Souvenir 2019






21st NATIONAL CONFERENCE OF SOCIETY OF INDIAN RADIOGRAPHERS

On 7-8th December 2019, FTCCI, Red Hills, Hyderabad

Organized by
SOCIETY OF INDIAN RADIOGRAPHERS (SIR)
Telangana State Chapter

In association with
NIZAM'S INSTITUTE OF MEDICAL SCIENCES
Hyderabad

21ST NATIONAL CONFERENCE OF SOCIETY OF INDIAN RADIOGRAPHERS - 2019

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Organising Secretary

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Vice-Chairman

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Hyderabad

G. Kishan Reddy
Minister of State for Home Affairs
Government of India

MESSAGE

Dear Srinivasulu,

I am glad to know that, the Society of Indian Radiographers, Telangana State Chapter is organizing 21st National conference of Society of Indian Radiographers - 2019 at Hyderabad in association with the Nizam's Institute of Medical Sciences.

The Radiography & Imaging Sciences is well developed now and the diagnosis of various diseases has become more accurate with newer modalities and techniques used in this field. The Good Diagnosis depends upon on the quality and accurate techniques used by the technologists. Hence the Radiographers are the back bone of Diagnostic Radiology. It is very essential to update their skills and knowledge as the technology is rapidly changing day by day.

I am happy to inform you that the Union government in order to regulate and standardize the education and services of paramedics, introduced the Allied & Healthcare Professions bill the Parliament, which will check the problems faced by the Radiographers and other paramedics.

I am sure this conference will provide an opportunity to the younger generation and new entrants into this field to excel themselves. The academicians would deliver on different aspects of Radiology & Imaging sciences and contribute to improve the patient care and services.

I send my best wishes on this occasion.

(G. Kishan Reddy)

28th November 2019
New Delhi

Eatala Rajender
Minister for Health, Medical & Family Welfare,
Government of Telangana

MESSAGE

I am very glad to know that, the Society of Indian Radiographers (SIR), Telangana Chapter is organizing 21st National conference of Society of Indian Radiographers in association with the prestigious Nizam's Institute of Medical Sciences during 7-8th December 2019 in Hyderabad, the medical hub of India.

The Profession of Radiographers/Imaging Technologists is different from other paramedics, where the technologist is to attend the patients directly like the consultants. They need to protect the patient, patient attendants besides protecting themselves from the radiation hazards. They also face risk from of communicable/ infectious diseases as they expose to ill patients.

Due to rapid development in Diagnostic Radiology, the use of computers is increased The Radiology Transformed from conventional Radiography to Computed Radiography (CR), Digital Radiography (DR), Computed Tomography (CT), Mammography, Digital Subtraction Angiography (DSA), Multi-Detector Computed Tomography (MDCT), Magnetic Resonance Imaging (MRI), Gamma Camera, PET, SPECT, PET MRI. Such as many modalities are developed and a lot of skill and expertise has become essential for a technologist to work in this diagnostic Radiology.

I am sure the scientific presentations and discussions at this conference definitely help the technologists and students to update their skills and knowledge.

I congratulate the organizers and my best wishes for the successful conference and fruitful deliberations. I hope this will help to improve the patient care and services in the hospitals. I also welcome all the delegates from India and Abroad. I do hope all the delegates will enjoy the scientific feast as well as our hospitality and the Glory of Hyderabad.

With best wishes,

(EATALA RAJENDER)

Dr. K. Manohar, MD,FICP
Director

NIZAM'S INSTITUTE OF MEDICAL SCIENCES
Panjagutta, Hyderabad - 500082, Telangana
www,nims.edu.in

MESSAGE

Dear Srinivasulu,

I am very glad that the Society of Indian Radiographers, Telangana State Chapter is organizing the 21st National Conference of Society of Indian Radiographers in association with the prestigious Nizam's Institute of Medical Sciences, Hyderabad.

Due to rapid development in Radiology and Imaging Sciences, the role of Radigraphy & Imaging technologist has become vital in diagnosis. It has become a must to update their skills and knowledge to reach the present day demand. Earlier the radiographer was only concern with conventional radiography. Today, the CR, DR, CT, MDCT, MRI PET, SPECT, US, DOPPLER such as many modalities have developed and the accuracy in diagnosis is merely progressed with advance techniques of various modalities.

I believe that a Good Diagnosis by a Radiologist highly depends upon the quality of images produced and the techniques followed by the technologists. The role of radiographers do not end with operating the equipment, they need to protect the patients, attendants and themselves from the radiation hazards too. These kind of Seminars and Conferences definitely help the upcoming technologists, students to update their skills and knowledge. I appreciate the Organizing Committee for hosting this mega Scientific Event in Hyderabad and I am jubilant to be a part of this event.

I hope all the delegates attending this across the globe would enjoy the deliberations as well as the hospitality of Hyderabad and carry sweet memories to their homes.

All theBest.

Dr. K. Manohar

Padmasri Prof. Kakarla Subbarao.
Emeritus Professor &
former Director of NIMS
HYDERABAD

MESSAGE

Dear Mr. Srinivasulu

Greetings!

I'm happy that you are going to organize 21st National conference of Indian radiographers at Hyderabad on December 7th & 8th 2019. Radiographers are the right handers of radiologists. They play an important role in healthcare by using advanced techniques taking care of the safety of the patients. As I look at the highlights of the scientific programme, I'm proud that you are making rapid progress in the technological aspect of radiology. I wish any delegates will participate with interactive sessions and wish the conference to be a thundering success.

Regards,

Subbarao Kakarla

Dr. Rammurti.S
MD, MAMS, FICR
Dean of Faculty

NIZAM'S INSTITUTE OF MEDICAL SCIENCES
Panjagutta, Hyderabad - 500082, Telangana

Date: 28 November 2019

MESSAGE

It gives me immense pleasure to note that 21st National Conference of Society of Indian Radiographers is being organized by the Telangana State chapter of SIR in association with Nizam's Institute of Medical Sciences, Hyderabad on the 7th & 8th of December, 2019.

Technologists constitute the backbone of Radiology practice. With the rapid advances in Technology in the last two decades the practice of Radiology has seen significant change. The technologist of today is required to understand the use of computer hardware and software in addition to the basics of Radiology. In this era of evidence based medicine, accurate diagnosis is required for targeted therapy. In this regard Radiology & Imaging plays significant role in diagnosis and further management of the patient. Advances in Technology have increased the responsibility of the Technologist as new software applications are emerging.

As I understand this conference aims to address these issues by way of didactic lectures, symposia and panel discussion etc. Eminent National faculty and International Faculty from the UK and US will be sharing their experiences with the attendees.

Hyderabad, the 'City of Pearls' and 'Mecca of Medicine' has many historical places to visit and traditional cuisine to offer. The organizers are making all the efforts to ensure that you have an excellent Academic program and a fruitful interaction.

Dr. Rammurti.S

S.A. WAJID
Chairman, SIR
Bengaluru

MESSAGE

At the outset, I wish to congratulate Sri. Damodhar Naidu Koti, Chairman and Sri Srinivasulu Sirandas, organising Secretary and their entire team for conducting 21st National Conference of Society of Indian Radiographers on 7-8 th December 2019 at Hyderabad.

Medical Imaging and Radiotherapy are two fields, where advances in Radiology occur at a rapid place. Radiology has made rapid strides in the past 2 decade, with newer modalities like Duel Head CT; High field MRI , with Spectroscopy, PETS, DSA, Linear Accelerator, Gamma Camera, etc. Radiology Technologists are on the actual operational level of these sophisticated equipments. Radio diagnosis depends upon the quality of image produced by the technologist. The role of technologist in the field of Radiotherapy is laudable.

To maintain the quality of professional excellence it is necessary for the technologists to update their knowledge. I believe Conference is the only platform which gives wide coverage on technical aspects, Radiation issues and ethical issues which are very closely related when we talk of imaging and Radiotherapy.

I extend my best wishes to all the delegates participating in this Conference.

S.A. WAJID

Triloki Mishra
Scientific Officer,
Tata Memorial Hospital, Mumbai.

MESSAGE

I feel immense pleasure to welcome all the delegates as the President, SIR for this 21st National Conference of Society of Indian Radiographers at Ravindra Bharathi Auditorium, Hyderabad.

I hope that this Conference will give immense exposure as Radio-diagnosis and Radiotherapy has entered the state of the art microchip based technology which has added accuracy in diagnosis in proper and timely treatment to the suffering patient.

It is hoped that the conference will provide an opportunity to the participants for exchanging professionals' excellence in handling sophisticated equipment for patient care.

I am sure that this conference will be an excellent forum for interaction among the Radio-diagnosis and Radiotherapy technologists to upgrade their knowledge, which will ultimately benefit the ailing humanity.

My good wishes to Shri Damodara Naidu Koti, Shri Srinivasulu Siramdas and the other organisers of this conference.

I wish the conference a grand success.

(Triloki Mishra)
President
Society of Indian Radiographers (SIR)

P. Ramachandra Reddy

Secretary General
Society of Indian Radiographers (SIR)

MESSAGE

It gives me great pleasure to be a part of 21st National Conference of Society of Indian Radiographers in Hyderabad.

I hope that this conference will give immense exposure as Radio-diagnosis and Radiotherapy has entered the state of the art microchip based technology which has added accuracy in diagnosis in proper and timely treatment to the suffering patients.

It is hoped that the conference will provide an opportunity to the participants for exchanging professional's excellence in handling sophisticated equipment for patient care.

I am sure that this conference will be an excellent forum for the Radio-diagnosis technologists to upgrade their knowledge, which will ultimately benefit the ailing humanity.

My good wishes to Shri. Srinivasulu Sirindas and his team for this conference.

I wish the conference a grand success.

P. Ramachandra Reddy

Damodara Naidu Koti
Chairman Organising Committee
21st NCSIR - 2019 &
President, SIR, Telangana State Chapter

MESSAGE

On behalf of Organizing Committee, I am happy to welcome you all for the conference which is to be held on 7th & 8th Dec, 2019 in Hyderabad. The radiographer plays a pivotal role in the Radiological sciences.

The Radiographer is a Torch light of Radiology who is also a path finder to the Radiologist. With a rapid development in Medical Sciences it is very necessary to understand & practice the Technology with utmost care. We "the Radiographers can be trained locally but can also grow globally". All this is possible with update in our specialized fields. In this conference, the scientific sessions chosen from Basics to advanced Topics which enables us to brush up our knowledge and update ourselves to the recent trends in Medical Imaging Technology.

The society of Indian Radiographers (SIR) Telangana Chapter in association with the Nizam's Institute Medical Sciences meticulously planned the Scientific Deliberations, which will be an academic feast for all of us. Let we all participate in the conference large in number and make it a grand success.
Hope you all enjoy our hospitality. Wish you happy new year2020 in advance.

Thanking you

Damodar Naidu Koti

K. Damodara Naidu

(Damodara Naidu Koti)

Srinivasulu Siramdas
Working General Secretary, SIR
General Secretary, SIR Telangana State Chapter
Organizing Secretary, 21st NCSIR 2019.

MESSAGE

It gives me immense pleasure to invite all my professional colleagues to this Scientific event, the 21st National Conference of Society of Indian Radiographers (21st NCSIR 2019) being held at Hyderabad. This is the third National Conference being conducted by the state chapter under the auspices of the Nizam's Institute of Medical Sciences besides CMEs and State level Conferences every year.

It is a major event where the technologists from all states and abroad will attend and share their knowledge and experience. It is an opportunity for the upcoming radiographers, technologists and students to upskill.

My Sincere thanks to Dr. K. Manohar, Chief Patron and the Director NIMS, and Dr. Rammurti. S, Sr. Prof. & Head, Department of Radiology & Imageology, the Dean, NIMS and Patron of this Conference for their guidance and support to organize this event.

I thank the S I R Central Committee for granting permission to conduct this event in Hyderabad. I also thank all the Executive Committee members of Central and State Associations for their heartful support and blessings to make this event materialized.

My sincere thanks to Mr. Vadday Prasad, UK for his initiation in inviting the International Faculty from Cambridge and Oxford Universities and I also thank all the Faculty (National & International) for sparing their valuable time to inculcate the knowledge, skills and newer techniques to the younger generations in Imaging Sciences.

I thank all my colleagues, the Chairpersons and organizing committee members of 21st NCSIR 2019 and the Office Bearers & Executive Committee members of Telangana State Chapter for their wholehearted support at every level.

I thank the AERB and Trade Delegates, the persons involved directly and indirectly for their extended support in organizing this event. I thank the KREST for their support in presenting Prof. Kakarla Subbarao Life Time Achievement Award and Best Scientific Paper Awards every year.

I appreciate and welcome all the student delegates who are attending in large number and their active participation in Prof. KSR Best Scientific Paper Award Competition.

The Climate during this season will be very pleasant in Hyderabad and everybody can enjoy visiting the historical places of the Pearl City and I hope this Congress gives a wonderful experience, enriches knowledge and all return homes with great satisfaction. Thank you one and all a Happy New Year Greetings too.

Srinivasulu Siramdas

YADAGIRENDER SIRAMDAS
Senior Radiographer (Retd.)
Gandhi Hospital, Secunderabad
Vice Chairman & Editor of Souvenir SIR -2019,
21st National Conference

EDITORIAL

It is a great honour and privilege to me to this Radiology Souvenir 21st National conference organized by Society of Indian Radiographrs, Telangana Chapter with Association of Nizam's Institute of Medical Sciences, Hyderabad.

Today, the Radiology plays a vital role in the field of Medical Sciences. Radio-diagnosis depends upon the quality of image produced by the Technologists. To maintain professional excellence it is necessary to update their knowledge.

This Conference is one of the platform for the Technologists to participate Scientific sessions., Group discussions and so on. This enables the technologists to update their knowledge and skills.

I would like to thank our Chief Guest, Dean, Delegates from all over National & International, all our Organizing Committee Members and S.I.R. Members.

I also express my gratitude to Sri Damodhar Naidu Koti, Chairman, President State Chapter & Sri Srinivasulu Sirandas General Secretary State Chapter and Working General Secretary SIR, for their support in each and every step in the publication of this Souvenir. I would also like to thank all our contributors and advertisers.

I hope you will enjoy this National Conference of 21st SIR-2019 in Hyderabad. We will endeavour to have you come back again & again to such conferences and CME Programmes of SIR.

Wishing you all Happy & Prosperous New Year 2020 in advance.

Thank You.

(S. YADAGIRENDER)

21st NATIONAL CONFERENCE OF SOCIETY OF INDIAN RADIOGRAPHERS – 2019

Venue: FTCCI Auditorium, Red Hills, Hyderabad

Scientific Program

Day 1 (Date: 07.12.2019 – SATURDAY)

8.00 – 9.00 am - SPOT REGISTRATION

SESSION 1 Chairperson : _____

TIME		TOPIC	SPEAKER
09:00 – 09:20 am	G 1	Guest Lecture MRI - The Basics	Mr. P S. Mahesh, SCTIMST, Trivendrum
09:20 – 09:40 am	G 2	Guest Lecture: Medical Hard Copy Devices - Laser Camera	Mr. Panneer Selvam, Associate Prof. of Medical Physics, SRMC, Chennai
09:40 – 10:00 am	G 3	Recent Advances in Cardiovascular MR Techniques and Applications	Dr. Martin Graves Head of MR Physics & Radiology IT, Cambridge University Hospitals NHS Foundation, United Kingdom
10:00– 10:20 am	G 4	Guest Lecture: Using hyper polarized Xenon-129 MRI Technique & Applications	**Mr. Anthony Mclntyre** Superintendent Radiographer, MRI, Radiology, Churchill Hospitals, Foundation NHS Trust, Oxford University.
10:20 – 10:40 am	G 5	Guest Lecture: FUSION IMAGING	Dr. L. T. Kishore Director, Radiology Services Vijaya Diagnostics, Hyderabad
10:40– 11:00 am	G 6	The role of a Radiographer in MSK MR Imaging	Mr. Prasad Vadday Senior MRI Radiographer Cambridge University Hospitals, UK
11:00– 12:00noon		INAUGURATION	
12:10 – 12:30 pm	G 7	Guest Lecture “Interventional Radiology - where it scores”	Dr. Rammurti. S Dean, Nizam’s Institute of Medical Sciences Hyderabad
12:30 – 12:50 pm	G 8	Guest lecture: Radiation Hazards & Preventive Measures	AERB
12:50 – 01:10 pm	G 9	How to develop Artificial Intelligence Lab within Radiology	Dr. Andrew Patterson Cambridge University Hospitals, UK
01:10 – 02:00 pm	LUNCH		

SESSION 3 (Student Presentation) **PROF. KSR BEST SCIENTIFIC PAPER COMPETITION** **Chairperson :**			
02:00 – 02:10 pm	**S 1**	**Analysis of various parameters which influence & improves the CT image quality**	**Mr. Hamsavardhan. S** **SRM Institute of Medical Sciences, Chennai.**
02:10 – 02:20 pm	**S 2**	**CT Evaluation of Thoracic Aortic Aneurysms**	**Olivia Geogy** **PSG Institute of Medical Science and Research, Coimbatore**
02:20 – 02:30 pm	**S 3**	**Coronary Angiogram**	**Jaipreetham Prakash. B** **Dr. Kamakshi Institute of Medical Sciences & Research , Chennai**
02:30 – 02:40 pm	**S 4**	**Uncommon congenital and Acquired aortic diseases - Role of MDCT & CT Angiography**	**Ms. Rithika. V** **SRIHER, Chennai**
02:40 – 02:50 pm	**S 5**	**Significance of 4D Computed Tomography**	**Ms. Sneha. R** **SRIHER, Chennai**
02:50 – 03:00 pm	**S 6**	**Evaluation of various clinical and technical parameters of lung biopsy using Conventional CT and Robotic Assisted CT**	**Mr. Karthikeyan S. B** **BIR, MMC, Chennai.**
03:00 – 03:10 pm	**S 7**	**Role of CT in congenital cardiovascular disease - A case Study**	**Ms. Alameluu** **SRIHER, Chennai**
03:10 – 03:20 pm	**S 8**	**DUAL ENERGY COMPUTED TOMOGRAPHY - A case study**	**Ms. Malathi. L** **SRIHER, Chennai**
03:20 – 03:30 pm	**S 9**	**CT- Renal Angiogram**	**Ms. Deepika** **SRIHER, Chennai**
03:30 – 03:40 pm	**S 10**	**"CT Urography in evaluation of haematuria**	**Prasanna. K** **PSG Institute of Medical Sciences, Coimbattore**
03:40 – 03:50 pm	**S 11**	**CT Radiation Dose and Iterative Reconstruction Techniques**	**N.H. Mohammed Hassan Rifay,** **SRIHER, Chennai**
03:50 – 04:10 pm	**G 10**	**Guest Lecture** **Can a Radiographer report MRI Scan**	**Mr. Babu Joseph** **MRI Reporting Radiographer & Deputy Manager** **Queens and King George University Hospitals , London, UK**
SESSION 4			
04:10 – 04:20 pm	**T-1**	**Trade Lecture**	**Samsung India Pvt. Ltd**
04:20 - 04:30 pm	**T-2**	**Trade Lecture** **UK Placement Guidance for Radiographers**	**SIMS Health Care Pvt.Ltd Hyderabad**
04:30 – 04:50 pm	**G 11**	**CT & MR Imaging of Orbit**	**Dr. Sunitha Linga Reddy** **Lucid Diagnostics, Hyderabad**
04:50 – 05:10 pm	**P-1**	**Importance of ECG Gating in MDCT Coronary Angiography**	**Mr. N. Krishna Kumar** **SCTIMST, Trivendrum**
05:10 – 08:00 pm	**HIGH TEA FOLLOWED BY CULTURAL PROGRAMS**		
08.00 pm	**DINNER**		

Day 2 (Date: 08.12.2019 – SUNDAY) - KLN Prasad Auditorium (Main Hall)			
SESSION 5 (Student Presentation)		**Chairperson : _____**	
08:00 – 08:10 am	S 12	Fundamental Physics of MRI	Tharun Kumar. R Dr. Kamkahi Institute of Medical Sciences & Research Memorial Hospital, Chennai
08:10 – 08:20 am	S 13	Fat suppression technique	Mr. Saksham Kumar NIMHANS, Bengaluru
08:20 – 08:30 am	S 14	"Functional MRI"	MR. Rahul. L SRM Institute of Medical Sciences, Chennai.
08:30 – 08:40 am	S 15	DCE Perfusion	Mr. Gowtham Raj R NIMHANS, Bengaluru.
08:40 – 08:50 am	S 16	PTBD - Dose controlling in Fluoroscopy Procedures	Mr. Mallikarjun D.K Kidwai Cancer Institute, Bengaluru
08:50 – 09:00 am	S 17	31P MRS & Its Applications	Ms. Monisha R BIR, MMC, Chennai
09:00 – 09:10 am	S 18	DTI & Fibre Tractography	Kaleem Basha SIMS, Chennai
09:10 – 09:20 am	S 19	Radiation Awareness among Public of Different Age groups, Educational Back Grounds and Regions	Ms. Pingali Sai Meghana
09:20 – 09:30 am	S 20	MRI PET - (Biograph mMR) A new approach for Multi modality imaging system	Mr. Alwine Anto Dept. Of NI & IR , NIMSHANS, Bengaluru
09:30 – 09:40 am	S 21	RENAL SCINTIGRAPHY	Ms. Vinitha Sakthivel PSG Instt. of Medical Sciences & Research Centre, Coimbatore
09:40 – 09:50 am	S 22	To evaluate the diagnostic accuracy of the CT component of SPECT-CTVs Diagnostic CT	Ms. Chaithanya. A NIMHANS, Bengaluru
09:50 – 10:00 am	S 23	Interventional Neurovascular Radiography - A Basic Approach to cath lab in aspects of prudent DSA Technologist	Manisha Pradhan Dept. Of NI & IR , NIMHANS, Bengaluru
SESSION 6 **Chairperson :**			
10.00 - 10.20 am	G 14	Contrast Media in Diagnostic Radiology	Dr. Abhishek Arora Associate Professor, NIMS
10:20 – 10:40 am	G 15	MR Elastography	Dr. Sandeep Juvvadi Tenet Diagnostics, Hyderabad
10:40 – 11:00 am	G 16	Guest Lecture: Dual Energy CT Scan and Clinical Applications	Dr. M. Ch. Balaji Reddy Focus Diagnostics, Hyderabad
11:00 – 11:10 am	T3	Trade Lecture	Jusha Medical Imaging Systems
11.10 - 11.30 am	TEA BREAK		

Day 2 (Date: 08.12.2019 – SUNDAY) HALL 2 SURANA HALL (PARALLEL SESSION)			
SESSION 7 (Student Presentation) Chairperson :			
8:00 – 08:10 am	S 24	2D Measurement Error in CR and DR	Sivasankari Shri Sathya Sai Medical College and Research Institute, Chennai
08:10 –0 08:20 am	S 25	"Evaluation of Urinary Excretory System by Using ionizing & Non Ionizing Radiation "	Ms. Mythili SRM Institute of Medical Sciences,Chennai
08:20 – 08:30 am	S 26	Evaluation of long bone assessment (Scanogram)	Mr. Subash SRM Institute of Medical Sciences,Chennai
08:30 – 08:40 am	S 27	Evaluation of tubal patency	Ms. Sneha G SRM Institute of MedicalSciences,Chennai
08:40 – 08:50 am	S 28	Radiographic stress views	Mr. Subha Karan S SRM Institute of Medical Sciences,Chennai
08:50 – 09:00 am	S 29	Ascending Urethrogram	Mr. Hari Balakrishnan SRM Institute of Medical Sciences,Chennai
09:00 – 09:10 am	S 30	Stereotactic breast biopsy	Ms. Athira. S SRIHER, Chennai
09:10 – 09:20 am	S 31	Dental Radiography	Charles Daniel, SRIHER, Chennai
09:20 – 09:30 am	S 32	Ultrasound Artifacts	Priyadarshini. S.V SRIHER, Chennai
09:30 – 09:40 am	S 33	Digital Breast Tomosynthesis	K. Divya Bharathi SRIHER, Chennai
09:40 – 09:50 am	S 34	Tissue Harmonic Imaging	Swetha. S SRIHER, Chennai
09:50 – 10:00 am	S 35	Evaluation of Focal Breast Lesions using US Elastography	Roopika. S, SRMC, Chennai
10.00 - 10.10 am	S 36	Simple tools are designated on the QA program for X ray Equipment	Ms. Nithya Mohan Shri Sathya Sai Medical College and Research Instt. Chennai
10.10 - 10-25 am	P 2	How we do it - Contrast enhanced Spectral Mammography	Ms. Divya Sri Ravi Kumar Govt. Kilpauk Medical College, Chennai
10:25 am	Executive Body meeting of Society of Indian Radiographers (SIR)		

MAIN AUDITORIUM - HALL - 1 (08.12.2019)

SESSION 8		**Chairperson :**	
11:30 – 11:40 am	**T-1**	**Trade Lecture**	**G.E Healthcare Pvt. Ltd**
11:40 – 11:50 am	**T-2**	**Trade Lecture**	**Siemens Healthcare Pvt. Ltd.**
11:50 – 12:05 pm	**P 3**	**"Diffusion Tensor Imaging"**	**Ms. Sheeba Kumari Sri Chitra Tirunal Institute of Medical Sciences & Technology**
12:05– 12:20 pm	**P 4**	**Cardiac MRI**	**J. Arun Prasanna Doss, Dr. Kamakshi Institute of Medical Sciences & Research, Chennai**
12:20 – 12:30 pm	**P 5**	**Arterial Spin Labeling**	**Muhammed Fawaz M SCTIMST, Trivendrum**
12:40– 12:55 pm	**P 6**	**Black blood sequence in Post Contrast MRI studies**	**Mr. Kaushal Kukreja Fortis Memorial Research Institute, Gurgaon**
12:55 - 1:10 pm	**G 15**	**Guest Lecture Endorectal Coil Vs Body Coil in MRI of Ca Rectum**	**Mr. Marimuthu Govt. Kilpauk Medical College, Chennai**
01:10 pm	**LUNCH**		
SESSION - 9		**Chairperson :**	
02:00 – 02:20 pm	**G 16**	**Guest Lecture: CARDIAC COMPUTED TOMOGRAPHY**	**Dr. Krishna Mohan Chief Radiologist, Vijaya Diagnostics, Secunderabad**
02:20 – 02:40 pm	**G 17**	**Guest Lecture: Basics of Ultrasound & Doppler**	**Dr. Murugesh Govt. Omundurar Medical College, Chennai**
02:40 – 03:00 pm	**G 18**	**Guest Lecture: Factors Affecting X -ray Image Quality**	**Dr. Ravoori Power Senior Consultant Radiologist Star Hospitals, Hyderabad**
03:00 – 03:20 pm	**G 19**	**Guest Lecture Clinical Radiology**	**Prof. J. Venkat Professor of Radiography, Apollo Hospitals, Chennai**
03:20 – 03:40 pm	**G 20**	**Guest Lecture PETCT - Principles & Applications**	**Dr. Kavitha. N Prof & Head, Department of Nuclear Medicine, NIMS, Hyderabad**
03:40 – 03:55 pm	**P 7**	**CT Imaging of Acute Pelvis Pathologies**	**Sheila Elangovan Associate Professor, Allied Health Sciences, SRIHER, Chennai**
03:55 – 04:10 pm	**P 8**	**CT Perfusion**	**S. Suganthi Assistant Professor, Allied Health Sciences, SRIHER, Chennai**
04:10 – 04:25 pm	**P 9**	**Radiation Dose Reduction Strategies in Paediatric Imaging**	**Mrs. Akila R, Tutor Academics, SIMS, Chennai**
04.25 – 04.40 pm	**P 10**	**MRI - Safety**	**Mr. Rana Randhir Kumar Tata Memorial Hospital, Mumbai**
04.40 - 04.50 pm	**G 21**	**Ayurveda in Todays Life**	**Dr. Saji D' Souza KSAC Hospitals, Hyderabad**
04.50 - 05.10 pm	**Q**	**QUIZ**	**Dr. Sujatha Patnaik, Associate Professor, NIMS, Hyderabad**
05.10 pm	**VALEDICTORY FUNCTION**		

SOCIETY OF INDIAN RADIOGRAPHERS

Telangana State Chapter
(Regd. No 531/2008)
Affiliated to SIR Central Committee Head Office: Bengaluru

Application for Membership

Name in block letters:_____

Date of Birth:_____ Age:_____ Sex:_____

Designation:_____

Name of the Institution:_____

Address for Communication:_____

_____

Permanent Address:_____

_____

_____ PIN:_____

Phone: Off:_____ Res:_____ Mob:_____

Email:_____

Membership: Current Member / Life member_____

Subscription Paid: Annual / Life_____

Affix Photo here Add one extra to the application

I have gone through the constitution of the association and I agree to abide by the same. I am enclosing herewith the DD No:_____ Dated:_____ towards membership in favour of **SOCIETY OF INDIAN RADIOGRAPHERS. AC No.: 107910011027424, Andhra Bank, NIMS Branch, IFSC: ANDB0001079.**

Place:
Date: Signature of the member

Subscription details:	**life member**
Residing in India:	Rs. 1500/-
Non Resident Indian	Rs. 100 US Dollars

Address for Communication:

Srinivasulu Sirandas, Secretary, SIR Telangana Chapter, # 54, Srinilayam, Kranthinagar, Karmanghat, Hyderabad - 500079. Ph.: 9441673339, Email: srinivasulusirandas@gmail.com

Damodara Naidu Koti, President, SIR Telangana Chapter,
#4-132, Esswar Villas, Nizampet, Kukatpally, Hyderabad - 500 090. Ph.: 98489 98737.
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MRI BASICS-PROTON TO AN IMAGE

Mahesh P.S.

Sri Chitra Institute of Medical Sciences and Technology, Trivendrum.

Protons,which is the nucleus of Hydrogen atom ,has three characteristics.It has a dipole which spins on its own axis,it precesses around a virtual axis,it can be in two different positions,one corresponding to a high energy level and other to a low energy level. When we place a subject or patient inside a magnet ,the spins of all the protons align with the magnetic field.This is done in two ways,either parallel or anti parallel(low or high energy levels).They precess or wobble due to the angular momentum of the atom.They precess at Larmour frequency.Larmour frequency can be calculated from the equation $\omega 0 = \gamma B0$,where $\omega 0$ is the larmour frequency, γ is the gyro magnetic ratio of hydrogen and B0 is the magnetic field strength.For a 1.5T MRI,the precessional frequency is 42.57x1.5 = 63.85MHZ.As more protons are aligned parallel to the main magnet the net magnetization will be in the same direction.

The net magnetization can be represented as a vector which having a magnitude and direction.A frame of rotation is considered with this vector.The Z axis is always pointing to the direction of main magnetic field ,while X and Y at right angles to Z axis. The net magnetization is called Mz or longitudinal magnetization.

By sending an RF pulse with certain strength and for a certain period of time,the net magnetization is rotated perpendicular to Z axis.ie to the X-Y plane if it is flipped to 90^0.This new magnetization is called Transverse Magnetization.It is possible to flip the net magnetization to any degree ranging from 1-180^0.This is called excitation.The protons absorb energy from radiofrequency pulse and excited to a higher energy level.When the RF is switched off these protons will align back to the direction of main magnetic field.This process is called Relaxation.

After the RF excitation,the net magnetization will starts regrow along Z axis.This regrowth of net magnetization from minimum to maximum is called T1Relaxation or Spin Lattice Relaxation.T1 is the time taken for the longitudinal magnetization to reach 63% of the original magnetization.

Soon after the 90^0 RF pulse the net magnetization is rotating in the X-Y plane as the protons are inphase. They will start dephasing because the magnetic field of each vector is influenced by one another.The process of getting from total in-phase to total out of phase is called T2 Relaxation or T2 Decay.T2 is also a time constant.It is defined as the time it takes for the spins to diphase to 37% of the original value.T2 relaxation also called spin-spin relaxation.

T1 and T2 will be different for each tissues.Tightly bound protons will release their energy much quicker to their surroundings than protons bound loosely.Fat will diphase quickly while water molecule will diphase slower.The rate at which they release energy is different.

The excitation and relaxation must be repeated many times.The time between two 90^0 excitation pulse is called TR (Repetition time).Time between 90^0excitation pulse and the echo is the TE (Echo time).

1895: Wilhelm Roentgen detects x-rays

DUAL ENERGY COMPUTED TOMOGRAPHY AND CLINICAL APPLICATIONS

Dr. Ch. Balaji Reddy

Focus Diagnostics, Hyderabad

In x-ray computed tomography (CT), materials having different elemental compositions can be represented by identical pixel values on a CT image (i.e. CT numbers), depending on the mass density of the material. Thus, the differentiation and classification of different tissue types and contrast agents can be extremely challenging.

In dual-energy CT, an additional attenuation measurement is obtained with a second x-ray spectrum (i.e. a second "energy"), allowing the differentiation of multiple materials. Alternatively, this allows quantification of the mass density of two or three materials in a mixture with known elemental composition.

Recent advances in the use of energy-resolving, photon-counting detectors for CT imaging suggest the ability to acquire data in multiple energy bins, which is expected to further improve the signal-to noise ratio for material-specific imaging.

A number of technical approaches exist for acquiring dual Energy data,

1) Sequential acquisition of two different scans,
2) Rapid tube potential switching,
3) Multilayer detectors,
4) Twin beam
5) Dual x-ray sources.
6) Energy-resolving, photon-counting detectors represent an emerging approach to acquiring more than two energy measurements;

CLINICAL APPLICATIONS:

Renal stone characterization
Gout crystals assessment
Metal artifact reduction
Efficient bone removal

Monoenergetic image analysis.

Iodine overlay with quantification

Bone marrow assessment
Effective calcium removal and lumen analysis in Angiograms.
Significantly reduced radiation dose.

21ST NATIONAL CONFERENCE OF SOCIETY OF INDIAN RADIOGRAPHERS 2019 - HYDERABAD

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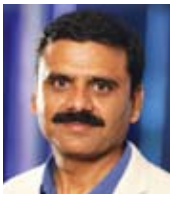

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Inauguration of CME, at NRI Medical College, Vijayawada by Dr. Dr. Veeragandham Subbarao on 10th March 2019.

Mr. Srinivasulu Siramdas, WGS, Mr. Damodara Naidu, President SIR and Mr. M.A. Waris Organizing Secretary of SIR also seen in the picture.

Felicitation to Mr. Damodara Naidu Koti, by his students at NRI Medical College, Vijayawada

Hyperpolarised Xenon (HPX) MRI

Guest Lecture: Anthony McIntyre

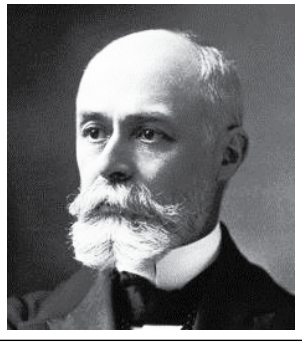
Superintendent Radiographer, MRI, Radiology, Churchill Hospital, Oxford University Hospitals Foundation NHS Trust, Oxford OX3 7LE, 01865 235789, anthony.mcintyre@nhs.net

What are we waiting for?

This talk will cover a basic introduction to this unique field within MRI and Radiology which allows us to gather more than just anatomical information of an area of the body that is not normally considered to be accessible via MRI. Instead of using the MRI scanner to detect a signal from Hydrogen protons Xenon imaging allows us to detect gas uptake both in the lungs and the performance of the lungs in exchanging this gas into the bloodstream.

Scanning technique and the practicalities of using the technique in a standard MRI department will be discussed. Some of the latest developments will be looked at.

Most importantly, the talk will attempt to cover the question: "What are we waiting for in HPX MRI?"



1896: Antoine Henri Becquerel discovers radioactivity

Prostate MRI

Ignoring The Elephant in the Room.

This talk will look at the Prostate Scanning Pathway employed by the Churchill Hospital in Oxford, UK. MRI has developed from a basic staging tool after cancer diagnosis to providing an effective method of both improving diagnosis and planning further treatment via the use of Multiparametric (Mp)MRI.

While the pathway at this Hospital works well, the talk will also look at why it only works for us and is almost certainly not right for your service. The talk will also cover the benefits of MpMRI over other methods of prostate scanning, the pros and cons of gadolinium, the classification of MRI findings and the onward pathway of patients.

Many aspects of prostate imaging will not be covered in any detail. These will be the "Elephant in the room." The talk will include an exploration of how one size does not fit all when it comes to MRI and medical technology.

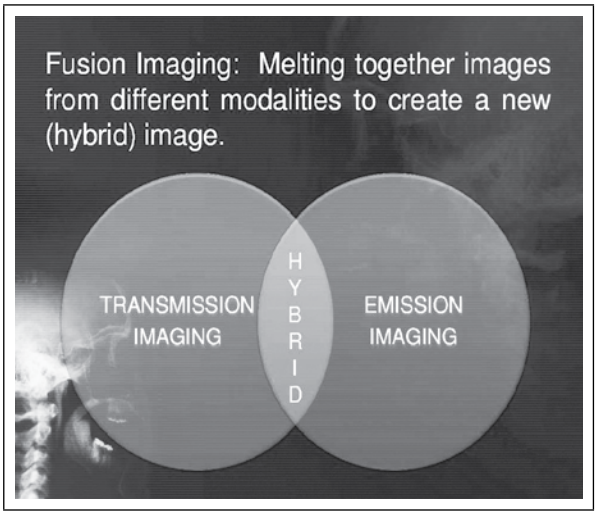
Best Wishes,
Anthony

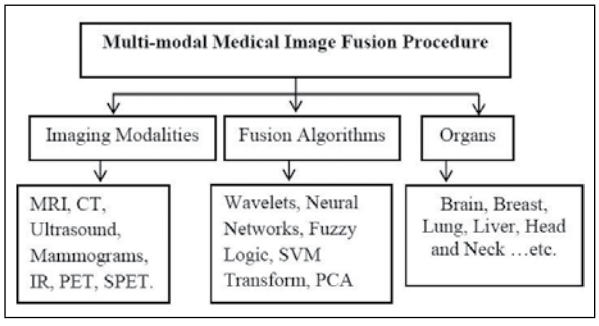
FUSION IMAGING

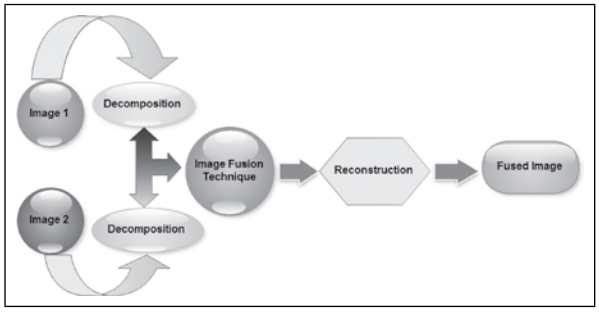
Dr. Kishore Lt

CARE HOSPITALS, HYDERABAD

From advances in x-ray film and cassettes to the introduction of computers and digital images, diagnostic imaging has never stopped reinventing its technology to improve patient care. Today, diagnostic imaging is on the cusp of explosive growth in an arena known as fusion imaging. This technology melds two independent imaging modalities— typically a procedure that demonstrates an organ's function with one that depicts the organ's anatomy—to produce a diagnostically and clinically superior study. Nuclear medicine procedures such as positron emission tomography (PET) and single photon emission computerized tomography (SPECT) are unparalleled in their ability to assess information about metabolic function, while Computerized Tomography (CT) and Magnetic Resonance (MR) are superior at depicting anatomy. Until recently, clinicians had to obtain physiological and anatomical information on separate machines and use special registration software to digitally superimpose the two images. Today, new hybrid equipment is capable of performing both types of examinations simultaneously, automatically merging the data to form a composite image. By uniting metabolic function with anatomic form, fusion imaging depicts the human body with a level of precision never before achievable.







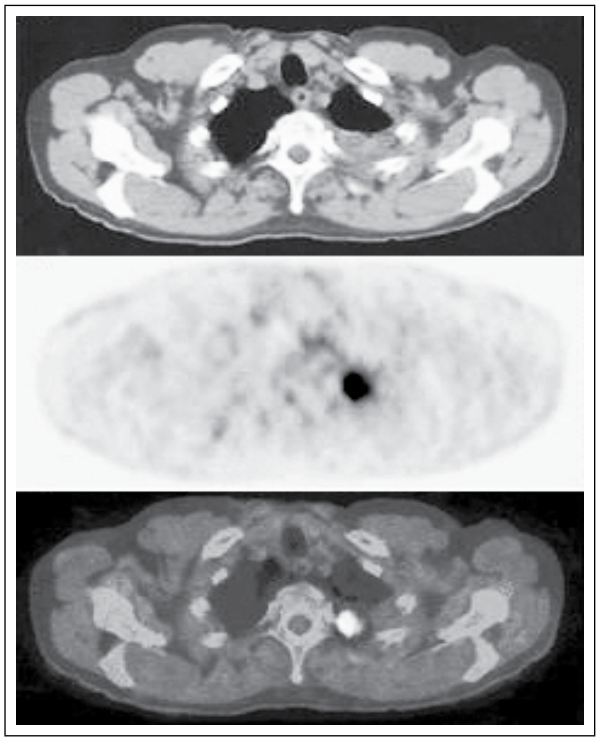
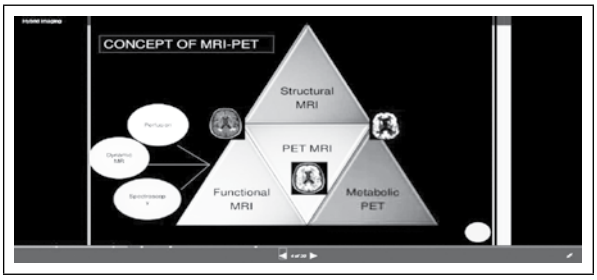
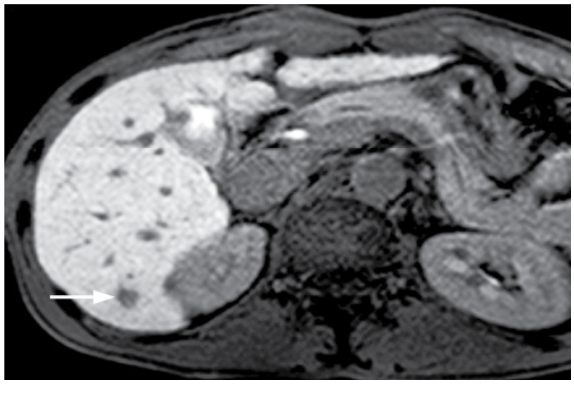


Fig. CT shows left pleural reaction. PET shows FDG avid lesion in left apical region. Fusion image shows active nodular lesion along the medial aspect of pleural reaction which is now easy to biopsy.

PET/MR imaging offers the potential for a powerful "one-stop shop" combination of structural, functional, and molecular imaging technology that may be superior to that of PET/CT, PET alone, or MR imaging alone for certain clinical applications.



For the fusion imaging technique, a variety of tracking methods are available, including optical, image-based, and EM tracking. In general, optical tracking is most commonly utilized for surgical procedures and image-based tracking for vascular interventions. In contrast, EM tracking is most widely used for US-guided procedures. With the technical development of ultrasonography (US), electromagnetic tracking-based fusion imaging of real-time US and computed tomography/magnetic resonance (CT/MR) images has been used for percutaneous intervention such as biopsy and radiofrequency ablation (RFA). Because of the fusion imaging technique, the fused CT or MR images show the same plane and move synchronously while performing real-time US. With this information, fusion imaging can enhance lesion detectability and reduce the false positive detection of focal hepatic lesions with poor sonographic conspicuity. Three-dimensional US can also be fused with realtime US for the percutaneous RFA of liver tumors requiring overlapping ablation.



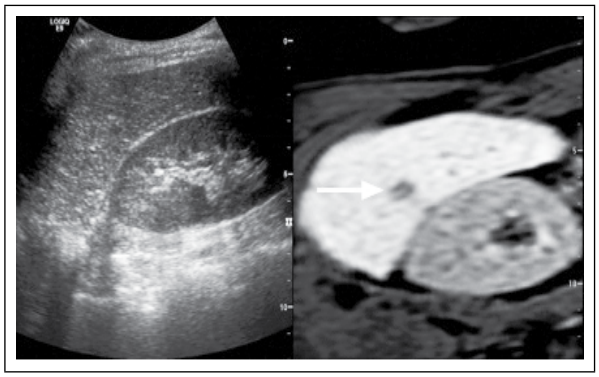
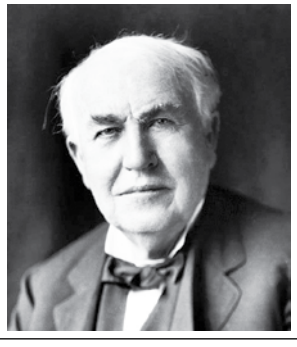


Fig. MR shows focal mass lesion in right lobe of liver. This lesion is not clearly seen on ultrasound. Fusion image shows the lesion in real time ultrasound, which is now easy to biopsy.



1896: Thomas Edison invents the first commercially-available fluoroscope

BASICS OF ULTRASOUND & DOPPLER

Mr. Murugesh.E,

BOT, M.Sc (Psy), CMT, DRDT, MRT, Radiographer, Government Medical College, Omandurar Govt. Estate, Chennai-2

ULTRASOUND:

The sound of frequency above 20000Hz is called Ultrasound. The range of ultrasound frequency used for medical imaging is 1MHz to 20MHz.

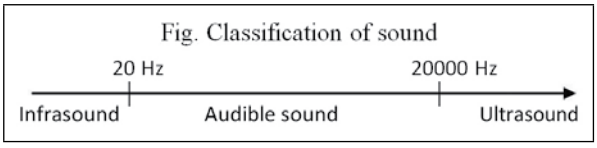


Fig. Classification of sound

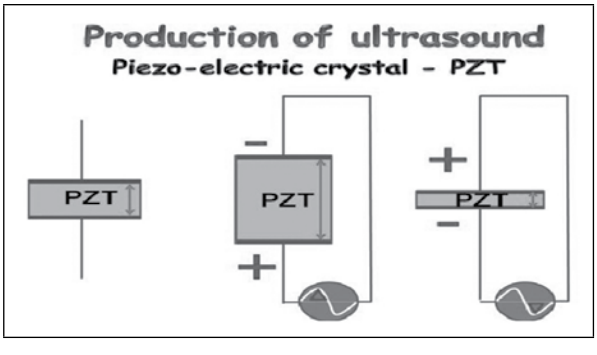
PRODUCTION OF ULTRASOUND:

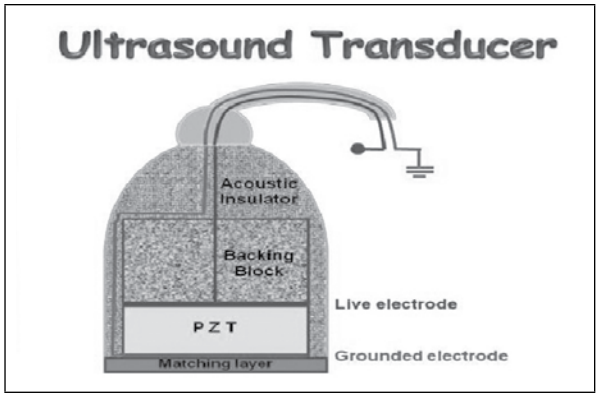
A transducer is a device that converts one form of energy into another. Ultrasound transducer is the device which converts the electrical energy into ultrasound energy and vice versa.

Ultrasound transducer converts electrical energy into ultrasound energy during transmission mode and converts ultrasound energy into electrical energy during receiving mode. The ultrasound transducer works as both transmitter and receiver.

Certain materials, on application of electric field will be subject to a change in its physical dimension and vice versa. This effect is called piezo-electric effect and the materials which exhibits this effect is called piezo-electric effect.

The piezo-electric crystal element (PZT-Lead Zirconate Titanate) is the main component of the ultrasound transducer. When alternating electric field is applied across the crystal, it vibrates to produce ultrasound waves.





ULTRASOUND TRANSDUCERS:

The piezo-electric crystal is located near the face of the transducer. The front and back faces of the crystal are coated with a thin conducting film to ensure good contact with the two electrodes that will supply the electric field. The top electrode is a live electrode. The bottom electrode is grounded to protect the patient from electrical shock.

A thick backing block abuts against the piezo-electric crystal reduces the ultrasound pulse duration. The housing is usually a strong plastic. An acoustic insulator of rubber or cork prevents the sound from passing into the housing.

TYPES OF ULTRASOUND TRANSDUCERS:

Various types of real-time ultrasound probes are available to cater to various applications. Basic types are linear array, convex array and sector array. Special types are endo-cavitary (trans-vaginal / trans-rectal), Intra-operative, ophthalmic, 3D and 4D probes.

INTERACTION OF ULTRASOUND WITH MATTER:

During scanning, the ultrasound waves are transmitted into the body of the patient. Ultrasound travels through the body until it comes to another material of different acoustic impedance. At every interface (boundary between different tissues) some proportion of ultrasound gets reflected, some gets

scattered, some gets absorbed and the remaining gets transmitted / refracted depending up on the nature of the tissue-interface.

With diagnostic level low-intensity ultrasound, reflected and scattered echoes contributes for the formation of the image. Transmitted ultrasound helps to get information about deeper structures. Refracted ultrasound produces artifacts which degrades the image quality. Absorbed ultrasound produces minimal amount of heat in the tissues which gets dissipated too fast to produce any biological hazard.

ULTRASOUND DISPLAY MODES:

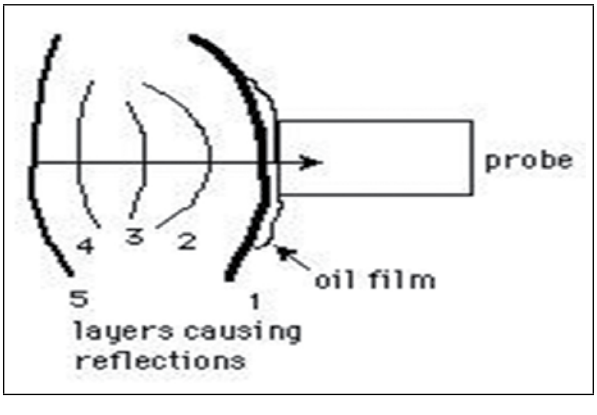
The ultrasound echoes reaching the transducer is converted into electrical signals which are then processed to form the patient data in an appropriate display device (Cathode ray oscilloscope / TV monitor).

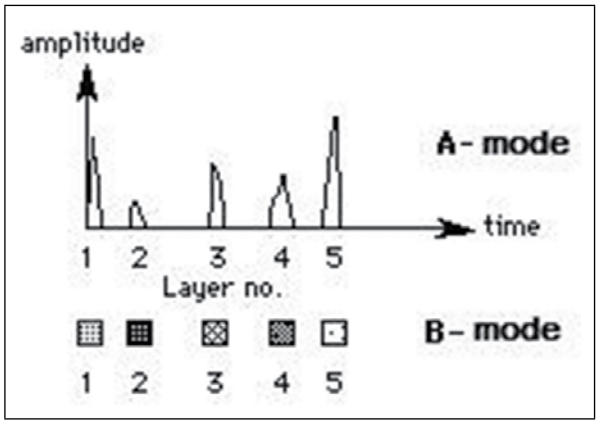
A-mode:

'A' stands for amplitude.

The echoes are represented as spikes projecting from a baseline. The height of the spikes indicates the echo amplitude. The speed of sweep of the base-line is calibrated to correspond to the speed of ultrasound in soft-tissue (1540m/s) and therefore the position of the displayed echo along the baseline indicates the position of the acoustic boundary within the body.

The information obtained is limited and is displayed on the cathode ray oscilloscope. The mode has its applications in Ophthalmology, determination of brain mid-line shift in trauma or brain tumor patients, accurate measurements of fetal head size.





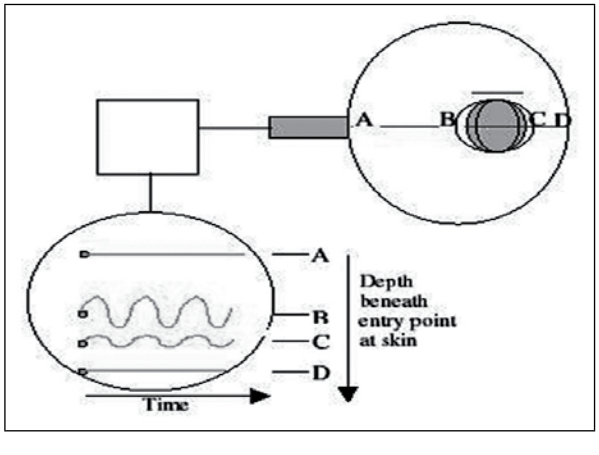
B-mode:

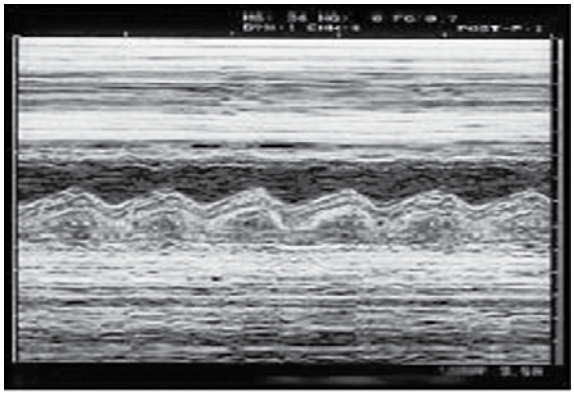
'B' stands for brightness. Here in this mode, the echoes are represented as brightness dots along the horizontal base-line. The echo intensity is indicated by the degree of brightness. Even though this mode gives limited information, in practice, this principle is applied in TM-mode and B-scan.

TM-mode:

'T' stands for Time and 'M' stands for motion. In this mode motion of the echoes is tracked over a period of time. The display sweeps across the screen in a direction perpendicular to the base-line to add the dimension of time and thus to chart the motion of the individual echoes. The stationary interfaces trace out a straight line display, where as moving reflectors trace out curved lines. This mode is useful in tracking moving structures such as the heart, components of the heart and great vessels. The transducer is kept stationary. The traced out pattern is compared with the established normal patterns.

Applications: Echocardiography.





M-mode cardiac scan

B-scan:

The ultrasound transducer is operated in such a way that the sound beam traverses a plane of the body. B-scan is performed by sweeping the transducer across the region of interest producing outlines of organs and mass and also the consistency and density variations within. Multiple scan lines are produced and the corresponding trains of echoes are processed to form an image frame. Multiple image frames are changed per second to form real-time two dimensional image of the region of interest.

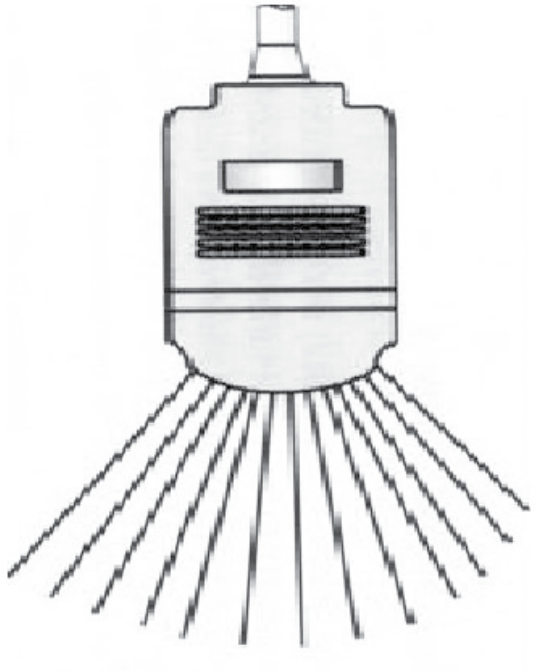


Fig. B-scan acquisition

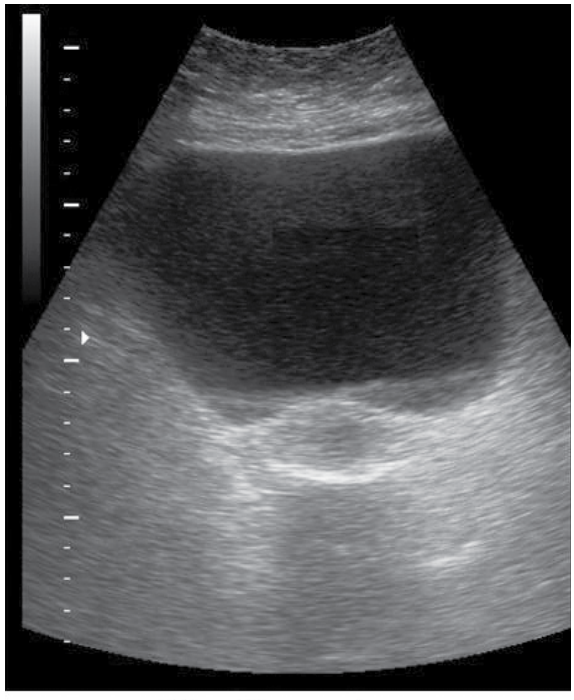


Fig. B-scan image

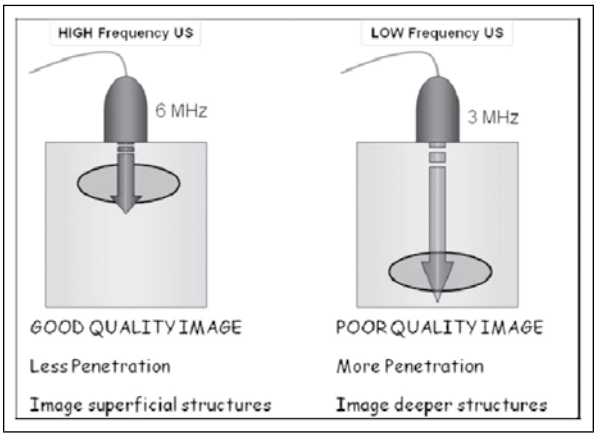
In B-scan, persistence of the previously obtained scan line data and gray-scale imaging should be possible. For this purpose, scan converter is used which is basically a memory device and it helps to convert the scan acquisition format into TV display format.

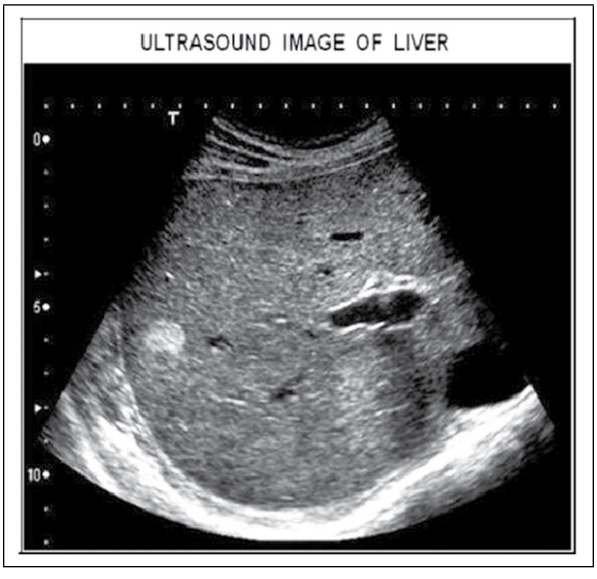
ULTRASOUND IMAGE QUALITY:

High frequency ultrasound, larger size piezo-electric crystal, ultrasound focusing, short ultrasound pulse duration and lesser ultrasound beam width helps to improve image quality.

As ultrasound frequency and attenuation are directly proportional to each other, use of high frequency ultrasound is restricted for imaging superficial structures. To image deeper structures, low frequency ultrasound is used with a compromise in image quality.

Moreover, various ultrasound machine controls like Time Gain Compensator, Delay control, Near Gain, Far Gain, Enhancement control, Intensity control, Reject control, etc. helps to improve the display of image on the TV monitor.





ADVANTAGES OF ULTRASOUND IMAGING:

It is considered safe (uses no ionizing radiation) and so patient can be made to undergo scan at specified intervals and have proper follow-ups.

US can differentiate solid mass and cyst.

US can differentiate malignant and benign masses.

US can easily and accurately measure dimensions and volume.

US can easily tell how close the masses are from important vessels. US is a comparatively less expensive investigation.

Ultrasound scan reporting can be done much faster.

DOPPLER: The Doppler shift is an apparent change in sound frequency that results from the reflection of ultrasound from a moving target.

In Doppler, an ultrasound beam of known initial frequency is reflected from moving targets (primarily red blood cells). Doppler signals are shifted proportional to the direction of blood flow (increased frequency signifies movement toward the transducer, and decreased frequency denotes movement away from it) and the velocity of flow (a large Doppler shift indicates increased velocity).

After the information is processed, it is displayed to demonstrate direction, magnitude, velocity, and uniformity of velocity vectors (turbulent versus laminar), findings that assist in distinguishing normal from abnormal flow. Signal strength, which is proportional to the number of moving red blood cells, is represented in shades of gray on the spectral display (the darker the shade, the greater the number of targets).

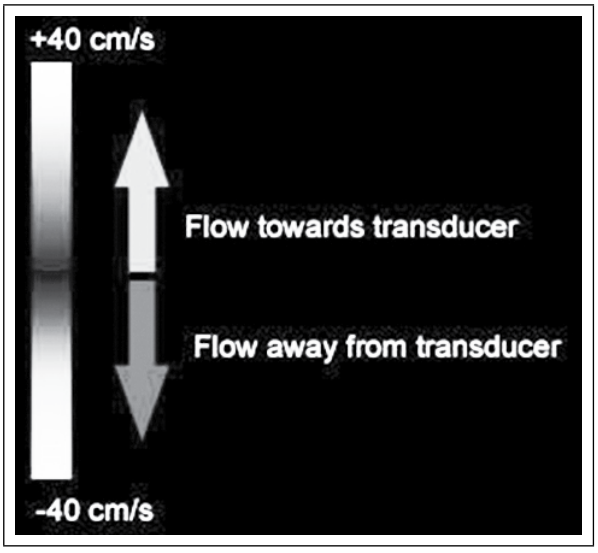
Continuous-Wave Doppler: Continuous wave Doppler (CWD) simultaneously transmits and receives sound waves with separate piezoelectric crystals, recording every velocity received along a path defined by the operator. It is capable of recording the direction and velocity of flow even at high velocities. The signal, however, is not gated (it receives all underlying velocities); thus, spatial localization of the abnormal velocities is lacking.

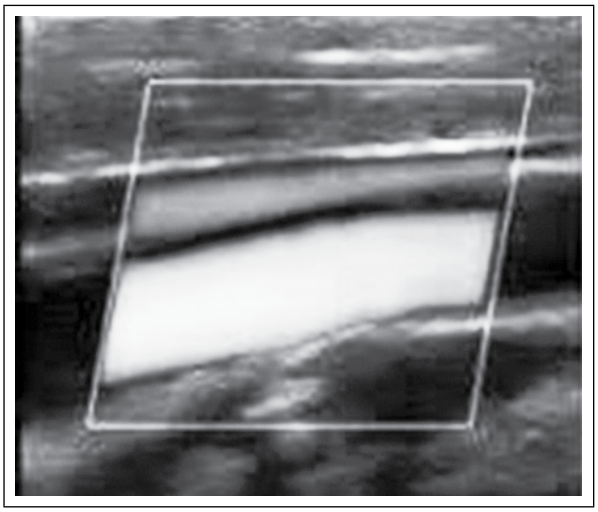
Pulsed-wave Doppler: In pulsed wave Doppler (PWD), the user defines a small area (the sample "volume" or "gate") within the B-mode image, and (based on pulse repetition frequency, or the time required for returning sound waves) only the Doppler shifts recorded from that area are recorded. Because the pulsed-wave Doppler technique sends and receives ultrasound intermittently, however, accurate recording of high-velocity signals is more difficult than with continuous-wave studies (because of aliasing).

Thus, pulsed-wave Doppler has signal aliasing at high frequencies but has depth acuity.

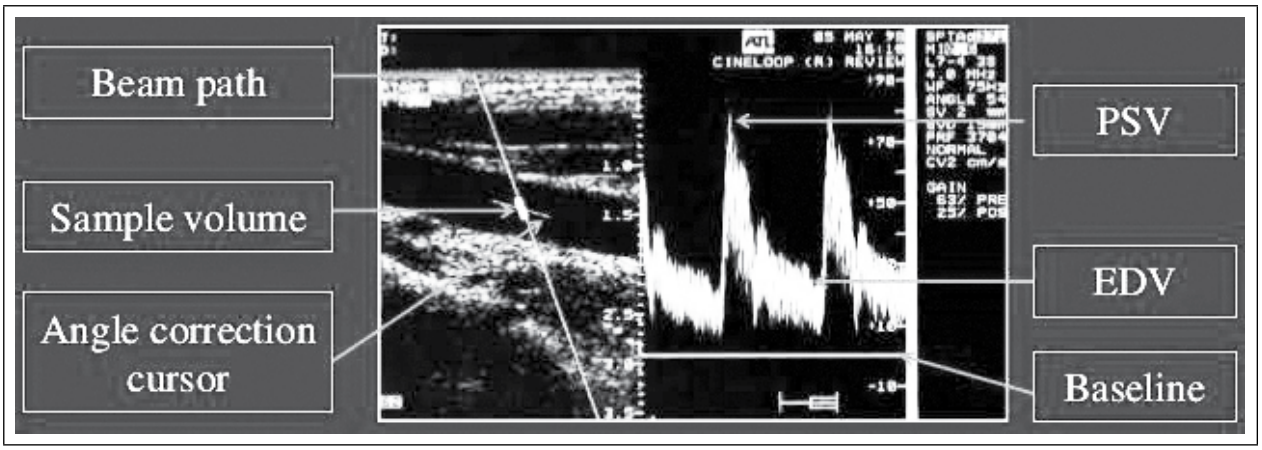
Color Flow Imaging: In a commonly used format, blood moving toward the transducer is represented as warm colors (shades of red), and blood moving away from the transducer is depicted as cold colors (shades of blue). Turbulent (non-laminar) blood flow

is represented by the addition of green hues to the other colors (a mosaic pattern). Aliased velocities shift the color from red to blue or vice versa (color reversal). A mosaic pattern and color reversal often coexist because high velocities are usually associated with turbulent flow.



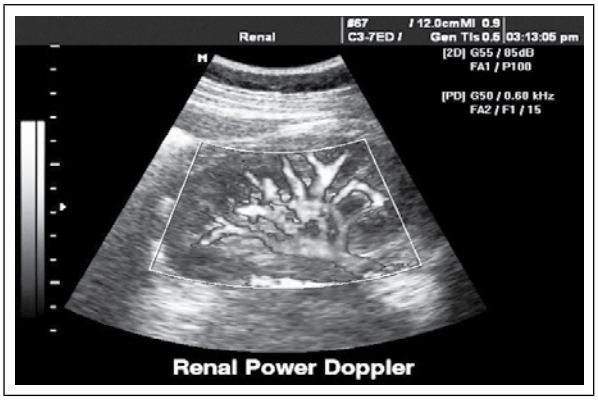


SPECTRAL Doppler: This utilize Fourier analysis (fast Fourier transformations) to average the frequencies over a circumscribed time period, usually 5 milliseconds, convert frequencies to velocities using the Doppler equation, and display a "spectrum" of these frequencies as Doppler waveforms (hence the term "spectral")



Power Doppler is a technique that uses the amplitude of Doppler signal to detect moving matter. Power Doppler:

- is independent of velocity and direction of flow, so there is no possibility of signal aliasing
- is independent of angle, allowing detection of smaller velocities than color Doppler, facilitating examinations in certain technically challenging clinical setting
- has higher sensitivity than color Doppler



Mr. Srinivasulu Siramdas elected as Working General Secretary of SIR at Chennai. 12.2017.

Inauguration of Indo US CME at KREST on 11.11.2018 organized by SIR T.S State Chapter

Felicitation to Dr. Rammurti. S, Sr. Prof. and Head, Dept. of Radiology, NIMS who is back bone of all our Events during Indo Us CME on 11.2018.

Felicitation to Dr. K. Manohar, Director, NIMS on the occasion of Indo Us CME on 11.2018.

Felicitation Prof. Kakarla Subbarao

SIR Representation to Union Minister Sri. Sadananda Gouda during 20th NCSIR-2018

Felicitation to retired Radiographers by SIR, Telangana State Chapter

Felicitations to Radiographers on the occasion of Indo US CME 2018

The First Porf. Kakarla Subba rao life time Achievement Award 2014 to Sri . S.A. Wazid, Chairman SIR.

Prof. KSR Life Time Achievement Award – 2015 to Mr. Pawan Kumar Popli, AIIMS, New Delhi

Prof. Kakarla Life Time Achievement Award – 2016 to Mr. Trilokinath Mishra, President, SIR.

Prof. KSR Life Time Achievement Award – 2017 to Mr. Munirathinam, Chennai

Mr. Daniel Kanakrayil , received the Prof. KSR Life Time Achievement Award 2018 on 11.11.2018, at KREST, Hyderabad. Mr. B.V. Reddy, Mr. NVSSLN Murthy, Mr. Shankar Bhagat, Dr. K. Manohar, Director NIMS, Mr. Damodara Naidu Koti, Mr. Srinivasulu Siramdas, Dr. Rammurti. S, Sr. Prof & Head, Dept. of Radiology NIMS and Mr. Waris also seen.

New Developments in MRI Liver imaging

Martin Graves

PhD Cambridge University Hospitals, UK

MRI offers advantages for the non-invasive localisation and characterisation of benign and malignant focal lesions as well as diffuse liver disease.

Focal lesion characterisation requires the use of dynamic contrast-enhancement (DCE) using either standard Gadolinium chelates or for specific indications hepato-biliary agents that are taken up by functioning hepatocytes. Diffusion weighted imaging (DWI) is used for the identification of primary lesions and metastases but not characterisation as there is too much overlap in quantitative apparent diffusion coefficient (ADC) values.

DCE: Assessment of the dynamic uptake of a contrast agent requires rapid data acquisition to provide an appropriate balance of spatial and temporal resolution, as well as volumetric coverage over an extended acquisition time incompatible with breath-holding. Several advanced free-breathing dynamic pulse sequences have been developed that can acquire multi-phase data robust to respiratory motion.

DWI: Although DWI is very sensitive to changes in cell density its application in the liver is technically challenging due to respiratory motion, poor SNR, limited spatial resolution and distortion. Careful optimisation of the imaging protocol and the use of newer segmented EPI sequences can ameliorate some of the associated artefacts.

Fat: The difference in processional frequencies between the protons in water and fat can be exploited to quantify the hepatic fat fraction. This is most readily achieved using fast 3D multiple-echo gradient echo sequences that can be acquired in a single breath-hold. However, accurate and precise measurements require correction of several confounding factors including T1 bias, T2* relaxation and the multiplicity of different resonant frequencies of the various fat moieties.

Iron:Like fat quantification, iron can also be indirectly quantified using breath-hold 3D multiple-echo gradient echo sequences. The signal decrease, as a function of the different echo-times, is fitted by an exponential decay model that is used to determine the T2 * relaxation time o its relaxivity R2* (=1/ T2 *). The liver iron concentration (LIC) can be estimated using published calibration curves that have been validated against liver biopsies.

Fibrosis: The mechanical stiffness of the liver increases directly with fibrosis and can be quantitatively determined using MR elastography (MRE). This is a method that measures the speed of shear waves propagating through the liver that are created by a vibrating pneumatic driver placed over the liver. A breath-hold phase-contrast sequence is used to detect the tissue motion, which is then mathematically converted into tissue stiffness maps (elastograms).

There are also several technical developments that can improve the quality and hence diagnostic confidence of liver imaging, including new designs of RF receiver coils and accelerated acquisition techniques.

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2. Hernando D, Levin YS, Sirlin CB, Reeder SB. Quantification of Liver with MRI: State of the Art and Remaining Challenges. J. Magn. Reson. Imaging 2014;40:1003-1021.

Physics of Cardiac Magnetic Resonance

Martin Graves

PhD Cambridge University Hospitals, UK

Introduction A basic cardiac MRI examination will incorporate techniques for morphological and functional imaging with more advanced methods used for the evaluation of myocardial viability. Whilst recent developments in hardware and software have substantially improved the quality and reliability of cardiac magnetic resonance (CMR) it is important to understand the methods and their limitations.

Morphological Imaging Ideally demonstrates a myocardial contrast weighting e.g.T1w or T2w, with ideally no signal from the blood pool. In order to obtain images in a breath-hold a fast spin echo (FSE) based method is used with the ECG-triggered echo-train readout positioned in diastole when cardiac motion is reduced. Since blood within the ventricle may appear with variable signal intensity a double inversion recovery (DIR) preparation scheme is often used to suppress the signal from blood.

Functional Imaging demonstrates myocardial motion throughout the cardiac cycle thereby allowing both qualitative and quantitative assessment of global and regional ventricular and valvular function. Multiple images, known as temporal phased, are acquired throughout the cardiac cycle, so that when played back as a movie or "cine" loop the motion can be clearly shown. The basic sequence is a balanced steady-state-free-precession (bSSFP) gradient echo that has high blood/myocardial contrast. MRI can also encode the velocity of tissue, usually blood flow, within the phase of the MR signal. Special cine phase-contrast (CPC) imaging sequences allow multi-phase imaging of blood flow.

Myocardial Perfusion performed using MRI offers several ad advantages over the conventional nuclear medicine methods for the evaluation of myocardial perfusion. Myocardial perfusion MRI involves imaging the heart during the bolus administration of a Gadolinium-based contrast agent during which we observe a transient 'T1-enhancement' effect whereby the myocardial signal intensity increased during the passage of the contrast agent through the myocardium. Regions of ischemia with poor perfusion will show a significantly reduced and/or delayed enhancement compared to the normally perfused regions.

Myocardial Viability can be assessed using Late Gadolinium Enhancement (LGE). Recent evidence shows that LGE is exclusively related to irreversible injury, irrespective of contractile function or age of injury. After either an acute ischemic injury or a chronic infarction there is an increase in the extracellular volume which results in retention of a standard extracellular gadolinium contrast agent. If T1w imaging is performed 10-20 minutes following administration of the contrast agent there is maximal signal difference between infarcted and normal myocardium.

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1896: John Macintyre opens the world's first radiology department in Glasgow

ANALYSIS OF VARIOUS PARAMETERS WHICH INFLUENCE AND IMPROVES THE CT IMAGE QUALITY

Hamsavardhan.S, Bsc.MIT[III rd Year]

Department of Radiology and Imaging Sciences SRM Institutes for Medical Sciences,Vadapalani, Chennai-600026

Introduction:

In CT scanning, image quality has many components and is influenced by various technical parameters. While image quality has always been a concern for the physics community, clinically acceptable image quality has become even more of an issue as strategies to reduce radiation dose – especially pediatric patients.

Aim:

The purpose of this study is to describe various components of CT image quality – noise, slice thickness (Z-axis resolution), low contrast resolution, and high contrast resolution – as well as radiation dose and to describe how each of these may be affected by technical parameter selection

1898: Marie Curie publishes her paper 'Rays emitted by uranium and thorium compounds'

SCANNING PARAMETERS:

- kV
- mA
- Time
- Pitch
- Voxel Size
- Matrix
- Noise
- Resolution

Results:

Various above mentioned factors are modified and images and its quality are analyzed.

Conclusion: Different clinical imaging tasks have different requirements in terms of acceptable image quality. The more clearly defined the objectives of a clinically indicated study, then the more clearly the image quality requirements can be determined.

In an effort to reduce radiation dose, the effect on physical image quality and the ability to carry out the clinical imaging task must be considered.

CT IMAGING OF ACUTE PELVIC PATHOLOGIES

Sheila Elangovan

Associate Professor- Faculty of Allied Health Sciences, Sri Ramachandra Institute Of Higher Education and Research, Chennai-116

PREAMBLE

A very large range of disorders, from benign, self-limited conditions, to processes requiring emergency surgery, can present with acute abdominal and pelvic pain. Computed Tomography plays a substantial role in the routine diagnosis and management of patients with these disorders. Similarly, CT is pivotal in the evaluation of patients with abdominal and pelvic trauma, whether blunt or penetrating.

When to perform CT?

CT plays an important role as a problem solving tool in stratifying patients with acute pelvic symptoms into appropriate treatment options particularly when ultrasound is inconclusive or suboptimal.

Patient preparation & premedication

No specific patient preparation due to acute pelvic symptoms (emergency scenario)

Indications

Blunt trauma
Appendicitis
Inflammatory bowel disease
pneumoperitoneum
Colitis, Iliac or Meckel's diverticulitis
Omental infarction
Small bowel / large bowel obstruction
Intussusceptions
Caecal / sigmoid volvulus
Epiploic appnedagitis
Acute gynaecological disorders
Uterine disorders
Ovarian disorders - ovarian torsion, hemorrhagic ovarian cyst, ovarian hyperstimulation syndrome
Endometriosis
Pelvic inflammatory disease
Post-operative complications
Post partum complications – Ovarian vein thrombosis, endometritis, HELLP

Technical requirements

MDCT

CT protocol

- Plain / Plain and contrast CT
- Justified multiphase contrast enhanced CT

Protocols should be optimized and tailored to address a specific indication for pelvic imaging.

CONCLUSION.

Computed tomography (CT) remains the mainstay of the evaluation of patients presenting with acute pelvic symptoms. Since protocols have evolved along with technological advancements CT (plain or contrast enhanced) pelvis has been established as a most useful imaging modality and clinical tool in the evaluation of acute pelvic pathologies in male and female patients.

1913: Albert Salomon commences research leading to mammography

Medical hardcopy device – Laser Camera – Working Principle

S.Panneerselvam

Associate Professor of Medical Physics, Sri Ramachandra Institute of Higher Education & Research , Chennai

Introduction

Radiological images are displayed for interpretation using an expensive Medical grade LCD monitors. Despite the increasing capability to transfer and view medical images , digital images are still needed to be recorded on a film as an Hardcopy to the patient.

Today , images are commonly recorded on film by Multiformat Laser Camera , also known as Laser printers. The images from various modality are sent to this laser Camera by a computer network and this imager can print the images in various formats (1 image , 4 images , 12 images or 20 images in one sheet of film). After exposing the film , the same can be processed chemically and then viewed with the help of a Viewing Lobby. Now all the laser imagers use silver based film and thermal processing to convert the latent images on the exposed film into visible images.

Laser Camera

A laser camera consist of following components

1. Microprocessor
2. An image memory
3. An analog to digital converter (A/D Converter)
4. A laser with a modulator to vary the intensity of the beam
5. A rotating polygon mirror to scan the laser beam across the film
6. A film transport mechanism to move the film in a linear fashion , so the scanning covers the entire film

Types of Laser based Hard Copy technology

i) Wet Laser technology
ii) Dry Laser technology
iii) Laser induced Thermal technology

Wet Laser technology

After exposing the film from a particular modality, the same is developed using a processor. The laser beam exposes the film as a series of dots The intensity of each dot depends on the strength of the input signal. Stronger the beam, darker would be the resultant dot on the film.

The laser beam continues to expose the entire page as a series of dots The images on the film exposed by the laser beam are latent images The latent image then needs to be processed in chemicals so that the latent image is converted to a visible image
Most of the Wet Laser Cameras offer 2 options for processing images. The images could be processed in the dark room (manually or in a stand-alone Automatic Film Processor) or it could be processed through a docked Automatic Film Processor. A Film Processor is said to be docked to a Laser Camera when it is directly connected to the Laser Camera.

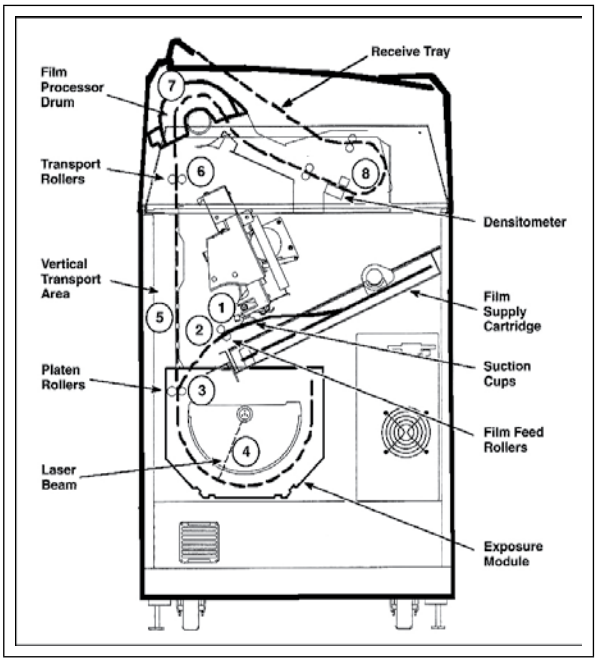
Dry Laser technology

The Dry Laser technology (or the Photothermographic technology) uses the same laser exposure mechanism as the Wet Laser technology. However, the Dry laser technology does not require any chemicals for processing – thereby eliminating the need for darkrooms, plumbing and environmentally polluting chemicals.

In this technology after the Dry laser film is exposed, it passes over a Hot Drum (temperature greater than 120°C). The Dry Laser film is a special film containing chemicals which are sensitive to the Laser light (for image formation) and to heat (for conversion of latent image into visible image).

Working Principle

A suction pump lifts a single film out of supply cartridge and feeds into transport rollers. Film moves to a Platon (flat glass pane) which is the exposure area. Platon holds the film , while the scanner writes the image onto the film. Film is the transported over a processor drum, wherein heat develops the film (Thermal Processing) . Transport Rollers move the exposed film through Densitometer to a sorter and out to bins.



LASER means Light Amplification by Stimulated Emission of Radiation. Laser in a Laser camera are differentiated on the basis of their wavelengths.

1. Helium Neon Laser: 633nm
2. Solid State Laser: 670nm (Visible Region)
3. Solid State Laser: 810nm (Infra red Region)

Advantages of Dry laser technology

- Excellent image quality
- No Processing Artifacts
- No contact artifacts
- No Wet Processor required
- Eliminates smelly darkrooms
- Eliminates requirement of chemicals thereby leading to reduced environmental pollution.

Quality Control in Dry Laser Camera

Dry Cameras are periodically tested in departments by using a " SMPTE " (Society of of Motion Picture and television Engineers) test pattern generated by the Dry Camera software. An SMPTE test pattern optimally adjusts a dry camera to print films as seen at a monitor. The SMPTE pattern provides both qualitative and quantitative information of image display systems , dry cameras as well as variation in optical density of Dry films

Periodic cleaning of Print head and self checks on Laser gun are also important aspects of quality control

Conclusion

An understanding of Hard copy devices is often superficial and neglected which leads to day to day quality issues of the Imaging film. So It is important for all the technologist to know the key features of Dry camera and its impact on workflow for smooth functioning.

References

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1913: William Coolidge introduces his eponymous x-ray tube

Importance of ECG Gating in Multi Detector CT Coronary Angiography

N.Krishnakumar

Department of imaging Science and Interventional Radiology,
Sree Chitra Tirunal Institute for Medical Science and Technology (SCTIMST), Tvm-11

Introduction:

Accurate detection of coronary artery disease is a great challenge with a non invasive cross-sectional imaging technique. The small diameter of the coronary vessels, their complex three-dimensional shape, and their rapid movement due to cardiac contraction limit the use of conventional non-gated helical computed tomography (CT) to accurately display the coronary arteries, when acquiring low pitch high interpolating cardiac data, radiation dose management also becomes an important issue.

Objectives:

Cardiac gating of CT data is one possible way to decrease the effects of cardiac motion. With helical CT, gating of the cardiac images to the ECG examination can be accomplished retrospectively. The essence of the technique is reconstruction of images at the point in the cardiac cycle at which minimal cardiac motion is present.

Meterials and Methods:

Multi-detector row CT, with simultaneously scanned sections and half-second rotation time, provides a new opportunity for cardiac imaging. Partial view acquisition and ECG-Gated helical reconstruction, both of which are feasible in new scanners. This permits both detection and measurement of coronary calcium, as well as CT angiography with a higher signal-to-noise ratio and good spatial resolution, even though using high tube current, we can reduce the radiation dose with special techniques like ECG synchronized tube current modulation.

Discussion:

The purpose of this presentation is to evaluate the effectiveness of ECG-gated image reconstruction for multi-detector row CT coronary angiography in reducing cardiac motion artefacts, evaluate the influence of heart rate on cardiac image quality and dose management.

1927: Egas Moniz develops cerebral angiography

CT evaluation of Thoracic Aortic Aneurysms

Olivia Geogy B.Sc RIT Intern

PSG Institute of Medical Science and Research, Coimbatore

Abstract

An aneurysm is abnormal widening or ballooning of a portion of an artery due to weakness in the wall of the blood vessel.A thoracic aorta aneurysm occurs in the part of the body's largest artery (the aorta) that passes through the chest and are relatively uncommon compared to abdominal aortic aneurysms. There is a wide range of causes, and the ascending aorta is commonly affected.

Thoracic aortic aneurysms (TAAs) can be broadly divided into true aneurysms and false aneurysms (pseudoaneurysms). True aneurysms contain all three layers of the aortic wall (intima, media, and adventitia), whereas false aneurysms have fewer than three layers and are contained by the adventitia or periadventitial tissues.

Multidetector computed tomography (MDCT) angiography allows the comprehensive evaluation of the TAA's in terms of morphologic features and extent, presence of thrombus, relationship to adjacent structures and branches, and signs of impending or acute rupture, and is routinely used in this setting.

Computed tomography angiography (CTA) is the work-house of aneurysm assessment able to rapidly image the relevant vascular territory with high resolution. It can visualize both the sac and the lumen and detect potential complications.

Knowledge of the causes, significance, imaging appearances, and uncommon aortic aneurysm, as well as of the normal postoperative appearance of the thoracic aorta, is essential for prompt and accurate diagnosis.

1934: Frederic and Irene Joliot-Curie artificially produce radioisotopes

Some Memorable Events Of Sir State Chapter

World Radiography Day Celebrations at NIMS

Felicitation to Prof. Kakarla on his 95th Birth Day

NIMS old Students of PGDRIT

A memorable event with all faculty

Best Scientific Paper Awards to Student Radiographers every year

SIR ACTIVITIES representation in AERB, Mumbai

Represented Joint Parliamentary Committee on behalf of SIR, Rajya Sabha, New Delhi

Inviting Sri. G. Kishan Reddy, Union Minister inviting as Chief Guest for 21st NCSIR 2019

Invited Sri. Eatala Rajender, Health Minister, Govt. of Telangana to be the Guest of Honor for 21st NCSIR 2019.

Presentation of **"The Radiologist of the Millennium"** to Prof. Kakarla Subbarao by SIR in 2000

9th National Conference of SIR 2002 held at Hyderabad

12th National Conference of SIR 2006 held at Hyderabad

CORONARY ANGIOGRAM

Jaipreetham Prakash B

B.SC RIT (Intern), Dr.Kamakshi Institute of Medical Science and Research,
Dr.Kamakshi Memorial Hospital. Pvt.Ltd., Pallikkaranai, Chennai, Tamil Nadu 600100

CONTENTS:

- INTRODUCTION
- HISTORY OF ANGIOGRAM
- HISTORY OF CORONARY ANGIOGRAM
- ANATOMY OF HUMAN HEART
- INDICATIONS OF CORONARY ANGIOGRAM
- MODALITIES USED FOR CORONARY ANGIOGRAM
- CONTRAST MEDIA USED IN EACH MODALITY
- CONTRA INDICATION
- INJECTOR SETTINGS
- ROOM SETTINGS
- TROLLEY SETTINGS
- PRE PROCEDURE PATIENT CARE
- BOLUS TRACKING
- METHODS INVOLVED IN CORONARY ANGIO UNDER X-RAY
- METHODS INVOLVED IN CORONARY ANGIO UNDER C.T.
- METHODS INVOLVED IN CORONARY ANGIO UNDERFLUOROSCOPY IN CATH LAB
- METHODS INVOLVED IN CORONARY ANGIO UNDER M.R.I.
- POST PROCEDURE PATIENT CARE
- SAFETY DRUGS USED.
- POST PROCESSING
- RADIOLOGICAL INFERENCE
- CONCLUSION

Abstract:

This presentation will clearly explain the basic and fundamental concepts of coronary angiogram in a detailed manner. It clearly briefs the modalities and its each distinct method's clearly. The concepts of Bolus Tracking and the need of the Bolus tracker is explained. Pre and Post Patient care is well explained. The technique also helps to explain the capacity of the each modality. The safety drugs what we use are explained with its combination and alternates. The post processing also explains the process of image formation in each modalities.The radiological inference helps us to study the circulation in the Heart.

Conclusion:

The anatomical explanation makes gives the way for easy understanding. Thus, it gives an clear cut idea about the concept of coronary angiogram for the one who is new to the stream of imaging techniques. Also Enumerating the various equipment's may give the knowledge about those diagnostic equipment's in a simplified manner .

1936: John Lawrence uses phosphorus-32 to treat leukemia

UNCOMMON CONGENITAL AND ACQUIRED AORTIC DISEASES ROLE OF MDCT IN CT ANGIOGRAPHY

PRESENTER : RITHIKA. V

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INTRODUCTION:

An aortogram is an image of the aorta, the largest artery in the body, acquired by injecting a radiopaque substance into a patient and using medical imaging equipment to snap a series of pictures.

AIM OF THE STUDY

To study the CT imaging findings in AORTOGRAM, having various pathologies including congenital malformations, atherosclerotic (aneurysm), acute aortic syndromes (dissection, intramural haematomas, penetrating ulcer) and vasculitits, with special emphasis on critical diagnosis, wherein, the patients requires prompt and varied management depending on the location and extent of aortic abnormalities.

METHODOLOGY

Study Design : Retrospective & Prospective
Sample size : 30
Study period : June2018 –August 2019
Study Place : Department of Radiology and Imaging Sciences.

INDICATIONS:

- **Aneurysm**- a ballooning-out of the aorta
- **Aortic dissection** -when bleeding occurs in the walls of the aorta
- **Aortic regurgitation or aortic stenosis**- when blood returns back to the ventricle
- **Congenital heart defects** -such as double aortic arch
- **Injury to the aorta from trauma or other problems**

CONTRA-INDICATIONS:

- Renal failure
- Allergic to contrast reactions
- Pregnancy
- Severe diabetes

PATIENT PREPARATION:

- Informed consent
- Fasting 4 hours prior to the procedure
- Renal function test should be within the normal limits
- Previous report should be collected
- IV cannula made insitu preferably in the cubical fossa

CONTRAST MEDIA:

- Non Ionic Contrast IOHEXOL OMNIPAQUE 350mgI/ml
- Flow Rate : 3.5-4.5ml/sec
- Pressure : 325psi

PATIENT PREPARATION:

- Informed consent
- Fasting 4 hours prior to the procedure
- Renal function test should be within the normal limits

PATIENT POSITION: SUPINE

PATIENT ORIENTATION: FEET FIRST

ANATOMICAL REFERENCE: STERNAL NOTCH

PLANNING:

From sternal notch to symphysis pubis.

PROCEDURE FOR CT AORTOGRAM

➢ The appropriate protocol for abdomen is chosen and series of axial sections are acquired from the level of the diaphragm to the level of pubis symphysis.

- A non-ionic contrast media(Iohexol 350mgI/ml) is given with a dose of 1.2 ml/kg body weight at a flow rate of 3 to 4 ml/sec intravenously and then the arterial phase, venous phase and delayed phases are taken.
- The acquired images were interprets by consult radiologist by reviewing image characteristics in various phases.

PHASES	TIME
Arterial phase	18-20 sec
Venous phase	55-60 sec
Delayed phase	5-7 min

CONCLUSION

CT-aortogram has thus been proven as an excellent tool in evaluating the aortic pathologies and its role in acute aortic case and emergencies is irreplaceable.

CT- aortogram far outweighs conventional aortogram as the latter is not much useful in the viewing of intarmural and extraluminal associated findings.

ct- aortogram is very much beneficial towards planning for surgery.(to be d

1939: Kitty Clark publishes Clark's Positioning in Radiography

SIGNIFICANCE OF FOUR-DIMENSIONAL COMPUTED TOMOGRAPHY (4DCT)

SNEHA . R

B.Sc. Radiology 5th Semester, Sri Ramachandra Institute Of Higher Education And Research (DU), Porur, Chennai-600 116

INTRODUCTION:

A recent innovation in the field of CT is the emergence of four-dimensional computed tomography (4DCT), where a three-dimensional computed tomography (3DCT) volume containing a moving structure is imaged over a period of time, creating a **dynamic volume data set**.

4D-CT is a newer imaging technique that records multiple images in time and aims in visualizing temporal dynamics of a 3D sample with a sufficiently **high temporal and spatial resolution**.

TECHNIQUES IN 4D CT:

- 4DCT improves clinical images by reducing organ and tissue motion due to respiration during CT acquisitions. The software provides **high quality images** within a respiratory range retrospectively.
- Auto 4D offers a fast, efficient automated 4D workflow including intensity image creation (MIP, Ave-IP, Min-IP)
- 4DCT is a protocol driven and fully automated which helps choosing appropriate phases or building 4D movie loops.
- **Image display**: Three windows display **transverse, coronal, sagittal, oblique, and 4D images** which can be magnified within the display window or to full screen size.
- 4D based image display and manipulation provides image acquisition resolution upto 512 X 512 matrix.

METHODOLOGY

The study design is prospective of 5 patients who underwent 4DCT at Sri Ramachandra Medical Center for the study period from November 2018 to January 2019

CONDITIONS REQUIRING 4DCT

- Parathyroid adenoma
- Brain – Arteriovenous malformation (AVF)
- Tetralogy of Fallot (TOF)
- Tracheomalacia
- Obstructive sleep apnea (OSA)

PARATHYROID:

- 4D parathyroid CT is an advanced method for the detection of primary hyperparathyroidism as it allows sensitive detection and location of **parathyroid adenomas** by dynamic acquisition of contrast enhancement phases.
- On multiphase post-contrast images of the neck, parathyroid adenomas demonstrate **characteristic rapid enhancement** and washout of contrast and can be more readily differentiated from **lymph nodes** by using this technology.
- Presurgical 4DCT is advantageous not only in its **spatial resolution**, but in that its **imaging coverage** is greater, which allows for potential ectopic sites to be demonstrated.

BRAIN- ARTERIOVENOUS MALFORMATION (AVM):

- Three-dimensional computed tomography angiography (3DCTA) of the brain has excellent sensitivity for diagnosing intracranial aneurysms and other cerebrovascular malformations however 3D-CTA examines only single image at a point time and therefore provides limited information about **flow dynamics** which are important in characterisation of arteriovenous malformation (AVM).
- Technological developments of CT now permit **dynamic** imaging techniques of brain (4DCT) which is a new useful non-invasive tool in diagnosis of **AVM** patients as it aids in differentiating different patterns of venous drainage.

- Further 3D-CTA can provide an image of arteries opacified with contrast whereas 4D-CTA can demonstrate the **flow pattern** through different components of AVM at different phases of contrast flow.

TETROLOGY OF FALLOT (TOF):

- Four-dimensional cardiac CT provides superior delineation of small vessels ,aortopulmonary collaterals and pulmonary arteries, is less affected by **metal artifacts** and has shorter acquisition times reducing the need for **sedation**.
- This technique provides **high resolution** and quality depiction of the origin and course of coronary arteries which is essential for surgical planning in **pre-operative** TOF as well as in older TOF patients with possible coronary abnormalities.

TRACHEOMALACIA:

4DCT thoracic CT allows the accurate evaluation of the extent and severity of tracheomalacia as it can be performed during **free breathing**, regarded as a more physiological state, without additional **respiratory maneuvers** or procedures whereas in thoracic 3DCT respiratory motion artifacts often **degrade image quality** in free breathing children.

OBSTRUCTIVE SLEEP APNEA (OSA)

- CT OSA is a **non-invasive** imaging technique that provides the quantitative assessment of the upper airway.
- In four-dimensional computed tomography a **series of rapidly recorded multiple images** are taken at sequential cycles of time and displayed on a monitor in a dynamic movie display format.
- This technology provides **faster frame rates**, capable of 50 ms of scan time.
- 12 levels are scanned and 10 images at each level is obtained. The images from each level can be reviewed in a movie mode ton yield perfect **dynamics of respiration**.

CONCLUSION

- Four-dimensional Computed tomography has emerged as a useful imaging modality to detect parathyroid lesions causing primary hyperparathyroidism and also to evaluate Brain AVM,Tetrology of fallot and OSA. So, awareness of and knowledge about these factors will will help the radiologists in accurate diagnosis.

1950s: David Kuhl invents Positron Emission Tomography (PET)

Evaluation of Various Clinical and Technical Parameters of Lung biopsy using Conventional CT and Robotic Assisted CT: A Case Study

Presenting Author: Mr. S.B.KARTHIKEYAN*, Co- Author: Prof. Dr. SHIVASHANKAR,**

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Introduction

CT-guided biopsy is the effective procedure of choice to obtain diagnoses in patients with lesions suggestive of malignancy at imaging.

CT-guided biopsy can be performed with dedicated interventional robotic system. The MAXIO is a FDA approved robotic positioning system that facilitates percutaneous needle placement during CT-guided interventional procedures.

Objective

To evaluate the various clinical and technical parameters and performance of a robotic system for CT-guided biopsy in comparison to the conventional manual technique.

Materials and Methods

Patients referred for CT-guided biopsy were randomly assigned to two groups namely, Robot-Assisted Procedure (RAP) and Conventional Procedure (CP). Procedure duration, dose length product (DLP), accuracy of the needle positioning, diagnostic performance of the biopsy and rate of complications were evaluated to assess the clinical performance of the robotic system as compared to the conventional technique.

Results

All biopsies were successfully performed. Procedure duration and radiation dose were significantly reduced in group A as compared to group B. Accuracy of the needle positioning, diagnostic performance of the biopsy and rate of complications were similar in both groups.

Conclusion

Robot-assisted CT-guided biopsy can be performed safely, with high diagnostic accuracy thereby reducing procedure duration and radiation dose in comparison to the conventional manual technique.

Category of Presentation

Podium presentation

1957: Ian Donald invents fetal ultrasound

ROLE OF CT IN CONGENITAL CARDIOVASCULAR DISEASE – A CASE STUDY

ALAMELUU M

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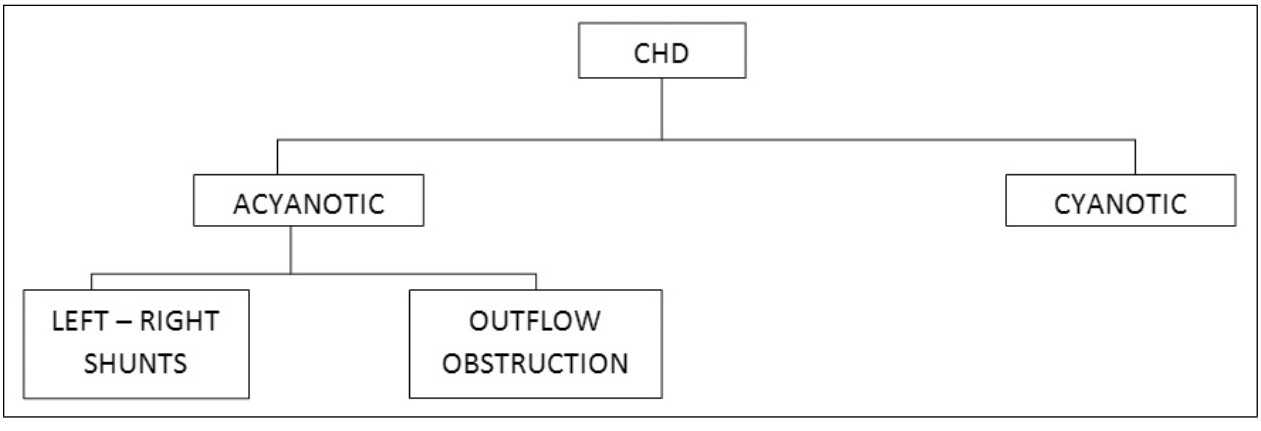
INTRODUCTION:

CONGENITAL – At birth
CARDIOVASCULAR – Heart + Vessels

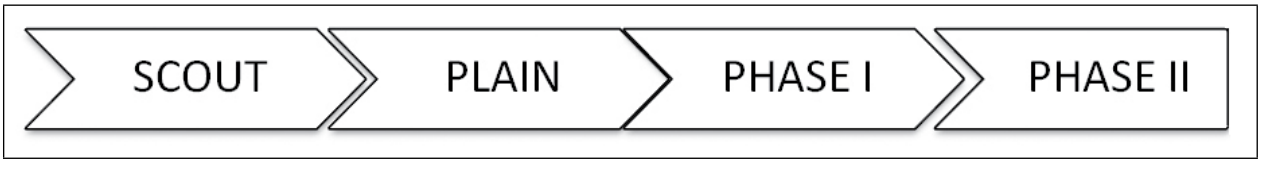
A congenital cardiovascular disease is defined as a defect in the structure and function of the heart or great vessels that is present at birth. CT accurately depicts many forms of congenital cardiovascular disease

CONGENITAL HEART DISEASE CLASSIFICATION:



TECHNIQUE:

The protocal of pulmonary angiography might be quite adaptive for the purpose of diagnosing congenital cardiovascular diseases. First a scout image is obtained followed by a plain scan.Then contrast is being injected and the angiogram phases are obtained for the study. Finally the images are reformatted and reported



CONTRAST:

Administration of contrast media is required for angiography. Contrast is administered by considering:

- Dosage – volume of contrast
- Osmolarity
- Type of contrast
- Route of administration
- Method of administration
- Flow rate
- Patient's body weight

REFORMATION:

Various image reformatting techniques were used depending on target structure and purpose.

2D

- Curved planar reformation

- MIP
- MinIP

3D

- Shaded surface display
- VR

Fast multisection spiral CT can be used to obtain isotropic volume data, and high-quality two- and three-dimensional multiplanar reformatted images can be created to accurately and systematically delineate the normal and pathologic morphologic features of the cardiovascular system.

INTERPRETATION:

It can be used to systematically evaluate the aorta, pulmonary artery, pulmonary vein, cardiac chambers and ventriculoarterial connection, relationship between the upper lobe bronchi and pulmonary arteries, coronary artery, valves, systemic veins and visceral sites with a step-by-step approach.

CASE STUDY:

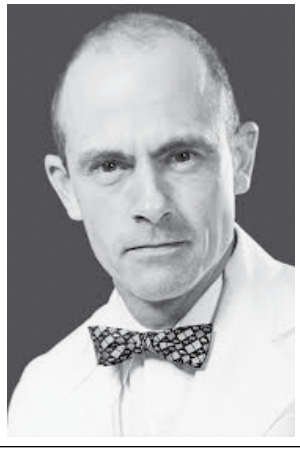
MATERIALS REQUIRED

➢ GE REVOLUTION EVO 128 SLICE

STUDY DESIGN : Retrospective Study
STUDY PERIOD : 1 year
INCLUSIVE CRITERIA : Pediatric Cases
EXCLUSIVE CRITERIA : Adults

CONCLUSION:

CT Angiography is important in the evaluation of congenital cardiovascular disease. Images obtained with current-generation CT scanners accurately depict preoperative and postoperative thoracic cardiovascular anatomy in exquisite detail.



1964: Charles Dotter introduces image-guided intervention

DUAL ENERGY COMPUTED TOMOGRAPHY – A CASE STUDY

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INTRODUCTION:

Dual-energy computed tomography (DECT) or spectral computed tomography is an advanced form of CT that uses different X-ray spectra to enhance material differentiation and tissue characterization.

PRINCIPLE:

The dual energy CT (DECT) is based on the principle of differential absorption of energy at variable kVp settings.

TYPES:

Three types of dual-energy CT scanners are available that differ in the technique used to acquire high- and low-energy CT datasets:

- A dual-source dual-energy scanner.
- A single-source dual-energy scanner with fast kVp switching.
- A single-source dual-energy scanner with dual detector layers.

DUAL SOURCE DUAL ENERGY SCANNER:

In dual source dual energy scanner, two separate detector arrays acquire two different image datasets from two separate x-ray tubes operating at two different tube potentials. High-energy scans are obtained at 120 or 140 kVp, and low-energy scans are obtained simultaneously at 80 or 100 kVp.

SINGLE SOURCE SCANNER WITH RAPID kVp SWITCHING:

This single-source CT scanner with a single detector layer relies on a single x-ray source with fast switching between two kilo voltage settings (80 and 140 kVp) at intervals of 0.5 msec during a single gantry rotation to generate high- and low-energy x-ray spectra.

SINGLE SOURCE SCANNER WITH DUAL DETECTOR LAYER:

Single-source dual-energy CT scanner has a modified detector array with two scintillation layers arranged one over the other to receive separate high- and low-energy image data streams from a single x-ray source. The top detector layer captures low-energy data and the bottom layer captures high energy data, from these two datasets, two separate image series are reconstructed.

RADIATION EXPOSURE:

For a single-source DECT with rapid kilovolt switching, the radiation dose is usually higher than conventional monoenergetic CT, with ratios up to three times more radiation. It's partly due to the non-availability of tube current modulation with the rapid kilovolt switching technique.

APPLICATIONS:

- Dual energy CT offers the potential to analyze material composition through image acquisition at two different energy levels.
- In tissue characterization, dual energy applications add value to CT imaging due to superior lesion detection and characterization (e.g., liver lesion, renal mass).
- It provides accurate renal stone differentiation between uric acid-containing and calcium-containing urinary calculi.

ADVANTAGES:

- Enhance material differentiation and tissue characterization.
- Reduction of beam hardening artifact.
- Reduction of streak artifact.

LIMITATIONS:

- Restriction of FOV in Dual Source DECT.
- Increased radiation dose.
- Noise in low kVp leading to decreased image quality.

CASE STUDY - Characterization of Renal Calculi

MATERIALS REQUIRED : GE REVOLUTION EVO 128 SLICE

STUDY DESIGN	:	Retrospective Study
STUDY PERIOD	:	3 months
INCLUSIVE CRITERIA	:	Patients with Renal Calculi
EXCLUSIVE CRITERIA	:	Patients without Renal Calculi

CONCLUSION:

Dual energy CT offers exciting applications and possibilities previously unavailable with conventional single energy CT. DECT offers the possibility to exploit spectral information for diagnostic purposes. Radiologists should explore the various clinical benefits of dual-energy CT, an emerging technology in medical imaging.

1965: Benjamin Felson publishes his Principles of Chest Roentgenology

CT – RENAL ANGIOGRAM

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INTRODUCTION

CT –renal angiogram is the visualization of renal arteries and veins by injecting contrast media using non Invasive technique.

INDICATIONS

- Renal donor.
- Renal hypertension.
- Aneurysm.
- Renal stenosis.
- Renal stent.

CONTRAINDICATIONS

- renal failure.
- allergy to contrast media.
- Pregnancy.
- severe diabetes.

PATIENT PREPARATION

- Name and UHID of the patient should be checked.
- All metal objects should be removed from the region of interest.
- Patient is changed into the hospital gown.
- Informed written consent should be obtained.
- RFT values should be checked.

CONTRAST AGENT

Non-ionic contrast media
Iohexol : omnipaque 350mgI/ml

PATIENT POSISTIONING

- Patient position-supine
- Patient orientation-feet first
- Anatomical reference-xiphisternum

MATERIALS AND METHODOLOGY

Study design : Retrospective
Sample size : 50 patients
Study period : JANUARY 2018 – JANUARY 2019
Study place : SRI RAMACHANDRA INSTITUTE OF HIGHER EDUCATION AND RESEARCH

Machine specification:

1. GE Light Speed VCT 64 slice
2. Philips Brilliance 16 slice

PROCEDURE FOR CECT ABDOMEN

- ➢ The appropriate protocol for abdomen is chosen and series of axial sections are acquired from the level of the diaphragm to the level of pubis symphysis.
- ➢ A non-ionic contrast media(Iohexol 350mgI/ml) is given with a dose of 1.2 ml/kg body weight at a flow rate of 3 to 4 ml/sec intravenously and then the arterial phase, venous phase and delayed phases are taken.
- ➢ The acquired images were interprets by consult radiologist by reviewing image characteristics in various phases.

PHASES	TIME
Arterial phase	18-20 sec
Venous phase	55-60 sec

PROCESSES AFFECTING THE RENAL ARTERIES

Renal artery stenosis, fibromuscular dysplasia, renal artery entrapment, renal artery dissection, renal artery aneurysm, renal artery occlusion.

PROCESSES AFFECTING THE RENAL VEIN

Nutcracker syndrome, renal vein thrombosis, renal vein leiomyosarcoma, renal vein trauma.

CONCLUSION

An understand of the imaging protocol used to address renovascular pathologic conditions will help the radiologist be highly effective when describing findings to consulting clinicians.

CT UROGRAPHY IN EVALUATION OF HEMATURIA

K.PRRASANNA

B.Sc RIT – 2nd YEAR

Abstract

CT Urography has become the most useful imaging investigation of both for upper and lower urinary tract to diagnose benign conditions urolithiasis as well as malignancy.It has replaced the IVU (Intra Uterine Urography) in evaluation of urinary tract pathologies.It is the non-invasive investigation of choice for many urologic problems including calculi, renal masses, urinary tract infection, trauma and obstructive uropathy. The sensitivity of CT Urography is higher especially in patients presenting with Hematuria.

Hematuria means presence of blood in urine .Types of Haematuria Gross and Microscopic Hematuria. So the CT Urography helps in thorough evaluation of underlying cause of hematuria and also provides the actual extent of the disease.

Causes of Hematuria are Kidney or bladder cancer, irritation or swelling in kidney, prostate or another part of urinary tract, polycystic kidney disease, blood clots or disease that cause problems with blood clotting, sickle cell anaemia.

Evolution of CTU: (Computed tomography Urography)

1) Combining of CT & IVU:

It is one of the earliest descriptions of using CT to assist in evaluation of the Urinary tract involved combining CT and Intravenous Urography. Contrast media was then injected inteavenously during which time a standard intravenous urogram was obtained.

2) Hybrid CT/IVU:

It is an alternative method, a CT suits may be modified by adding conventional-ray equipment to a CT scanner.

3) Axial Images:

It is the latest technique used to evaluate the renal Collecting systems, Ureters and bladder.

Types of Axial techniques are :

A) Single Bolus Technique:

The most comprehensive imaging protocol utilizes at least three different image acquisitions unenhanced scans to assess the kidney and ureters for calculi.

B) Split Bolus Technique:

Two groups are reported on a different approach to performing CTU in two doses so that the patient would be imaged when the first dose was being extended into the renal collecting systems, ureters and urinary bladder while the second dose was still opacifying the renal parenchyma.

Although all Imaging modalities play an important role in imaging urinary tract CT Urography represents the most comprehensive Imaging examination of the Urinary tract.

1971: Godfrey Hounsfield introduces the CT scanner (co-developed with Allan Cormack

CT RADIATION DOSE AND ITERATIVE RECONSTRUCTION TECHNIQUES

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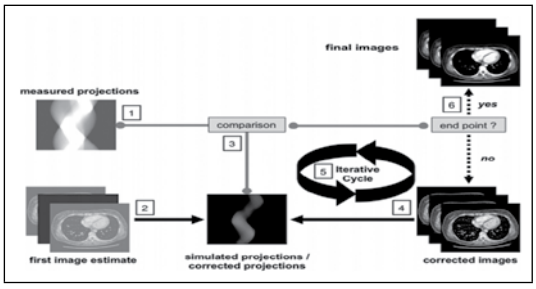
INTRODUCTION

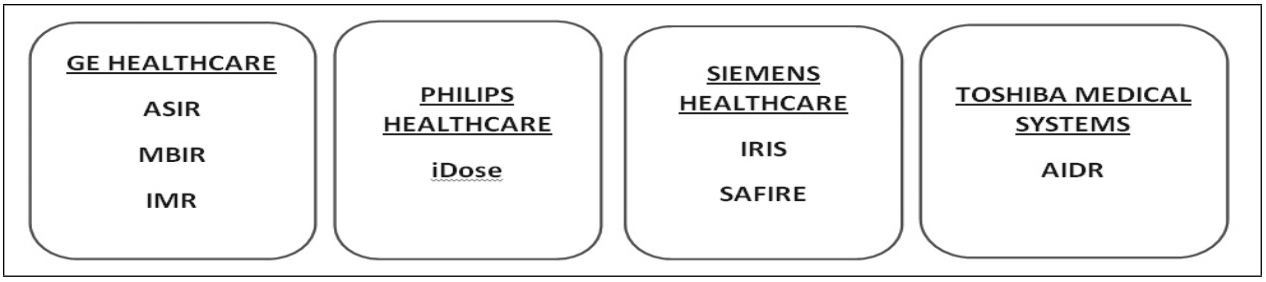
- CT radiation dose optimization is one of the major concerns for the scientific community.
- Image reconstruction algorithms play a vital role in maintaining or improving image quality in reduced-dose CT.

BASIS OF ITERATIVE RECONSTRUCTION

- Iterative reconstruction techniques, as the name suggests, iterate the image reconstruction several times to better estimate these mathematic assumptions and generate images with lower noise.
- Iterative reconstruction algorithms have remerged with the potential of radiation dose optimization by lowering image noise.
- IR improves image quality through cyclic image processing.



VENDOR-SPECIFIC IR APPROACHES



CLINICAL APPLICATIONS OF ITERATIVE RECONSTRUCTION

Clinical implementation of IR into CT protocols shows substantial promise for major improvements in imagequality, chiefly noise reductionwith subsequent radiationdose reductionand artifact suppression.

- Chest CT
- Abdominal CT
- Head and Neck CT
- Paediatric CT

LIMITATIONS

- Over smoothing of images with higher strengths of iterative reconstruction.
- "stepwise" or "blocky" appearance of tissue margins.
- Waxiness or pixilation.
- Loss of visibility of major fissures in the lung parenchyma due to this smoothing of images

CONCLUSION

- Iterative reconstruction techniques have the potential to enable CT radiation dose optimization by either lowering tube current or tube potential.
- CT dose reduction with iterative reconstruction techniques should be achieved in a gradual stepwise approach.
- Some iterative reconstruction techniques are also associated with limitations, which include texture changes and longer reconstruction time.

Fundamental Physics of MRI

Tharun Kumar R

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Contents

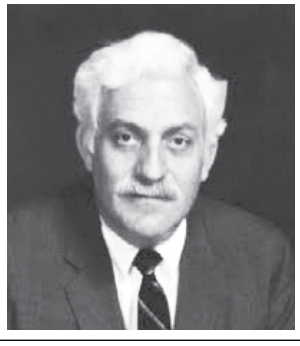
Abstract

This presentation will provide the basic concepts required to understand magnetic resonance (MR) imaging is a straightforward process. Although the individual concepts are simple, there are many concepts to learn and retain simultaneously; this situation may give the illusion that learning the physics of MR imaging is complicated. This presentation is made easy for the students; understand the methods used to create the images because image contrast specifically depends on how the image data were acquired. Initial concepts include Electromagnetic waves and its properties with respect to the characteristics of Radiofrequency waves and formation of magnetic fields from electric currents in loops of wire, the resonance phenomenon, the protons with its spin and precession, the hydrogen proton and its frequency of precession, and absorption of radiofrequency energy. These concepts can then be applied to learn about T1 and T2 relaxation and contrast and how the acquisition parameters of echo time and repetition time can be used to achieve these image contrasts. Basic pulse sequences include the spin-echo, multiecho spin-echo, turbo spin-echo, inversion-recovery, and gradient-recalled-echo sequences.

Most importantly mathematical theorem involved in MR signal production and imaging acquisition in different MRI equipments have been illustrated with easy animation for better understanding.

Conclusion

Many concepts fundamental to an understanding of MR imaging have been presented. It will be important for those new to this imaging modality to review these concepts and be able to apply these to more complicated situations in MR imaging. Some basic core elements of MR imaging were initially discussed, and these formed a foundation for subsequent discussion of T1 and T2 contrast mechanisms and several different pulse sequence acquisition strategies. Other topics that remain to be presented in future presentation in this series include localization of the MR signal by using gradients, instrumentation, image artifacts, and safety.



1977: Ray Damadian builds the first commercial MRI scanner

FAT SUPPRESSION TECHNIQUE

Mr. Saksham Kumar,
NIMHANS, Bengaluru

Fat suppression techniques are useful in MR Imaging to eliminate strong signals from fatty (adipose) tissues that interferes with the signal from adjacent areas from detecting pathology or contrast enhancement.

INDICATIONS FOR FAT SUPPRESSION TECHNIQUES

i) To reduce chemical shift artifact or improve visualisation of uptake of contrast materials.

ii) Tissue characterisation particularly in adrenal glandtumors,bone marrow infiltration,fattytumors etc.

BEHAVIOUR OF FAT AND WATER IN MRI

*Fat(triglycerides):- large molecules with magnetically shielded protons.

Short T1,low resonance frequency.

*water :-small,magneticallydeshielded

Long T1,higher resonance frequency.

PHYSICS

Fat suppression pulses are short duration RF pulses tuned to the resonance frequency of fat.They are applied immediately before the start of an MR Imaging sequence.These chemically selective pulses cause the signal from fat to be nulled(saturated) while the water signal is relatively unaffected.

*The technique requires a homogeneous magnetic field &homogenous volume of tissue.

To prepare this type of sequence, following properties should be used

*Fat and water have different resonant frequency.

*They have different larmor precession frequencies.

*they have different T1 relaxation time.

STIR

Preferred when spectrally selective techniques may not be ideal.

Eg:-larger FOV,lower field strength,areas of high magnetic susceptibility

CHESS (Chemical Shift Selective Imaging Sequences)

- Pure water or pure fat images.
- excitation pulse with resonance frequencies of fat
- HOMOGENETIES spoiler gradient
- Images are acquired before recovery of fat

Water Excitation

Water protons are selectively stimulated with a special type of binomial pulse having flip angle one half of total FA given twice at some time interval.

DIXON

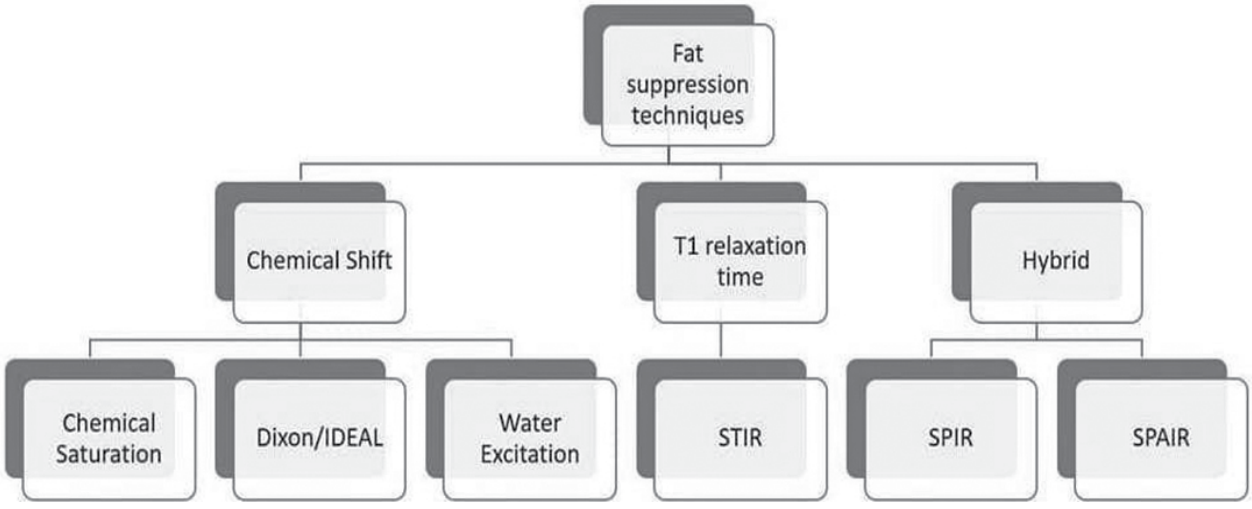
- Slightly different resonance frequencies cause their spin of fat and water to go in-and-out of phase with each other as a function of time.
- A function of GRE images at the same TR but two different TE
- One IP and second OP images
  IP=W+F
  OP=W-F

STIR

Hybrid technique combining CHES and STIR

SPAIR

Modification of SPIR by using an adiabatic inversion pulses that is a special class of RF pulses capable of correcting B1 field inhomogeniety.



Name of Technique	Method	Time Penalty	SAR	Sens. To B_0	Sens. to B_1	Comments
CHESS/ Fat-Sat	Chemical Shift	Small	Med	High	High	Most popular & versatile technique; works best at high fields (1.5T-3.0T); cannot use at fields <0.3T; poor or incomplete suppression near metal
Dixon	Chemical Shift	Large	Low	Low	Low	2 pt. & 3+ pt. methods; generate 4 images in one acquisition (in-phase, out-of-phase, water only, and fat only); commercial implementations: GE (IDEAL, Flex), Siemens (Dixon), Philips (mDixon), Hitachi (FatSep), Toshiba (WFOP)
Water excitation	Chemical Shift	Small	Low	High	Low	Binomial pulses (1-1, 1-2-1, 1-3-3-1); most widely used in MSK; good method for midfield (0.3-1.0T); commercial implementations: GE (SSRF), Siemens (WE), Philips (ProSet), Toshiba (PASTA, WET)
STIR	T1	Large	High	Low	Low	Widely used; works at all field strengths; tolerant of B_0 and B_1 inhomogeneities; nonspecific suppression of all short T1 materials (fat, protein, blood); cannot use post-Gad; images are T2-weighted
SPIR	Hybrid	Med	Med	High	High	Combination of CHESS+STIR: spectrally selective RF pulse inverts fat only, signal generated after TI delay. Images retain T1-weighting and can be used post Gad; cannot use at low fields (<0.3T) or poorly shimmed magnets; commercial implementations: GE (SPECIAL, SSRF), Philips (SPIR)
SPAIR	Hybird	Large	High	High	Low	Same as SPIR but uses *adiabatic* inverting pulse that minimizes sensitivity to B_1 nonuniformity; useful in abdominal breath-hold studies

Functional Magnetic Resonance Imaging(fMRI)

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Introduction

Functional Magnetic Resonance Imaging (fMRI) has attracted interest for its potential role in assisting the clinical diagnosis and management of patients who may have disruptionsBA function due to pathologic conditions.

Significant advancements have been made in applying fMRI to pre-surgical functional mapping in patients with structural brain lesions, including tumors, vascular malformation, epilepsy, and other lesions.

Physiologic basis and biophysical principle of fMRI using the blood oxygen level dependent (BOLD) effect, the main contrast mechanism used in nearly all clinical fMRI studies.

Principles of BOLD fMRI

- Physiologic basis of BOLD fMRI
- Biophysical principles of BOLD fMRI

Basis model for the BOLD fMRI signal

BOLD fMRI methodology

- Image acquisition
- Experimental design
- Data processing
- Statistical analysis

Clinical application: pre-surgical planning

- Sensorimotor and supplementary motor area mapping
- Language mapping
- Memory mapping

Resting- state fMRI and functional connectivity

- Background on resting- state fMRI
- Acquisition and analysis methods
- Advantages and disadvantages of rs- fMRI
- Application of rs- fMRI

Conclusion:

The clinical application of fMRI clinically has moved forward cautiously. The development of more sophisticated approaches to fMRI image acquisition and analysis, as well as the advent of rs-fMRI, has introduced more efficient approaches to obtaining reliable fMRI data.

1989: Spiral CT introduced

DCE Perfusion: Techniques, Acquisition, Parameters, Post Processing and Application

GOWTHAM RAJ R

(2nd YEAR BSC RADIOGRAPHY, NIMHANS), CO AUTHORS: Ramchandra Reddy, VenkatRamana, Babu, Siddharth, Dr.Shahyan, Dr.Sriharish,Dr.Sandhya, Dr. Rose Dawn Bharath

INTRODUCTION

DCE Perfusion: Techniques, Acquisition, Parameters, Post Processing & Applications

OBJECTIVE

The popular Tofts Model contains four parameters relating to pharmacokinetics of gadolinium in tissue.

MATERIALS & METHODS

DCE IMAGING - DCE MR perfusion , also widely referred to as "permeability" MRI, is based on the acquisition of serial T1-weighted images before, during, and after administration of extracellular low-molecular-weight MR contrast media and provides following parameters:

- Ktrans, the volume transfer constant for gadolinium between blood plasma and the tissue extravascular extracellular space (EES).
- fractional volume of the EES, denoted Ve.
- kep, the time constant for gadolinium reflux from the EES back into the vascular system.
- vp, the fractional plasma volume. In many lesions this variable is small and inconsequential.

RESULTS

- Ktrans correlates with the initial slope ("wash-in" rate) of the time-intensity curve
- Ve correlates with the peak height and with time-to-peak (TTP) of the time-intensity curve
- Kep controls the shape of the curve, reflected in the relative contributions of its independent components Ktransand Ve
- Vp, when small, has little effect on the curves, but when large, resembles the arterial input function.

CONCLUSIONS

DCE Perfusion MRI is a promising and novel method for evaluating perfusion in various pathologies. In addition currently it is the most robust technique for assessing permeability of different tumours ,in post treatment evaluation. It has potential to become a part of standard imaging protocols in future.

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2. Rosen BR, Belliveau JW, Vevea JM, Brady TJ. Perfusion imaging with NMR contrast agents. MagnReson Med 1990;14:249–265.

2005: Frank Gaillard creates Radiopaedia.org :)

BLACK BLOOD TSE SEQUENCE-in MRI Post Contrast studies (Dotarem)

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Abstract

In MRI, often certain lesions are left undetected due to enhancement of blood in Post Contrast studies (as contrast is given intravenously). There is a very slight distinct contrast between lesions and blood., and that is where, theBlack blood sequence comes into use.

Black Blood Sequence uses Conventional 3D T1 weighted spin echo (TSE)sequence. In this, *the signal from flowing blood is suppressed (rendering it "black")* rather than enhancing as it is in conventional Bright Blood MRA techniques.

It has been proved advantageous in detecting calcifications, lesions in many complicated clinical cases like *Brain metastasis, Case of Glomus Tumourand* so on.

31P MRS & Its Applications

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MRS is an analytical technique that complements MRI. Both typically acquires signal from the protons. Signal acquisition is from a larger area in MRI whereas in MRS it is from a voxel. Chemical shift forms the basis of MRS and is used to study the metabolic changes in vivo non-invasively.

MRS can be performed with NMR-active nuclei with spins- **^{1}H, ^{13}C, ^{19}F, ^{23}Na & ^{31}P**. The **^{1}H** nucleus is the most commonly probed due to its high gyro magnetic ratio and widespread development of hardware and techniques. It measures various metabolites and the frequency of these metabolites is measured in units called parts per million (ppm) and plotted on a graph as peaks of varying height. But it suffers from problems of water and fat contamination and magnetic field homogeneity.

^{31}P MRS is beneficial over ^{1}H MRS because of high sensitivity of phosphorus NMR, 100% natural abundance and it overcomes the above issues. It provides good spectral resolution because of large (~30ppm) chemical shift dispersion in vivo phosphates. The purpose of this study is to present the working of the ^{31}P MRS and the explanation of the physics of the process and the dedicated head coils. And it makes an attempt to explain its application in different clinical studies such as ^{p}H determination separation of choline peaks and study of cardiac muscles.

It is hoped that this study will give an overview of importance of ^{31}P MRS and its clinical applications.

DIFFUSION TENSOR IMAGING & FIBER TRACTOGRAPHY

Kaleem Basha.

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Introduction:

Diffusion tensor imaging (DTI) and fiber tractography has opened an entirely new noninvasive window on the white matter connectivity of the human brain. DTI and fiber tractography have already advanced the scientific understanding of many neurologic and psychiatric disorders and have been applied clinically for the pre-surgical mapping of eloquent white matter tracts before intracranial mass resections.

Application of diffusion tensor imaging:

- Brain tumours
- Pre-surgical planning
- Epilepsy
- Multiple sclerosis
- Stroke
- Traumatic brain injury

DTI visualization technique:

Visualization technique for diffusion tensor data based on two groups,

- 3D-rendering of images, geometric display methods by using various types of ellipsoid.
- Fibre tractography, visualizing and analyzing white matter fibre tracts.

Physics of DTI:

- Diffusion anisotropy
- What is a tensor?
- Diffusion tensor model and Eigen values, Eigen vectors
- DTI Visualization Schemes
- DTI - Fiber Tractography

The diffusion tensor (DT) describes the diffusion of water molecules using a Gaussian model. Technically, it is proportional to the covariance matrix of a three-dimensional Gaussian distribution that models the displacements of the molecules. The DT is a 3×3 symmetric, positive-definite matrix, and these matrix properties mean that it has 3 orthogonal (mutually perpendicular) eigenvectors and three positive Eigen values.

DTI pre-processing Summary:

- Acquire DTI images (hydrogen particles motion)
- Estimate tensors (mean particles motion)
- Tractography (reconstruct tracts and disambiguate cross sections)

Conclusion:

DTI is based on complex physics which radiologists need to understand for its comprehension. It has evolved as a novel noninvasive technique in understanding the complex anatomy of white matter fiber tracts which helps the radiologists & the neurosurgeons in evaluation, treatment planning & prognostication of brain tumors.

RADIATION AWARENESS AMONG PUBLIC OF DIFFERENT AGE GROUPS, EDUCATIONAL BACKGROUNDS AND REGIONS

Name of Author and Presentor: Pingali Sai Meghana

Abstract

INTRODUCTION :

As an imaging technologist we encounter radiation on daily basis and know how it affects the human body. The effects of long term radiation include cataracts , hair loss, skin burns and cancers and many other. The study aims to estimate the knowledge and awareness of public about radiation(x ray) in hospitals . It is the right of the people to know how much radiation they encounter during medical procedures , the limit of radiation that should be received and side effects of radiation over dose .

OBJECTIVE:

To estimate knowledge and awareness of public about radiation and radiation protection in hospitals.

Materials And Methods:

100 Questionnaires were provided to people of different age group working in different fields of work. The questionnaire tested the knowledge of people regarding radiation and radiation protection. The study also included rural population with few hospital staff like nurses ,ward boys, cleaners and students from different educational backgrounds like engineering, nursing, commerce and arts that answered questionnaires.

RESULTS:

The results indicated heterogeneous knowledge of people according to their backgrounds with respect to work, education and regions.

CONCLUSION :

From this survey we come to know that the knowledge about radiation and protection is not enough among the public that come from rural, educational background apart from health sciences and efforts must be made to increase the knowledge by posters, advertisements , public talking or few training programs by hospitals or other institutes.

International Day of Radiology

Since 2007 a World Radiography Day has been held on November 8th, to mark the date of Roentgen's discovery of x-radiation 7. In 2011 the European Society of Radiology (ESR) resolved that annually there should be a celebration of radiology on the date of the discovery of x-rays. The ESR liaised with transatlantic partners, the Radiological Society of North America (RSNA) and the American College of Radiology (ACR) and the first day was commemorated in 2012 4.

2012: inaugural International Day of Radiology

MRI-PET-POSITRON EMISSION TOMOGRAPHY (Biograph mMR): A new approach for multi modality imaging system

"for Prof. KSR Best Scientific Paper competition"

Alwine Anto 3rd Year B.Sc., Radiography, Dept of Ni&Ir (Neuro Imaging and Interventional Radiology) NIMHANS

INTRODUCTION

PET(POSITRON EMISSION TOMOGRAPHY) & MRI are medical imaging techniques that is widespread in use for patient diagnosis, management, and also in clinical research playing a key role in a wide range of fields from mapping of the human brain to the development of new treatments for cancer and neurologic diseases.

PET- in-vivo information about metabolism and functionality.

MRI - Anatomical information with a better soft tissue contrast as CT and does not apply additional radiation dose.

OBJECTIVES

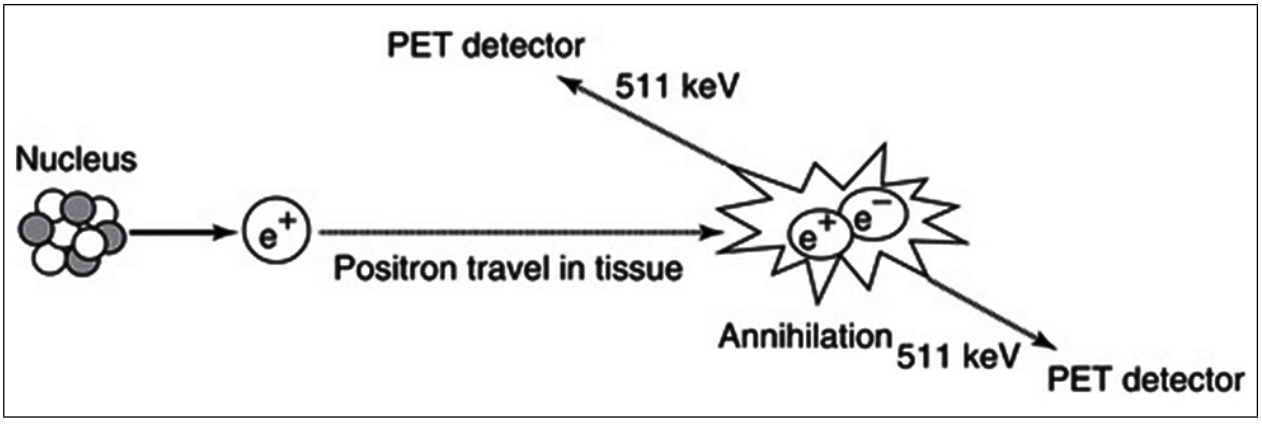
To provide a clinical update on PET MRI recent developments and the improvement in technical aspects for simultaneous acquisition by basic principles such as attenuation correction, coincidence interaction and co registrartion algorithms of PET AND MRI Images.

MATERIALS

- MR PET - BIOGRAPH mMR(SIEMENS)
- RADIOPHARMACEUTICAL - 18F FDG(FLURO DEOXYGLUCOSE)
- APD(AVALANCHE PHOTODIODES)
- ATTENUATION CORRECTION
- COINCIDENCE DETECTION

PRINCIPLE OF PET

The decay of F-18 is primarily positron emission with an energy of approximately 0.633 MeV. When injected intravenously, the emitted positrons travel a few millimetres in tissue before combining with negatively charged electrons, converting mass into energy and releasing two high-energy (511 keV) photons (gamma rays), which are emitted at approximately 180° to each other. The simultaneous detection of these photons by the PET scanner is then used to construct a three-dimensional image of the sequence of events.



METHODS

Patients underwent whole-body 18F-FDG PET after 4–6 h of fasting with oral hydration. Blood glucose levels were monitored, and the radiotracer was injected when glucose levels were no more than 140 mg/dL.

On arrival, patients were asked about their clinical history, allergies, and preparation for the PET examination (fasting and hydration). A 18-gauge IV cannula was inserted into a vein in the back of the hand. The 18F-FDG dose was injected (4.625 MBq/kg) approximately 50 min before the whole-body PET scan started.

Whole-body scanning was performed from the head to the pelvic floor using an Advance BIOGRAPH mMR(SIEMENS) which used avalanche photo diodes with attenuation correction.Attenuation correction was done by segmentation correction of Dixon sequencein whole body PET MRI. Immediately before image acquisition, patients were asked to void the bladder to reduce urine accumulation and thereby reduce radiotracer effects due to physiologic 18F-FDG elimination . Whole-body PET was performed in the caudocranial direction, acquiring data at 6 bed positions.The average duration of the whole-body scan was approximately 50 min.

CONCLUSION

PET MRI appeared a decade ago as a noninvasive diagnostic imaging technique for oncologic diseases. The most commonly used radiotracer for oncologic PET studies is 18F-FDG, which enables the evaluation of glucose metabolism and in vivo quantification of this biomolecular process. PET can detect the increased 18F-FDG metabolism in tumor cells that occurs because of cellular proliferation and that is dependent on the stage of malignancy. The recent technical developments in simultaneous acqusition of PET and MRI has resulted in motion corrected sequences with optimum imaging.

RENAL SCINTIGRAPHY FOR THE ASSESSMENT OF RENAL FUNCTION

Vinitha Sakthivel

3rd B.Sc (Rit) in PSG Institute of Medical Science and Research Centre, Coimbatore

The presentation Topic and it's abstracts given below for your reference.

AIM:

Renal scintigraphy gives a very detailed information of the renal functions to assist in the diagnosis and managements of patients with suspected renal pathologies for both adult and paediatric patients.

INDICATIONS:

- Evaluation of renal vascular hypertension
- Evaluation of renal pelvic obstruction
- Pre surgical quantitation
- Assessment of renal blood flow

CONTRAINDICATION:

- Pregnant women , lactating mothers

RADIOPHARMACEUTICAL AGENTS:

Tc-99mDTPA

PATIENT POSITION : supine with both arms raised

EQUIPMENT:

Large field of view gamma camera
Collimator: low energy all purpose

DOSAGE :

Adult : 3-5mCi
Pediatric: 1-3mCi
Route of administration: intravenous

PROCEDURE:

Count the pre syringe and post syringe count for 10sec. place the patient in supine position with camera posterior exception in kidney transplant and ectopic cases. Inject Tc99m DTPA as a bolus . Start the camera when the RP reaches the aorta to acquire dynamic images.

Flow images : 2sec X 30frames
Dynamic images : 60sec X 29frames

CONCLUSION :

Renal scintigraphy is a procedure that gives the exact value of renal functioning

CT GUIDED RADIOFREQUENCY ABLATION

Vinitha Sakthivel

3rd B.Sc (Rit) in PSG Institute of Medical Science and Research Centre, Coimbatore

It is a new minimally invasive technique that involves the introduction of guided needle electrode through a small puncture in the skin of the body overlying the diseased tissue. The probe is guided to the target site with the help of CT scan or ultrasound. Once the probe reaches the target site high frequency current is passed through the needle probes which produced a large amount of heat is produced with in and around the tumor cells. RFA can be used successfully to destroy tumor cells in any part of the body. It can also be used to treat dysfunctional tissue. Currently it has been effectively to treat cardiac arrhythmia, liver cancer varicose vein, kidney tumors, Osteoid osteoma, and Breast tumors. It is generally used for multiple tumors within the same organs or various organs. In last 15 years RFA has come to be a dependable and safe procedure with promising outcomes.

To evaluate the Diagnostic accuracy of the CT component of SPECT-CT versus Diagnostic-CT

AUTHOR: Chaithanya. A

2nd year B.Sc radiography student, NIMHANS, Bangalore,
CO-AUTHORS: Chandana Nagaraj, Gopinath, Venkatesh, Jitender Saini, Rose Dawn Bharath(H.O.D)

Objective:

To evaluate the Diagnostic accuracy of the CT component of SPECT-CT versus Diagnostic-CT.

Materials & Methods:

To evaluate the diagnostic accuracy of the 6 slice CT component of SPECT CT with the diagnostic 16 slice CT scanner a retrospective analysis of 5 cases of stroke were evaluated in both the scanners. Since presently we do not have a 6 slice CT scanner we could do this comparison with 16 slice CT scanner only. We evaluated the various CT parameters KV (Kilovolt), mA (milli Ampere), CTDI (Computed Tomography Dose Index) and DLP (Dose Length Product) to support our visual analysis of stroke patient.

Result:

Due to the changes in the parameter used to acquire a diagnostic CT scanner we found that the tube current used in 16 slice CT scanner is more than what is used in CT apart of SPECT-CT. Secondly most important was that the CTDI of CT component of SPECT-CT was definitely more than the diagnostic CT also the DLP was much higher in CT part of SPECT-CT. This clearly shows that the radiation exposure to the patient is much higher in CT apart of SPECT-CT compared to diagnostic CT. Also visual analysis of diagnostic-CT images are much informative and gives better diagnosis as compared to CT images of SPECT-CT due to the better resolution.

Conclusion:

CT images & parameters used in SPECT-CT is only for Attenuation Correction(AC) and fused image with SPECT image. The diagnostic CT parameter is made of high resolution, high contrast, more slices and less time and also mainly the radiation exposure to the patients is much lesser compared to that of SPECT, though better resolution is obtained. CT component SPECT-CT uses less slice thickness (eg.6 slices) but image quality and anatomical information is not well depicted. Major limitations of the study was the number of patients, difference in the number of slices and only visual analysis was used.

INTERVENTIONAL NEUROVASCULAR RADIOGRAPHY – A BASIC APPROACH TO CATHLAB IN ASPECTS OF PRUDENT DSA TECHNOLOGIST

"For Prof. KSR Best Scientific Paper competition"

MANISHA PRADHAN

3rd Year Bsc Radiography, Dept Of Ni&Ir(Neuro Imaging And Interventional Radiology), Nimhans

INTRODUCTION

Interventional neurovascular radiology is an exciting subspecialty which utilizes radiographic techniques in the form of image guidance to perform a variety of minimally invasive neurovascular and non-vascular procedures to treat a wide range of diseases. It's a better alternative to open surgery with faster recovery and fewer complications. It can be used for diagnostic (angiography) as well as therapeutic (angioplasty) purposes.

MATERIALS/TOOLS

- Single/biplanar cathlab
- Puncture needles of different gauze
- Catheters
- Guide wires
- Arterial sheath
- Stenting materials
- Embolic protection devices
- Embolization agents
- Contrast agents

TECHNIQUE

DSA (Digital Subtraction Angiography) refers specifically to techniques which subtract 2 images obtained as before and after administration of contrast media. This requires use of digital fluoroscopy or direct acquisition of digital data using charged coupled devices (CCD) or flat panel detectors (FPD).

Modified seldinger technique is a medical procedure to obtain safe access to blood vessels.

SUBSTRACTION METHODS

- Mask mode subtraction
- Time interval difference subtraction
- Dual energy subtraction
- Hybrid subtraction

ADVANCEMENTS IN DSA

- Roadmap/smart mask
- 3D/4D DSA
- XPER CT / VASO CT
- 2D PERFUSION

RADIATION PROTECTION

- Pulsed fluoroscopy
- Copper filtration
- Automatic dose rate control(ADRC) systems
- DAP(DOSE AREA PRODUCT) meters that displays cumulative dose

DIVERSE USAGE

- Vascular malformations
- Aneurysms and pseudo aneurysms
- Diagnostic cerebral angiogram(4/6 vessels)
- Angioplasty +/- Stenting
- Embolization of AVM(Arterial Venous Malformation) and DAVF(Dural Arterial-Venous Fistula)
- Vertebroplasty

CONCLUSION

Radiographers, as first line users, should be aware of the basic structure and function of these equipments so that judicious adjustments are made on a case to case basis. Adequate knowledge of methods of dose reduction during DSA is important to prevent hazardous radiation effects especially on skin, eyes and gonads. Some recent technological developments have evolved like latest detector technology based on crystalline silicon, emitter technology of X RAY Tube, functional imaging protocols that provide physiological information in the initial stages of research and have the potential to further boost in the field of Interventional radiology.

2D MEASUREMENT ERROR IN CR & DR

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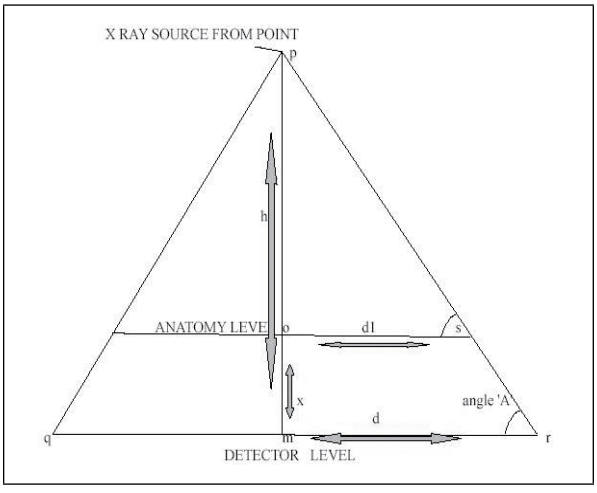
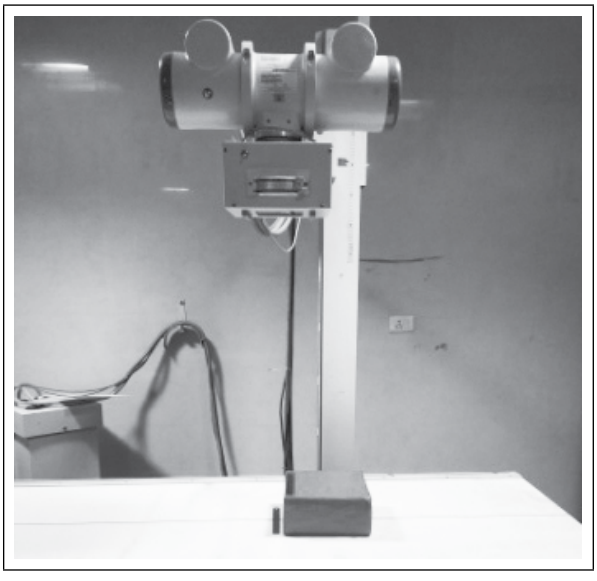
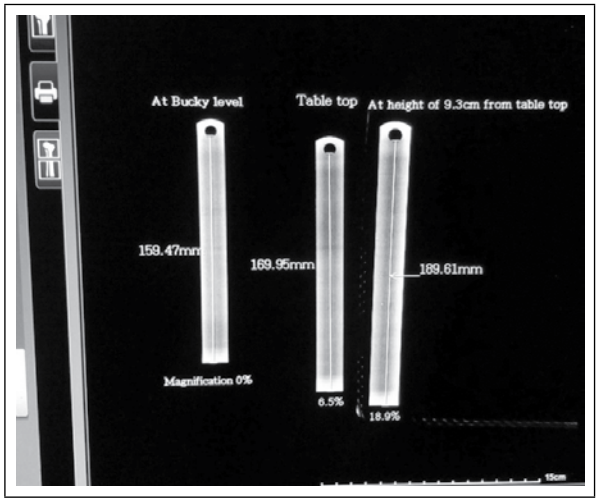
Abstract:

We have left behind an error in 2D measurement in digital X-ray imaging (CR & DR). In digital x-ray equipment 2D measurements are inaccurate, since they are measured at detector level and not an anatomical level. The measuring caliber tool given at the monitor is meant for measuring 2D measurement at detector level only .





The plane away from the detector will have higher magnification and plane near to the detector will have least magnification.we kept three similar metallic scales one at anatomical level, one at table top and one at detector level and exposed with 100 FFD, 50 kVp and 10 mAs. The image is processed and we did 2D measurement for all three metallic scales. We found 2D measurements are varying. The percentage of error is 6 to 18% for the objects 9.3 cm away from the table top. In this presentation we are going to explain this issue how we are controlling this error by applying a small trick for the given plane of interest on the digital x-ray image.



EVALUATION OF URINARY EXCRETORY SYSTEM BY USING [IONIZING & NON-IONIZING RADIATION]

Mythili,

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INTRODUCTION :

The urinary excretory system consist of two kidneys, two Ureters, bladder and urethra. The urinary tract is drainage system for removing wastes and extra water.

AIM AND OBJECTIVE:

The purpose of this study is to evaluate urinary system clinical conditions with the help of ultrasound, X-Ray & CT pyelogram.

INDICATION:

X RAY	ULTRASOUND	COMPUTED TOMOGRAPHY
• Fever • Abdominal Pain • Masses • Perforation • Bowel Obstruction	• Renal Cortical Cyst • Kidney Lesion • Bladder Debris • Size of the Kidneys • Tumors & Cysts • Renal calculus • Trauma	• Nausea & Vomiting • Fever • Urinary Blockage • Bladder wall thickness • Hematuria • Trauma

MATERIALS & METHODS:

- X-ray [TOSHIBA]
- Ultrasound [GE LOGIQ E10]
- Computed Tomography [GE optima 128 slice CT scanner]

The present study includes retrospective patients who, where all undergone X rays, Ultrasound & CT. Urinary systems clinical condition in above mentioned modalities where analysed.

PATIENT PREPARATION:

X-RAY	ULTRASOUND	CT SCANNER
• Fasting (overnight) • Change into a hospital gown and remove all jewellery • Explain the procedure to patient about scan • Ask LMP for female patients • Lead apron should be provided for other organs • Bowel preparation	• Instruct the patient to drink a enough of water • KUB ultrasound requires a full bladder so that the urinary bladder can be properly evaluated especially since the bladder volume is measured during the scan.	• PRECAUTIONS • CLOTHING • CONTRAST MEDIA • ALLERGY (allergic reaction to any contrast media.) • EAT/DRINK (don't eat anything 3hrs prior to your CT scan) • DIABETICS(medication should stop for 48 hours before and after the administration of contrast)

CONCLUSION:

In clinical practice, X ray KUB and ultrasound have almost similar patient outcome than CT since the stones that are missed by ultrasound or usually small and should pass spontaneously and some stones are missed in X ray KUB .

The CT should be reserved for those patients with clinical symptoms of a major colic who have had a negative U/S and X ray KUB.

The choice depends on the availability of each technique and the experience of the Radiologist.

LONG BONE RADIOGRPHIC ASSESSENT

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SRM Institutes for Medical Science,Vadapalani,Chennai-600026.

Introduction:

It is a special type of radiography to measure the long bone .In orthopedic field the Scanogram are used to measure real size/ length of the bone.

What Is Scanogram:

It is a radiographic technique used to determine the accurate and reproducible assessment of limb length and whole spine is required for successful treatment.

Indication:

- Scoliosis.
- Kyphosis.
- Limb Shortness patient.
- Osteoporosis.

Material and methods:

Equipment:

- Computed x ray unit-Siemens Heliophus D 600 MA.

Accessories:

- Long length vertical cassette holder CR
- Long length cassette (single exposure entire lower limb).
- Ball markers.

Procedures:

- To level both ASIS using block according to limb length discrepancy
- Patella facing forward
- Scan area- iliac crest to the distal surface of the OS calices.
- 4 cassettes with single exposure.
- Distance- 6 feet.
- Beam center at patella.
- Exposure- depending upon patient thickness.

Advantages:

- Greater accuracy.
- Less susceptibility to error if the patient is poorly positioned.
- Specifically Indicated when the patient has a knee flexion contractures or is in a circular external fixator.

X Ray V/S CT

X RAY	CT
Single exposure.	Spiral exposure.
Fine image quality.	Image quality is slightly lesser than x ray.
Standing position.	Supine position.

Limb alignment can be adjusted. Limb alignment cannot be known.

Conclusion:

This approach allow for a more comprehensive radiographic evaluation of lower extremities including deformity analysis , which reducing the expense , radiation and image quality and accurate measurement helps the surgeons for surgical purpose.

EVALUATION OF TUBAL PATENCY

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INTRODUCTION:

Tubal Patency will determine subsequent treatment as well as assisted conception options. Tubal assessment does reveals tubal blockage, then the patient may be referred for in vitro fertilization or tubal surgery. If patent, then alternative causes and consequent treatment options will be investigated.

MODALITY:

Hysterosalpingography[HSG], Sonohysterosalpingography, Laparoscopy and dye test.

METHODOLOGY:

Present study includes retrospective patients. HSG & Sono-HSG procedure was performed and findings such were analyzed. We have done study for six months and collected data for last 3 months where we have 15 cases showing % pathology like ovarian cyst , air bubbles right tubal blockage hydrosalpnix and rest are normal study.

HYSTEROSALPINGOGRAPHY[HSG] :

HSG was classically the first line investigation used in the assessment of tubal patency. This radiology procedure demonstrate the uterus and fallopian tubes help of X-Rays and contrast media.

SONOHYSTEROSALPINGOGRAPHY :

Sonosalpingography is a diagnostic procedure which uses Transvaginal sonography to confirm tubal patency by visualizing turbulence near the fimbrial end when a mixture of air and saline is injected into the uterine cavity via Foley's Catheter.

CONCLUSION :

An ideal radiological investigation of tubal assessment will be sensitive, specific, safe, widely available, inexpensive and diagnostically accurate.

RADIOGRAPHIC STRESS VIEWS

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Introduction:

Stress views are general x-ray views in which the radiograph of the anatomical part examination is done after applying stress. The stress is given by applying force and direction. The force depends on the body part is being examined.

Aim:

To evaluate:- ligamentous tears, joint stability, and the fracture unions

Materials And Methods:

- **Equipments**: Computed X-ray unit (Siemens-Heliophus-D) OR Digital X-ray unit (Toshiba)
- **Accessories**: Non-opaque Supporting pads & Traction Bands
- **Procedure:**

S.No	STRESS VIEWS	ESSENTIAL CHARACERISTICS	RADIOGRAPHIC TECHNIQUE	CENTERING POINT
01	Carpal Tunnel view	Carpal Tunnel Syndrome	90°-tube angulation	Pisiform &hook of Hamate medially. tubercle of Scaphoid and ridge of Trapezium laterally
02	Skyline Projection	Retro patellar joint spacing assessment	30°-Cranial tilt-Supine position	Centre-patella
03	Submento Vertical [SMV]	Inflammation and neoplasia in the Skull base	90° Tube-with Hyper extended neck	90° to OM plane and centre midway b/w the EAM
04	Mortise Projection	Pathology -entire ankle mortise	15°-20° & Medial rotation of leg	Centre b/w two Malleoli and line joining the Malleoli
05	Calcaneum Axial	Talo-calcaneal joint fractures	40°-50° Cranial angulation	Plantar aspect of the heel at the level of 5th metatarsal
06	Knee Valgus [distal-lateral] and Varus[distal-medial]	Valgus and varus deformity of Knee joint	10° Cepahalad angulation and 20° Knee flexion	Apex of the knee joint

Conclusion:

Stress views help in evaluation of pathology, joint stability and ligamentous tears etc. Though the advancement in CT and MRI have replaced some of the stress views, they are important tool for radiological diagnosis in early periods and even now. Thus they play a vital role for evaluation of radiological findings.

ASCENDING URETHROGRAM

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INTRODUCTION:

Ascending urethrogram is the radiographic examination to demonstrate the urethra by injecting radiographic contrast media into urethral orifice.

INDICATION:

- Fistula
- Strictures
- Congenital abnormalities
- Urethral tears
- Pre-urethral abscess

CONTRA INDICATION:

- Acute urinary tract infection
- Recent instrumentation

MATERIAL AND METHODS :

- Equipments:-Digital X-ray Toshiba
- Accessory equipment:- Foley catheter or penile clamp

PATIENT PREPARATION:

- There is no specific patient preparation.
- Ask the patient to void before the procedure.

TECHNIQUE:

1. The patient lies supine on the X-ray table.
2. Using aseptic technique the penile clamp is applied or the tip of the catheter is inserted so that the balloon lies in the fossa navicularis,
3. Then balloon is inflated with 1-2ml of water.
4. Contrast medium is injected under monitoring.

FILMS TAKEN:

- Anterior oblique views with leg abduction and knee flexion (4'o clock position)

AFTER CARE:

- Assure the patient comfort before leaving the department.
- Provide medication if required.

COMPLICATION:

Due to the contrast medium:

- Adverse reaction are rare

Due to the technique:

- Acute urinary tract infection
- Urethral trauma

CONCLUSION:

Thus AUG will show if there is a problem in the urethra . This then allows the urologist to plan the best method to treat the problem, which will depend on the location and length of the narrowing.

STEREOTACTIC BREAST BIOPSY

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INTRODUCTION:

A stereotactic breast biopsy is a procedure that uses mammography to precisely identify the lesion and can do the biopsy within the breast.

INDICATIONS:

- Microcalcifications
- Small distinct lesion
- BIRADS IV/V lesion

CONTRAINDICATIONS :

- There are no absolute contraindication

RELATIVE CONTRAINDICATIONS:

- Anti-coagulation
- Pregnancy
- Lactation

PATIENT PREPARATION:

- Patient hospital ID must be checked .
- Exclusive screening is done.
- Previous reports should be collected.

NEEDLE PREPARATION:

- Core needle guide in size 14G to 22G

PROCEDURE:

First, scout image is exposed and stereo pair of 0° ,+15° & -15° angled.

↓

This can helps us to target the lesion by angulating it in a X ,Y & Z axis by obtaining a paired image by using a biopsy control module

↓

Move the needle near the skin to indicate the area for the skin nick. inject the anesthesia.

↓

Turn the Z-axis to move the needle into the breast.

↓

If desired , acquire the pre-fire stereo images as necessary to identify the needle position

↓

Then the needle is injected at the gun shot & the sample is collected

COMPLICATIONS:

- Infection
- Haematoma

CONCLUSION:

Stereotactic breast biopsy is an less invasive & non-operative procedure in patients with suspicious micro calcifications, which are not visible under ultrasound scan.

DENTAL RADIOGRAPHY

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INTRODUCTION:

Radiographs are used in dentistry for the detection of trauma or pathology of the teeth and jaws for the presence and position of unerupted teeth in orthodontics for analysis of facial form and prior to surgery involving facial deformities.

DENTAL RADIOGRAPHY

1. Intraoral radiograph
2. Extraoral radiograph

INTRAORAL RADIOGRAPHY:

Intra oral radiography is a technique in which thefilm is placed inside the mouth

1. Periapical radiography: It is the lateral projection which display crown root of the teeth and surrounding structure
2. Bitewing radiography: Itdemonstrates the crowns of the teeth and alveolar crests over a part of both jaws
3. Occulsal radiography: It shows the large segments of dental arch and clearly demonstrates the palate and floor of mouth

EXTRA ORAL RADIOGRAPHY:

Extra oral radiography involves techniques in which the film is placed outside the mouth.

1. Dental Panaromic Radiography: It is a projection which produces images of both jaws.
2. Oblique Lateral Radiography: It demonstrates the oblique lateral view of maxilla and mandible
3. Cephalometry:It is to demonstrate the facial bones for using orthodontic,implant treatment.

DENTAL PAAROMIC TOMOGRAPHY:

It is an extra oral radiographic technique that produces images of facial structures which includes both themaxilla and mandible,dental arches and supporting structures.

PRNCIPLE OF PANOROMIC IMAGE FORMATION:

INDICATIONS

- Assessment for implant.
- For follow-up of treatment, progress of pathology or postoperative bony healing.
- Evaluation of developmental anomalies.
- Assessment of styloid process elongation.
- To evaluate odontogenic and non-odontogenic disease.

PATIENT PREPARATION

- The patient should remove all radio opaque objects from head and neck.
- If the patient is wearing a bulky coat, it should be removed.

POSITIONING:

- Ask the patient to walk straight into the machine, gripping the handles if available.
- Patient's head should be tilted down, towards the floor, the Frankfort plane is parallel to the floor of the object.
- Adjust the height of the machine and ask the patient to bite into the bite block groove
- Check the upper and lower incisors are both in the groove and ask the patient to rest their chin on the chin rest.
- Stand behind the patient, and check the symmetry of the position
- Close the head restraints
- Make any fine adjustment at this point
- Ask the patient to close their lips and press their tongue to the roof of their mouth.
- Ensure the patient to stay still, absolutely for about 18-20s.

CENTRING:

- The sagittal plane light should lie in the middle of the face.

- Antero-posterior lights should be centered distal to the upper lateral incisor.

kV	mAs	mA
ADULT 60-78	12- 16	6-15
CHILD 60-66	12-16	4-12

ADVANTAGES:

- Positioning is relatively simple and minimal expertise is required,
- Both maxilla and mandible are visible in a single film,
- Both condylar heads shown in the single film, allowing easy comparison,
- Useful for mass screening.

DISADVANTAGES:

- An area of interest outside focal trough is poorly visualized.
- Technique is not suitable for children under 5 years or some disabled patient.
- Movement of patient during the exposure can create difficulties in image interpretation.

CONCLUSION:

- OPG has several advantages in the field of dentistry and it is inevitable in the role of diagnosis.
- Understanding the different positional techniques becomes a self motivational attempt for each individual technologist to perform dental radiographs confidently, aiding in perfect diagnosis.

Ultrasound Artifacts

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What is an artifact?

- An artifact is the distortion or error in the image that is not a representation of the object imaged.
- The causes may be machine, patient or operator related.

Different types ultrasound artifacts:

- Refraction artifact
- Speed displacement artifact
- Mirror image artifact
- Reverberation artifact
- Shadowing and enhancement artifact
- Side lobes artifact
- Grating lobes artifact

Refraction artifact:

Cause: It is caused by bending of the transmitted ultrasound pulse at an interface.
Manifestation: Anatomical displacement in the image.
Correction: Change the orientation of the Ultrasound probe.

Speed displacement artifact:

Cause: The time versus distance relationship in an ultrasound instrument is based on the speed of sound in soft-tissue eg: 1540 m/s
Manifestation: If the ultrasound beam travels through a region in which the speed of sound varies much from 1540 m/s , the anatomical information is imaged at a wrong depth.
Correction: A correction algorithm is used.

Mirror image artifact:

Cause: It is caused in presence of a very strong reflector such as air-bone interface/diaphragm.
Manifestation: Diaphragm is a specular reflector which acts like a mirror and produce an inverted image of the diaphragm
Correction: Change the beam orientation.

Reverberation artifact:

Cause: It caused by multiple reflection between two highly reflective interfaces.
Manifestation: It is seen as multiple , equally spaced with decreasing amplitude in straight line.
Correction: Change the orientation of the Ultrasound probe.

Shadowing and enhancement artifact:

Cause: It is caused by variation in the ultrasonic attenuation between the tissue present in the region of interest.
Manifestation: Partial or total shadowing distal to the structure which is highly attenuating and enhancement distal to the structure which is low attenuating.
Correction: Change the orientation of the beam.

Side lobe artifact:

Cause: It is caused by energy in ultrasound beam from a single element or array transducer that falls outside the main lobe.
Manifestation: Echoes returning from tissue along the propagation direction of the side lobes.
Correction: Apodization and pulsed beam.

Grating lobe artifact:

Cause: It occur with multi element array transducer, and result from the division of a smooth transducer surface into a large number of small elements.
Manifestation: This misdirected energy produces ghost images.
Correction: Use closely spaced elements.

Conclusion:

- The ultrasound artifact are readily discernible because of the transient appearance or obvious effect on the image and hence can be immediately rectified.

DIGITAL BREAST TOMOSYNTHESIS

K. DIVYA BHARATHI

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INTRODUCTION

Digital breast tomosynthesis is a new technology that addresses the limitation caused by overlapping structures by acquiring a series of low-projection images. This method has improved sensitivity and specificity compared with digital mammography, especially in cases of non calcified breast cancer and improves cancer visibility

DBT Technology

The breast is compressed and held stationary between the compression paddle and detector.

The x ray tube moves in an arc over head, executing a series of low dose exposure at preset intervals ,each from a dif¬ferent angle.

A DBT system can acquire images in standard mammographic images in cranio-caudal, mediolateral oblique and mediolateral.

RECONSTRUCTION

After image acquisition 11-50 views will be obtained for getting the volumetric data.DBT images can be reconstructed into sections as thin as 1 mm into plane that is parallel to the detector.

For example: If a 60 mm compressed breast is reconstructed at 1 mm thickness, there will be 60 slices for the physician to review.

If the images are reconstructed at 10 mm thick “slabs” using maximum intensity projection (MIP) thick slices, there will be 6 images to review.

ADVANTAGES

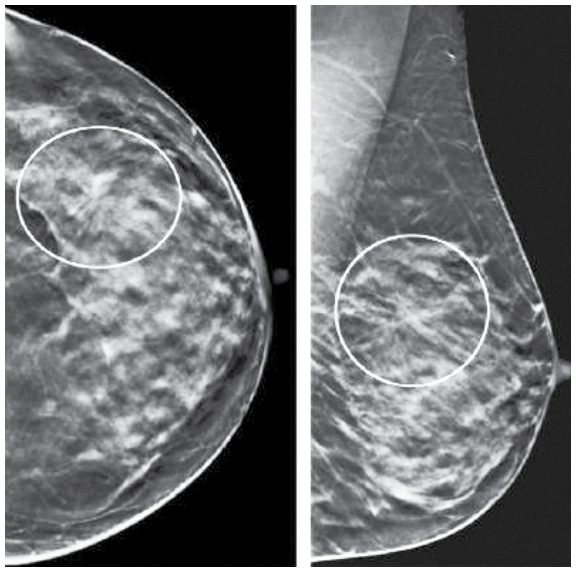
Improve lesion visibility

Replacement for Traditional Supplemental Imaging

Assessment of Noncalcified Cancers

PRACTICAL USE OF DBT

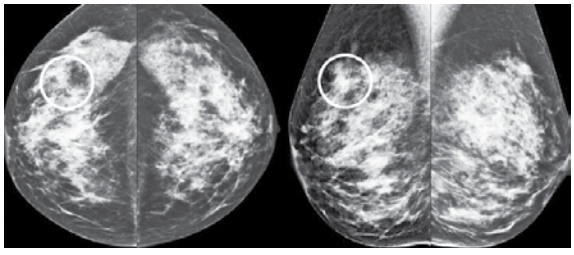
Architectural distortion



2D 3D

Tumor measurement

Number of Tumor Lesions or Satellite Lesions



LIMITATIONS

Patients with large breast may feel uncomfortable or not tolerate as compression is prolonged for fewer seconds

CONCLUSION

DBT is a useful tool in diagnostic evaluation and staging of breast cancer.

This can lead to improved preoperative sizing of lesions, identi¬fication of additional satellite lesions, and evalua¬tion of the contralateral breast

Society of Indian Radiographers (SIR)
"Youtube Channel"

This Channel is
for the Radiographer...
by the Radiographers...
to the Radiographers...

To view this channel click on the below link
https://youtu.be/PfhUypiF-Gw

Kindly forward this to all Radiological Technologists.

Please Subscribe and Watch

TISSUE HARMONIC IMAGING

SWEATHA.S

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INTRODUCTION :

Harmonic imaging is a ultrasound method in which the low frequency ultrasound (f0) is transmitted higher harmonic echoes(2 f0) are selectively detected and used for imaging .

Harmonics are the multiple integral of fundamental frequency (2f0,3fo .4f0..,)

CLASSIFICATION OF HARMONIC IMAGING :

- Contrast harmonic imaging.
- Tissue harmonic imaging

CONTRASTED HARMONIC IMAGING:.

CONTRAST AGENTS:

- Contrast agents – Micro bubbles are used to produce harmonics . Micro bubbles behaves in non linear fashion. Size of the micro bubble – 3-6microns and it should be encapsulated micro bubbles. Should remain stability.

GENERATION OF HARMONICS :

The contrast agents is injected into blood vessels to generate harmonic upon interaction with ultrasound and then harmonic signal is used to obtain images .

LOW PRESSURE WAVES	HIGH PRESSURE WAVES
Time to compress = time to expand	Time to compress is less compared to time taken to expand so the crest travels faster than trough.
The wave response in linear manner	The waves behaves in a non linear fashion

It produces double the incident frequency due to the high pressure ultrasound wave which causes non linear compression of gas bubbles.

ADVANTAGES:

- Used for direct imaging
- Increases the sensitivity , more signals from the blood supply.

DISADVANTAGES:

- It take more time for image build up and there will be lesser frame rates.

PULSE INVERSION ALGORITHM:

- The transducers sequentially emits two pulse with similar amplitude but with inverted phase .

PRINCIPLES OF PULSE INVERSON :

The scanner detects the choes from these two successive pulse and forms their sum for ordinary tissue , which behaves in a linear manner the sum of two inverted pulse is simly zero ..,

TISSUE HARMONIC IMAGING:

In tissue harmonic imaging , the tissue itself produces some harmonics , where the speed of sound becomes more where pressure is more.

PROUCTIONS OF HARMONICS:

- Compression are travels faster than rarefaction.
- When high pressure is applied tissue responds non- linearly.
- The non linear propagation of ultrasound produces tissue harmonic .

IMAGE FORMATION :

Transmiting a low frequency → penetrates to body tissue generates high frequency harmonics sound → Echoes from fundamental frequencies are rejected.

The harmonics gets localized centrally , so the bandwith get reduced , so the lateral resolution is better in THI .

IMAGE CHARACTERISTICS:

- Decrease image dyanmic range
- Better lateral resolution
- Enhanced visualization of deeper structure.

ARTIFACTS REDUCTION IN TISSUE HARMONICS :

- Decrease scatter from body walls – side lobe artifacts.
- Reduced artifacts from weak echoes – Reverberation artifacts .

CLINICAL EFFECTS IN THI :

- Breast and axilllary lymph nodes
- Distinguish between renal cyst and solid renal focal abnormalities

CONCLUSION:

Harmonic imaging helps to produce images of Deeper structure with improved spatial resolution and contrast resolution with reduced artifacts.

EVALUTION OF FOCAL BREAST LESIONS USING ULTRASOUND ELASTOGRAPHY

ROOPIKA S

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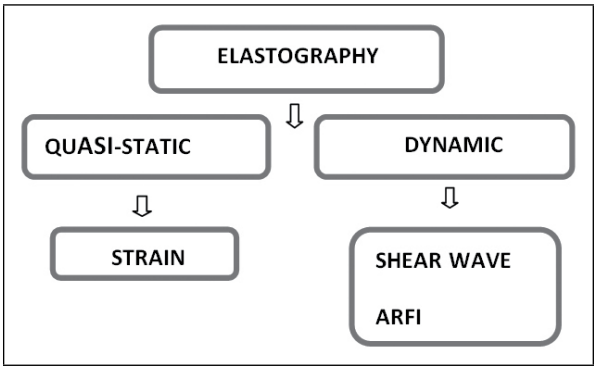
INTRODUCTION:

Ultrasound Elastography is a Non-invasive Technique of imaging Stiffness or Elasticity of tissues by measuring movement or transformation of tissue in response to a Small Applied Pressure.

TYPES OF ELASTOGRAPHY:



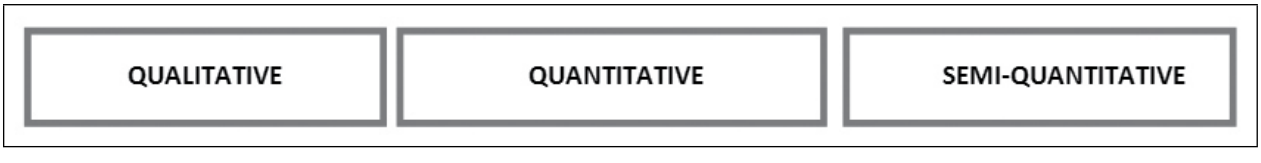
STRAIN: The Elastogram is created using either **Minimal Compression** or physiologic tissue motion from cardiac pulsations or respiration as the stress force on tissue.

SHEAR WAVE: Shear Wave Elastography relies on the displacement of tissues induced by a force, either External Pressure or the radiation force from a **Focused Ultrasound Beam**. The displacement of tissues induces elastic Shear Waves, which propagate and are detected by the ultrasound transducer.

ACOUSTIC RADIATION FORCE IMPULSE IMAGING: Instead of using external compression, Ultrasound Scanners are used to generate Short-Duration Acoustic Radiation Forces that impart small localized Displacements in the tissue.

INTERPRETATION:

Different Scoring System, Ratio and Criteria have been proposed to differentiate Breast Lesions. These Assessment are broadly classified into:



QUALITATIVE: This assessment method is generally **Less Accurate**, using only a Generated **Color Map**.

QUANTITATIVE: This method expresses The Elasticity of the Lesion in Units **(kPa in Shear Wave or mm/s in ARFI)**

SEMI-QUANTITATIVE:This assessment uses The Strain Ratio to Compare The Elasticity of the Lesion to the surrounding **Normal Parenchyma** or Fat in cases of Breast lesions.

BI-RADS LEXICON

The BI-RADS Lexicon provides an important tool to increase the Specificity and Diagnostic Accuracy of Ultrasonography of Breast lesions . The lesions are first characterized according their **Shape, Margins, Orientation, Vascularity** and **Echo Pattern** within a particular **BI-RADS Category**.

0 CATEGORY	Need Additional Imaging.
1 CATEGORY	Negative
2 CATEGORY	Benign
3 CATEGORY	Probably Benign
4 CATEGORY	Suspicious
5 CATEGORY	Highly Suggestive of Malignancy
6 CATEGORY	Known Biopsy Proven

CHARACTERIZATION OF BENIGN/ MALIGNANT SOLID LESIONS:

- Can improve specificity of **BIRADS score**.
- Reclassify BIRADS 3&4a lesions.
- Useful for Malignant Lesions Presenting as Benign on **B-mode**.
- Most important Elastographic Characteristics in Evaluating Breast Lesions by **Size** and **Stiffness Criteria**.

ADVANTAGES:

- Increase in **Diagnostic Confidence**.
- Reducing Unnecessary **Short-Term Follow Up.**
- Changing **Biopsy Decision** to Short-Term Follow up.

CONCLUSION:

Breast Ultrasound Elastography is a useful Imaging Modality Resulting in Increase Specificity and Sensitivity in Diagnosing different breast lesions when combined with B-mode ultrasound findings.

Simple tools are designed on the QA program for x-ray equipment

Miss. Nithya Mohan

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Abstract:

We designed some simple tools on quality assurance program for x-ray equipment in Radiology with easily available material to help our x-ray technician who is working in remote and urban areas.

These simple tools are cost effective and it can be easily applicable.

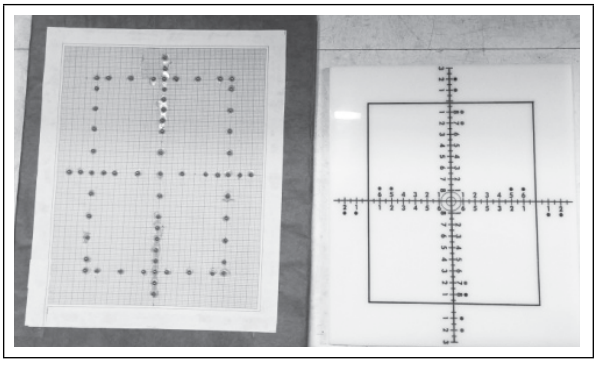
This QA program includes,

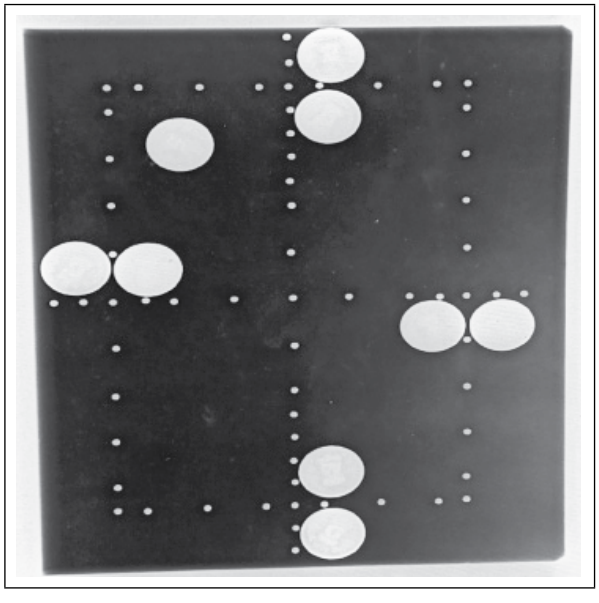
1. Congruence of Radiation and Optical Fields
2. Central Beam Alignment
3. Cone Beam Alignment
4. KV Linearity
5. Linearity of Ma loading Station
6. Timer Linearity
7. Focal Spot Size

Purpose of this presentation is to share the knowledge of making these simple tools with our students and staff of Radiology department,

This program may helpful for student radiographer to do project work in quality assurance paper and it will give great impact in quality assurance for public.

The comparative study of our tools with company tools is going on with help of AVANTTEC LABORATORIES PRIVATE LIMITED.





PERCUTANEOUS TRANSHEPATIC BILIARY DRAINAGE (PTBD) DOSE CONTROLEING IN FLUOROSCOPY PROCEDURES

Mallikarjun.D.K

Kidwai Cancer Institute, Bengaluru

Abstract:

Percutaneous transhepatic biliary drainage (PTBD) is a percutaneous therapeutic procedure, done in case of obstructive jaundice in case of biliary stones, biliary strictures, malignancy (pancreas, lymph nodal metastasis, gallbladder) under fluoroscopy or DSA. It is both palliative as well as curative. It is performed in case ERCP guided stenting is not feasible such as in case of high level of obstruction and altered anatomy due to previous surgeries. It involves percutaneous puncturing of biliary radicles followed by insertion of guide wire and sheath into biliary radicle followed by imaging guide wires and catheter manipulations, placement of external or internal drainage tube or stent completes the procedure.

We present here the indications, contraindications, patient preparation, technique, after care and complication of PTBD under fluoroscopy or DSA and reduction of skin dose of patient by using intermittent exposures, grid removal, last image hold beam filtration, pulsed fluoroscopy, and other dose reduction techniques.

CARDIAC MRI

Author and Presentation: MR.J. ARUN PRASANNA DOSS M.SC RIT

Lecturer – Radiology and Imaging Technology, Dr. Kamakshi Institute of Medical Sciences and Research, Chennai, Tamil Nadu, India.

CONTENTS:

Abstract:

This presentation will clearly explain the basic and fundamental concepts of Cardiac MRI in a detailed manner. It clearly briefs the modalities and its each distinct methods clearly. The concepts of TR and TE involved in the following sequences decides the quality of the imaging are explained in a detailed manner. The sequences which include SHORT AXIS , 4 CHAMBER & 2 CHAMBER which gives the specialty of cardiac imaging. The DYNAMIC STUDY is the special sequences involved to brief the study which helps to access and diagnose the pathology clearly. The use of a special sequences is also explained.

Conclusion:

The effective measures which undertook in the imaging techniques of CARDIAC MRI which access an easy viewing of heart and its valves and chambers. The highly effective diagnostic tools potential to display the cardiac imaging is explained.

HOW WE DO IT: CONTRAST ENHANCED SPECTRAL MAMMOGRAPHY – THE PROBLEM SOLVER IN INDERTERMINATE LESIONS OF BREAST

Presenter: Dhivyashree Ravikumar[*], Guide: Dr.J.Devimeenal[**]

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OBJECTIVE

The contrast enhanced spectral mammography aims to highlight the areas of concern within the breast and to categorize and grade the lesion.

INTRODUCTION

It is a non invasive technique and basically this requires speed and efficiency.

Mammography can be done with the individuals who are >40yrs and individuals with ve family h/o of Ca Breast that includes who are >35 yrs.

Imaging of CESM is useful in detection of increased formation of blood vessels associated with tumor development and it is a shorter examination.

CESM is also useful in evaluating the extent of disease in dense breast.

MAMMOGRAPHY TECHNIQUES

Patient Preparation Includes,

- Clinical indication,
- Informed consent,
- RFT evaluation,
- I.V Access –18G Venflon
- If female patient in a reproductive age group – must follow 10 day rule.

Contrast Agent Administration,

- Non-ionic contrast 350 mgI/Ml via 18G venflon.
- Volume: 1.5 cc/kg of body weight
- Flow Rate: 3 cc/sec via Power Injector.
- Breast is uncompressed during injection for 2.5min. we have to wait 2.5 min post injection before imaging.

Views To Be Taken,

- Right cranio-caudal (RCC)
- Left cranio-caudal (LCC)
- Right medio lateral oblique (RMLO)
- Left medio lateral oblique(LMLO)
- If requires delayed images can be taken that too within 2 min.

Automatic Exposure Control
Dual Energy Technique

- The Dual Energy technique consists of acquisition of low and high energy images
- Two exposures are made in rapid sequence: Low kV (standard mammogram)
  High kV (~45-49 kVp, Cu filter)
- Subtraction gives a 2D contrast image

USES:

CESM increases the diagnostic accuracy in detecting the

- Sub-centimetric malignant lesion,
- Differentiate double breast pathology,
- Detects residual/recurrent carcinoma,
- Clarifies equivocal lesions of sonography and mammography.

CONCLUSION

- Compared to MRI, CESM uses much less expensive equipment, so it can be performed at less cost.
- CESM can be considered as an alternative to MRI in case of contraindication to MRI.
- When the lesion is indeterminate in USG and mammography- based on the pattern of enhancement, contrast enhanced spectral mammography preciously categorizes the lesion.
- Hence the contrast enhanced spectral mammography so called “The problem solver”.

CT PERFUSION – AN OVERVIEW

S. SUGANTHI

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INTRODUCTION

Perfusion imaging in CT can provide valuable information about the physiological details about the volume of blood flow through the mass of the tissue.

AIM AND OBJECTIVES

To perform dynamic contrast perfusion of the brain, in patients who presented with generalized complaints and on those with specific complaints and to calculate CT perfusion parameters so as to aid better radiological interpretation and provide optimal treatment strategy.

CT BRAIN PERFUSION

Computed Tomography (CT) Perfusion is a functional imaging modality to evaluate tissue vascularity. It measures changes in tissue enhancement after contrast injection and tissue perfusion can thus be estimated with different kinetic models

NEED FOR CT PERFUSION

The Perfusion-CT technique has been found to be useful in the evaluation of cerebral ischemia and infarction, but recent studies have investigated the role of perfusion maps for evaluating brain neoplasms, because there is growing interest in the non-invasive assessment of tumor vascularity.

The rationale for the use of CT Perfusion for neoplasms is that the technique provides information about tumor angiogenesis. The increase of angiogenic activity and neovascularization in the neoplasms results in an increase of microvascular permeability and CBV, related to the presence of immature, disrupted or absent vessels of the blood-brain-barrier (BBB).

In particular, CT-Perfusion imaging permits a qualitative and quantitative evaluation of the brain perfusion by mapping cerebral blood flow (CBF) and cerebral blood volume (CBV).

RADIOGRAPHIC FEATURES

The key to interpreting CT perfusion in the setting of acute ischaemic stroke is understanding and identifying the infarct core and the ischaemic penumbra, as a patient with a small core and a large penumbra is most likely to benefit from reperfusion therapies.

INDICATIONS :

- Acute Stroke
- Tumor
- Vasospasm
- Temporary balloon occlusion

CONTRAINDICATIONS:

- HIGH RFT values
- History of allergy to contrast medium
- Pregnancy

CONTRAST AGENT:

IOHEXOL350mgI/ml

- 40 ml of non-ionic contrast with 30 ml saline chase
- Injection Rate : 4 ml per sec (ADULT)
  : 3-4 ml per sec (Pediatric)

OUTLINE OF PROCEDURE:

The patient is position supine with head first orientation, Initially a AP and lateral topogram is obtained; A plain helical scan is planned on the topogram, and the prescribed region of interest for CT perfusion study is obtained

PERFUSION SLAB

- Maximum number (4 – 8 - 16) of contiguous 5 mm slabs allowed by each specific CT scanner is used (toggle / shuttle mode if possible)

CT SCAN PERFUSION PARAMETERS

The CT images acquired are immediately post processed to obtain perfusion maps with different

parameters, the four main common parameters that are processed are:

BLOOD FLOW (BF)

- Volume of blood per unit time passing through a given region of tissue
- Expressed in ml/min/100g

BLOOD VOLUME (BV)

- The volume of blood per unit time passing through a given region of tissues
- Expressed in ml/100g of tissue

MTT

- It's the length of time a certain volume of blood spends in the capillaries of the given region of tissues.
- It's the ratio between BLOOD VOLUME and BLOOD FLOW

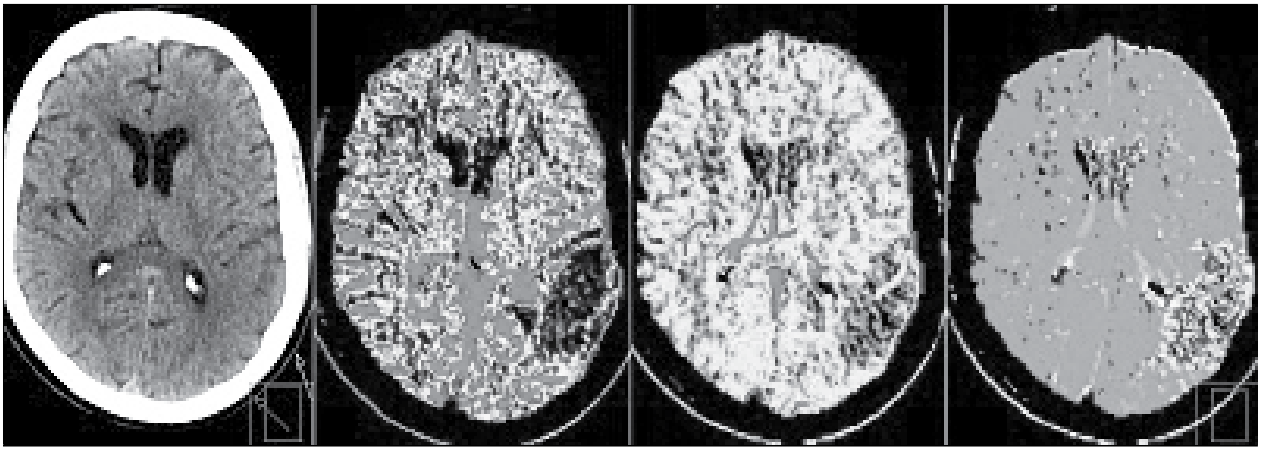
MTT = BV / BF Expressed in sec (seconds)

TTP

- It's a delay between injection of the bolus and its peak arrival in the tissues.
- It is expressed in sec (seconds)

IMAGE PROCESSING

Once the CT perfusion is completed, the acquired and reconstructed images were transferred to a workstation and processed with the aid of the CT perfusion software, with generation of color functional maps and calculation of functional parameters.



CONCLUSION:

The perfusion studies on the patient with acute stroke showed relative values of CBV and CBF which very well discriminated the areas of reversible and irreversible ischemia.

The study provided substantial and important additional information to facilitate optimal treatment strategy on patient with acute stroke.

Radiation Dose Reduction Strategies in paediatrics Imaging

Mrs.Akila R

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AIM:

To implement and follow Radiation Protection techniques in paediatric imaging. Children have higher radiation sensitivity than adults and therefore imaging techniques to be streamlined.

RISK FACTORS:

- Paediatric Patient are more vulnerable to the late somatic effects and genetic effects of Radiation than adults.
- Children are ten times more sensitive than adults and girls are more sensitive than boys
- Risk for developing a radiation related cancer can be several times higher for a young child compared with an adult exposed to an identical technique.

Strategies/Special Considerations:

Dose to the children can be reduced significantly by adopting either one or combination of the following: This includes

- Higher kVp and lower mAs
- Increased filtration
- Field size reduction
- Shielding of gonads, thyroid and lens
- Increased Source-Object Distance (SOD)
- Modifications in positioning technique

Dose Reduction Methods In Pediatric Radiography:

- Good image detail is achieved by maintaining a balance between the use of a small focal spot size and a short exposure time.
- High speed screen-film combinations should be used where possible to enable reduction in radiation exposure and exposure time
- The use of Automatic Exposure Control (AEC) is generally not appropriate in children as the sensors (size and geometry) are normally designed for adult patients. Instead, exposure charts corresponding to radiographic technique are followed.
- The radiation beam should be limited using collimation.
- Shielding devices should be appropriately positioned to be efficient for protecting the tissues for which they are placed and to avoid unnecessary repeat examinations.
- Immobilization, when required, should be provided

Dose Reduction Methods In Computed Tomography:

Use Reduced exposure factor(Paediatrics Protocol) which can reduce Paediatrics radiation dose

CONCLUSION:

Although replacing a CT with magnetic resonance imaging is ideal to completely avoid ionizing radiation, this is not always practical or preferred. Therefore, it is important to have CT protocols in place that minimize radiation dose without sacrificing diagnostic quality.

Abstract for MRI Safety

Ami K. Shah

Tata Memorial Hospital, Mumbai

Being a very large & powerful Magnet, and being always kept ON, it is very important for the Radiographers to know the aspects of MRI Safety while working in the MRI Department.

My paper describes the characteristics of the Magnetic Field along with the forces in the MR environment & also **why is proper MRI safety so important?** This I have tried to explain with the division of the four zones in MRI Department.

It always should be kept in mind that **ALL EMPLOYEES MUST BE SCREENED TO WORK IN A MAGNETIC FIELD ENVIRONMENT JUST LIKE THE PATIENTS, without any exceptions**.

The importance of Safety Signage, Screening Form, Patient Screening is also explained in this paper.

It also explains about the objects which should not be taken in MRI Department along with the potential dangers of MRI.

Quenching is an important aspect of MRI which I have tried to elaborate well along with the emergency shutdown.

FACTORS INFLUENCING CT IMAGE QUALITY

ALAGESH KRISHNAN

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INTRODUCTION:

- Image quality in CT is the visibility of diagnostically important structures in the CT image.

SCANNING PARAMETERS:

- The total x-ray beam exposure in CT is dependent on a combination of mA setting, scan time, and kVp settings.

FACTORS INFLUENCING CT IMAGE QUALITY:

- Spatial Resolution,
- Contrast resolution
- Quantum mottle (noise).

SPATIAL RESOLUTION:

- Spatial resolution in CT is defined as the ability to display or discriminate two adjacent objects which is closer to each other as a separate object.

CONTRAST RESOLUTION:

- It is defined as the ability of the imaging system to display an image of relatively large object that is only slightly different in density from its surrounding.

QUANTUM MOTTLE:

- Noise in CT is an unwanted change in pixel values in an homogenous image.
- Noise is the fundamental limit to the quality of CT image.

CONCLUSION:

- Thus, improved spatial resolution will be at the expense of increased noise unless dose is increased.
- Improvement of both contrast resolution and spatial resolution always requires increased patient dose .

STERLIZATION TECHNIQUES AND METHODS USED IN RADIOLOGY

Muruganandan S

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INTRODUCTION:

Sterilization is a process that destroys or eliminates all forms of microbial life and is carried out in healthcare facilities by physical or chemical methods.

Steam under pressure, dry heat, ethylene –oxide gas, hydrogen peroxide gas plasma, and liquid chemicals are the principal sterilizing agents used in health-care facilities.

DISINFECTION:

Process that kills or removes the pathogenic microorganisms with the exception of bacterial spores.

CENTRAL STERILE SUPPLY DEPARTMENT:

CSSD is divided into three main areas

- Dirty area
- Clean area
- Sterile area

DIRTY ZONE CLEANING:

Cleaning is done using water with detergents or enzymatic products

Enzymatic cleaners: A neutral pH solutions commonly used because it generally provides the best material compatibility and multi enzymes are added to neutral pH solutions to assist in removing organic material

Dilution of enzymatic cleaners:
Manual cleaning - Soak instruments for 3mts in prepared bath prior to washing

Automated cleaning- Ideal method to wash & terminally sterilize soiled instruments.

This combines with thermal water spray action known as impingement.

CLEAN ZONE: Packing area-checking,assembling, packing, labelling,Arranging and loading of instruments.

TYPES OF STERILIZATION:

Steam sterilization
Gas sterilization
Microwave sterilization
Infrared sterilization
Ionizing radiation sterilization

Steam sterilization: Expose each item to direct steam contact at the required temperature121°C and pressure(20 pounds) for the specified time (80mins).

Types- Autoclave
High speed pre vacuum steam sterilizer

Autoclave: Steam from above displaces cold air which escapes through the bottom of the chamber. The valves should be open from obstruction, the chamber should not be overfilled.

It is loaded with dressing tray, HSG tray suture materials, instruments, cotton rolls, gauze swabs, drapes, surgical bins.

Gas sterilization: ETHYLENE OXIDE GAS is used, it is highly diffusible and has excellent penetration

Used to sterilize materials that are sensitive to heat and moisture hence cannot be sterilized by steam

CONCLUSION:

When properly used, disinfectant and sterilization can ensure the safe use of invasive and non-invasive medical devices. However all healthcare workers must be aware of the current disinfection and sterilization guidelines and ensure it, it is strictly followed.

DUAL ENERGY X-RAY ABSORBPTIOMETRY

Mohammed cader sahib .M.S

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INTRODUCTION:

Dual energy x-ray absorptiometry (DEXA) is an x-ray based imaging technique primarily used to devise the mass of one material in the presence of another based on their unique x-ray attenuation at different energies. DEXA is an extremely accurate and precise method for qualification bone mineral density (BMD) and mass body composition assessment.

PRINCIPLE:

The DEXA principle is based on the fact that mass attenuation co-efficient for different tissues decreases at different rates with increase in x-ray energies. At low X-ray energies mass attenuation co-efficient of bone is very high compared to that of soft tissue and at high energy it is approximately equal to that of the soft tissue. By using two different x ray sources rather than one it greatly improves the accuracy in measuring the bone density.

INDICATIONS:

- Fracture following trivial injuries and reduced height of the vertebrae.
- Women with early onset of menopause and women who are on HRT (Hormone Replacement Therapy).
- Other disorders associated with osteoporosis such as rheumatoid arthritis or coeliac disease.
- A body mass index of less than19 (that is, if the person is underweight).
- Patients above age 65.

T SCORE AND Z SCORE:

Bone density test results are reported using T-scores and Z - scores. These scores shows how much an individual's bone density is higher or lower compared to the bone density of a healthy individual . A low T-score is suspected of osteoporosis. A Z-score above -2.0 is normal according to the International Society for Clinical Densitometry (ISCD).

CATEGORY	T - S C O R E RANGE	EXAMPLE
Normal bone density	-1 and above	+0.5
Low bone density	-1 and -2.5	-1.5
Osteoporosis	-2.5 and below	- 2.5

APPLICATIONS OF DEXA:

- To evaluate bone mineral density(BMD)
- To diagnose osteoporosis
- To measure total body composition and fat content with a high degree of accuracy

CONCLUSION:

Dual energy x-ray absorptiometry (DEXA) still holds good as the gold standard bone density measurement technology.

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