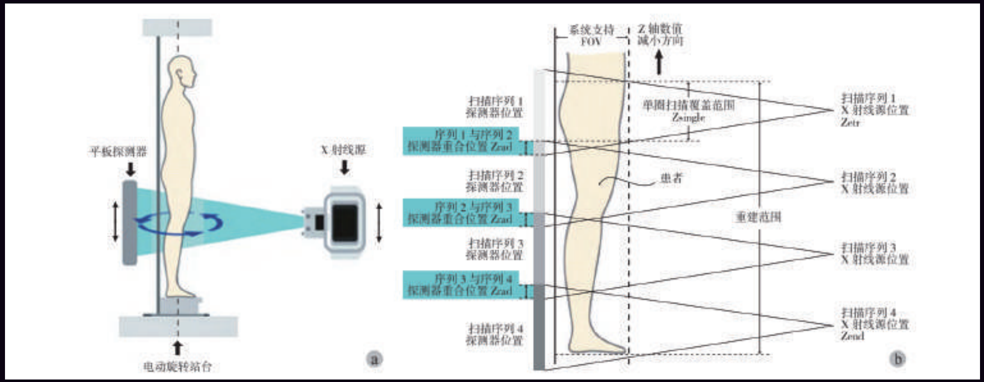
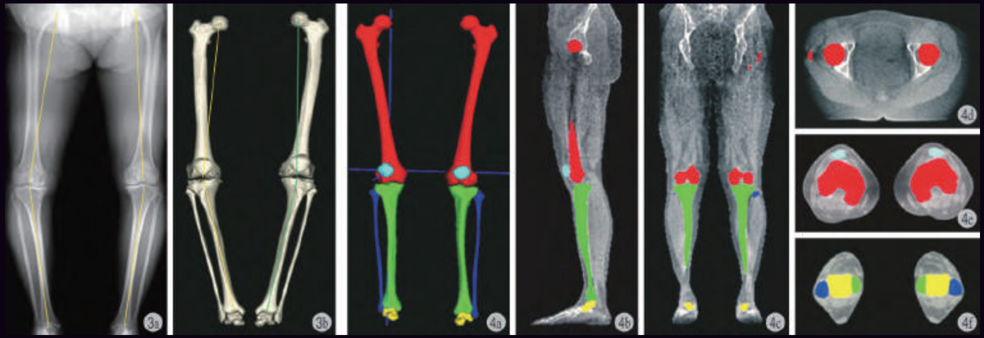




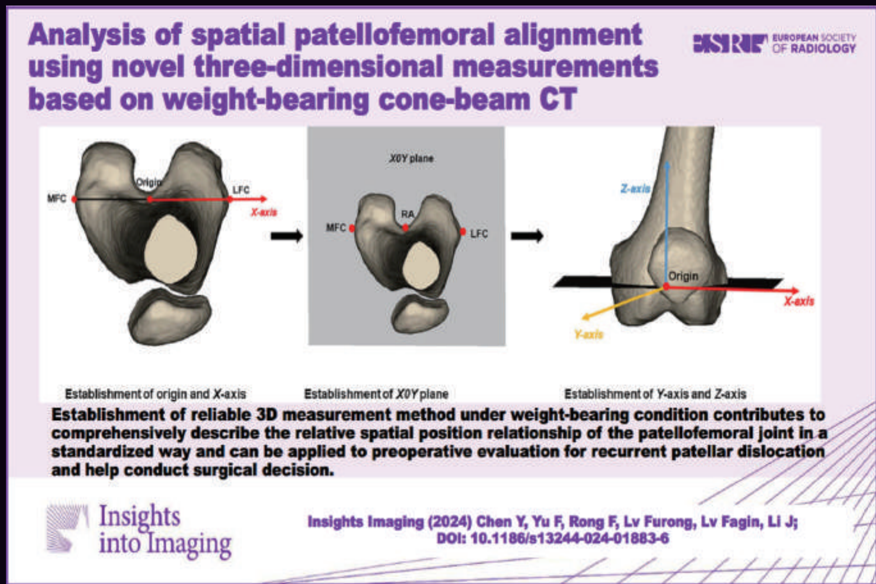


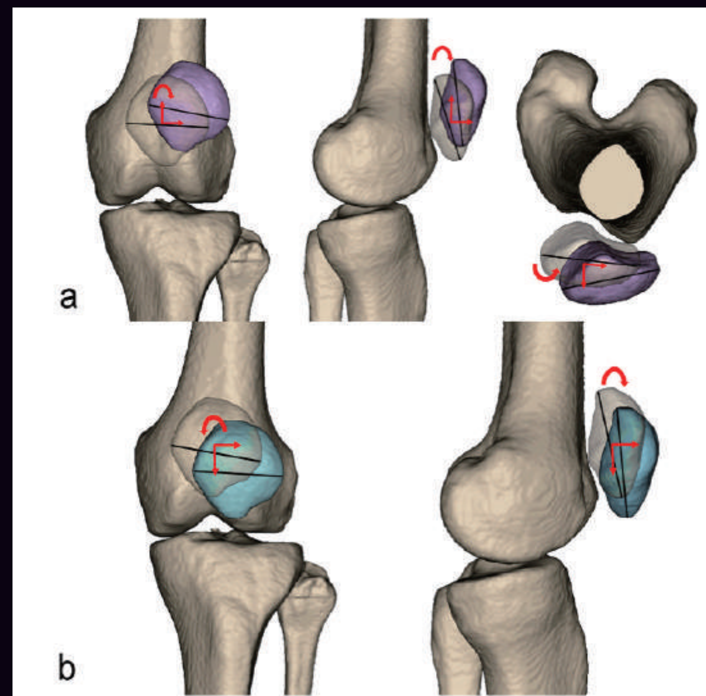
△ Acknowledgements to the collaborating institution: West China Hospital, Sichuan University

△ Journal: Chinese Journal of Bone and Joint (2024)

『 3D imaging of the patellofemoral joint in the weight - bearing position by the WR - 3D 』

- The imaging and measurement methods of the patellofemoral joint based on the 3D weight - bearing images using WR - 3D reliably and comprehensively reflect the relative spatial position relationship of the patellofemoral joint.
- The 3D measurement under weight - bearing conditions is helpful for preoperative evaluation of recurrent patellar dislocation (RPD), and axial lateral patellar tilt is the best predictor.
- Research shows that this method can be applied to 3D preoperative planning for patellar surgery.





△ Acknowledgements to the collaborating institution: First Affiliated Hospital of Chongqing Medical University
△ Journal: Insights into Imaging (2025)


A beam of light, insight into life

WR-3D

ANGELL

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