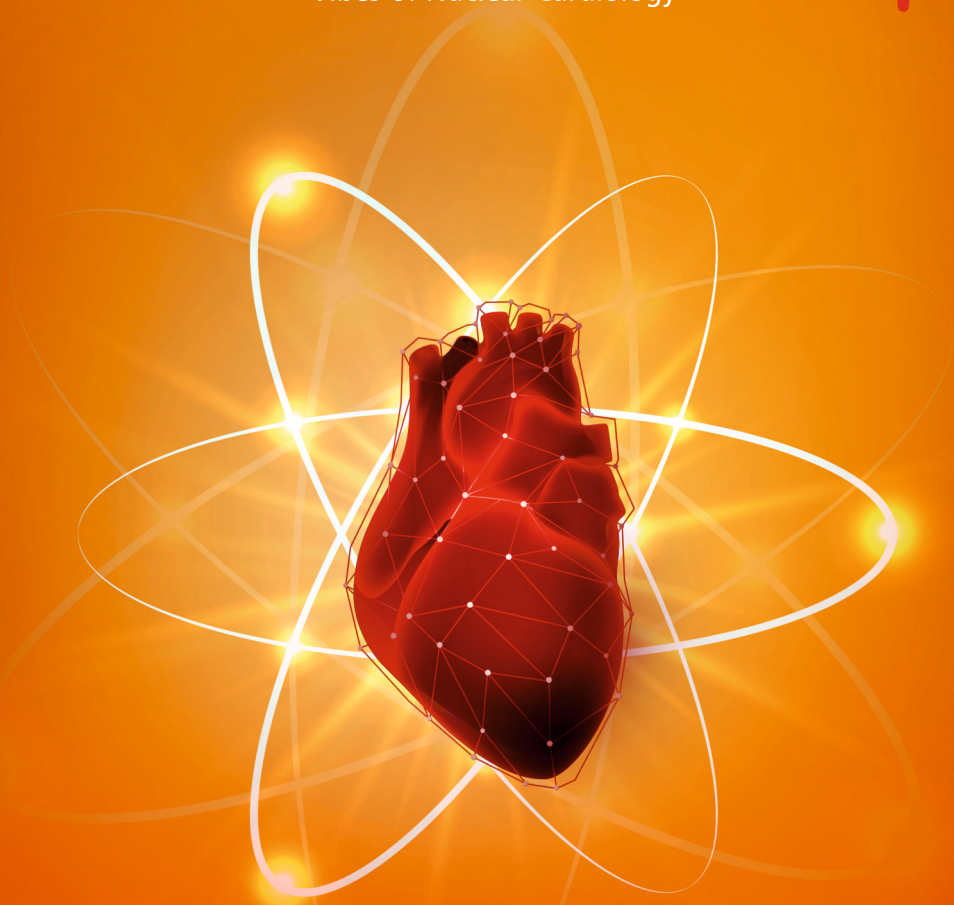




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Vibes of Nuclear Cardiology



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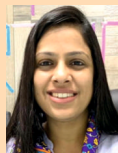


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NUCLEAR CARDIOLOGICAL SOCIETY OF INDIA

Dil Se

Message from the President, NCSI



It gives me great pleasure to present to you this fresh edition of the NCSI Newsletter. I congratulate the editorial team for their work and dedication in creating this edition and reviving the newsletter.

These newsletters are immensely important in building an interface between Nuclear Cardiology practitioners and referring Physicians, the importance of which cannot be understated in these pandemic times.

It has been twenty five years since the inception of the Nuclear Cardiology Society of India. This long journey started from tertiary care hospitals in metropolitan cities to now expanding its reach to third tier cities and over 300 centres across the country.

The services of Nuclear Cardiology have expanded from its conventional role in stress myocardial perfusion scans for ischemic heart disease to its widespread use in evaluation of infiltrative and inflammatory myocardial disorders.

I would also like to take this opportunity to invite you to our upcoming 13th bi-annual conference to be held virtually on 2nd & 3rd October, 2021, to be hosted by Fortis Escorts Hospital and Research Institute, New Delhi.

Thank you for your continued support in all NCSI endeavours.

Dr. Anshu Rajnish Sharma

President, NCSI.

12th Biennial conference of the Nuclear Cardiological Society of India (NCSI), 2019, Chennai

The 12th NCSI was successfully conducted in the city of Chennai, at the MIOT auditorium, MIOT hospitals, Chennai on 5th and 6th Sep 2019. The conference



was well attended with 218 registrations, which included 108 student registrations (post graduate medical students- 44, technology students 64). Registrations were not limited to nuclear medicine professionals, but also professionals from clinical cardiology, cardiac surgery, radiologists and medical physicists. Scientists Conference attracted registration from all over India and also professionals from countries like Kuwait, Iraq, Sri Lanka, Maldives and Republic of Fiji. For the first time in the history of any

NCSI meeting, the organizing committee decided to waive off the registration charge for the students. We also had 6 trade delegate registrations that supported the event generously. The conference was preceded by a 3-hour CME event on basics of ECG conducted by Cardiologist from MIOT hospitals, Chennai (a day before the main event on 4th Sep 2019) which was aimed at improving the knowledge of ECG and electrophysiology amongst the practising nuclear physicians and post graduate students.

The one and half day academic program was conducted with invited speakers (total 29, 26 Indian speakers and 3 overseas speakers) from all the central institutions of national importance (such as AIIMS-Delhi, SGIPGI Lucknow, Tata memorial Hospital,



Mumbai, JIPMER, Pondicherry) and centres of excellence in cardiac imaging outside India, such as University Hospital of Zurich and Chest hospitals, Ministry of health, Kuwait. The academic program had diverse spectrum of presentations, including basic clinical cardiology, stress

ORGANIZING TEAM



Dr. Piyush Chandra



Dr Satish Nath

physiology, gender bias in cardiac imaging, non-nuclear cardiac imaging (CT/MRI), advances in nuclear cardiology (amyloid imaging), advances in multi-modality-hybrid cardiac PET/CT and

role in the education and research in field of nuclear cardiology. This year's Homi Bhabha Oration was delivered by Dr Aju Pazhenkottil, from University Hospital, Zurich who emphasized the



PET/MR, use of latest PET radiopharmaceuticals in cardiac imaging, trouble shooting of artefacts in nuclear imaging, scan reading sessions with experts and radiations safety aspects. Presentations included imaging topics beyond ischemia/infarct imaging and covered topics such as cardiac infections, non-ischemic heart failure, sarcoidosis and cardiac amyloid imaging. There were debates conducted on important controversial topics (such as use of CTA Vs. stress MPI in diagnosis of CAD, use of Myocardial flow reserve Vs. Fractional flow reserve) in order to build consensus for guiding patient management. The most entertaining event was the quiz program on day 1 with 4 teams consisting of nuclear medicine post graduate students from TMH, JIPMER and SVIMS-tirupathi. This year's event was an opportunity for NCSI to award life-time achievement award to two stalwarts of nuclear medicine society of India, Prof Dr B K Das and Prof Arun Malhotra as recognition of their

importance of multi-modality integrated cardiac imaging in improving clinical outcomes in cardiology practice. The plenary lecture was delivered by Dr Arun Kalyansundaram (trained in Cleveland Clinic), who demonstrated the challenges in various day to day interventional cardiology procedures (such as chronic total occlusions etc.).

Most presentations in the CME program were didactic in nature with enthusiastic participation from the audiences. The CME program was recognized and accredited with 8 hours by Tamil Nadu medical council and 20 hours by the Dr



MGR Medical University. Feedbacks from registered delegates towards the program content, hospitality and the overall organization of the conference were very encouraging and something that the organizing team, led by Dr. Satish Nath, could be very proud of. The success of NCSI 2019 now lays a new benchmark for the next conference to be conducted in 2021.

13th Biennial NCSI Conference 2021, New Delhi

Invitation



Dr Atul Verma
Org. Secretary

It gives me a great pleasure to welcome you all to the “13th Biennial conference of Nuclear Cardiological Society of India (NCSI)” conference to be held on 2nd & 3rd October 2021 and jointly organised by Fortis Escorts Heart Institute & Nuclear Cardiological Society of India.

During these difficult times of National & International calamity, the conference is planned on a 3D virtual platform including virtual convention centre with sponsors' branding, Expo centre Atrium, Conference halls with multiple screens & live /semi live conference session with integration of webinar platform, clickable links of sponsors' branding & many other which will give you the pleasure of live & real look alike presentations. The E-certification for delegates & faculty will be distributed / can be downloaded immediately after

the presentations. The registration for the conference is free of cost. The E-Flyers will be distributed from time to time.

We envisage a conference that will have the best of academics.

The Scientific committee has planned a feast of programmes which will incorporate presentations from a number of respectable International & national faculties. The scientific sessions have been carefully planned that will cover a wide spectrum of topics along with orations, guest lectures, key note addresses and much more which will cover latest innovations, research and current topics. We propose making this a high tech conference with innovations in registration, entries and audio-visuals. Also we plan to have a special virtual cultural evening performance by the Delegates.

I on behalf of NCSI & Fortis Escorts Heart Institute, New Delhi, India welcome you to participate in this conference in large numbers to make it a grand success.

Thank You.



To register for 13th NCSI conference visit: <https://www.concepttc.com/nuclearcardiology/>

Dil e Daastan

Remembering
Prof. Dr. Arun Malhotra



Dr. Murali Nadig

It's really sad and shocking to know that Prof. Dr. Arun Malhotra is not with us anymore. He will always be remembered as a man with utmost empathy, gentle manners and friendly nature, apart from being a great administrator as well as an academician. I remember the day when I joined the Department of Nuclear Medicine at AIIMS, in Jan 2002, Sir had received me so well, made me sit in front of him, enquired about my family and even offered to take a few days break since I would have gone through the hardship of preparing and passing the PG entrance exams!!! Well, he would treat every other person with equal care. Under his stewardship the Department of Nuclear Medicine grew to equip with PET-CT, gallium generator, multiple wards for therapy etc. He also used to encourage students to publish and attend conferences. His way of handling interpersonal conflicts and pacifying is also something to be learned from.

Dr. Malhotra's demise has created a great vacuum in the NM fraternity. I wish Sadgati to his soul and pray God to give strength to his family to bear with the loss.

Teacher, Guide and a friend

Sanjay Gambhir

Really heartbreaking to realise that we will no longer have the company of Malhotra Sir in the Nuclear Medicine fraternity. I have known him for more than 30 years, first as a student, then as a speciality colleague and then as a friend. He had a unique personality of being friendly even when he was examining or interviewing someone for a job. A very relaxed person in control of the surroundings be it in a meeting or a party. He could easily surmount tough situations by saying let bygones be bygones, let's move forward. He was still active in the Nuclear Medicine fraternity and one would always look forward to meeting him. He made it a point to interact with as many people as possible especially the students. His love for the speciality is well known and he strived for progress. At a personal level he was a guide whose advice I sought and he was always there to help which will be missed. Let's celebrate him and his philosophy. RIP

Dr. Chetan Patel

After my PG entrance exams results in 1992, I had to take a decision on the specialty to choose for my career. Given my decent rank in the entrance exam, I could have selected one of the more traditional courses like Medicine or Surgery; however my interest was more in the Imaging branch. Since Radiology seats had been taken, I had a difficult option of either giving another try at the exams next year or to choose one of the clinical subjects that year, which I was not very keen on. I had heard of Dr. Arun Malhotra, a faculty in Nuclear Medicine at AIIMS, through a friend of mine who was related to him. I repeatedly tried to contact him but was unable to meet him in person or speak to him on phone (there were no mobile phones during that time). I tried to get information about Nuclear Medicine through other sources and was told that this is a dying subject with no future at all. So, with this mindset I had almost given up. Before I left home in the morning for my counseling, which was at Patel Chest Institute, Delhi University, I tried one final time to call up this elusive Dr. Malhotra with whom I had never spoken before or met personally. As fate would have it, Dr. Malhotra picked up the phone this time. I told him about my dilemma, about pursuing this rather unknown diploma (was called diploma in Radiation Medicine then) at the cost of more acceptable MD subjects and asked for his advice. The voice at the other end of the phone was calm and very confident. He told me "Son take this subject, you will not regret", he confidently told me that there were 220 nuclear medicine physicians in the country, all of whom he

knew personally and that they were all employed. "Although it's a new subject, but in future this gamble will pay off". There was something in his voice, it was reassuring, there was no arrogance, but at the time there was an element of confidence, it was something right from his heart. Four hours later, I had opted for Nuclear Medicine at the counselling inspite of the fact that even the counsellors were advising against it and that all my friends thought it was the biggest blunder of my life. That was July 1992, now it's 2021...Dr. Malhotra was right ... no other subject has grown so much as Nuclear Medicine has in the last 30 years and I have not regretted opting for it.

Since then, my career has revolved around Dr. Malhotra, he was my examiner for DRM exams, INMAS. He was my HOD, when I joined senior resident at AIIMS, and my Chief Guide for my DNB thesis. I joined as Assistant Professor at AIIMS under his headship and under his guidance rose to the post of Professor. As faculty, he gave me the freedom to try new avenues in Nuclear cardiology and supported me in all my endeavours. Even in difficult times he never lost his sense of humour, always met the challenges with a smile on his face. He was always there for the departmental staff; he would celebrate in their happiness and be around to give support when needed. He developed Nuclear Medicine department at All India Institute of Medical Sciences, New Delhi to unprecedented heights and was also instrumental in promoting and developing the specialty all over the country.

It's an irreplaceable loss for me personally as well as for the entire nuclear medicine community. It's the end of an era!

Frame of Fame

> J Nucl Cardiol. 2020 Jul 27. doi: 10.1007/s12350-020-02284-0. Online ahead of print.

18 F-NaF PET uptake characteristics of coronary artery culprit lesions in a cohort of patients of acute coronary syndrome with ST-elevation myocardial infarction and chronic stable angina: A hybrid fluoride PET/CTCA study

Abhiram G Ashwathanarayana¹, Manphool Singhal², Swayamjeet Satapathy¹, Ashwani Sood³, Bhagwant Rai Mittal¹, Rohit Manoj Kumar⁴, Madan Parmar¹, Darshan Krishnappa⁴, Nivedita Rana¹

Affiliations + expand
PMID: 32720061 DOI: 10.1007/s12350-020-02284-0

> J Nucl Med Technol. 2020 Dec;48(4):372-377. doi: 10.2967/jnmt.120.248435. Epub 2020 Sep 4.

Assessment of Myocardial Viability Using Nuclear Medicine Imaging in Dextrocardia

Shwetal U Pawar¹, Suruchi S Shetye², Mangala K Ghorpade², Rahul Azeez Seena²

Affiliations + expand
PMID: 32887761 DOI: 10.2967/jnmt.120.248435

Nuclear Medicine and Molecular Imaging
<https://doi.org/10.1007/s13139-021-00704-8>

INTERESTING IMAGE

Incidental Detection of Ischemic Myocardium on ⁶⁸Ga-FAPI PET/CT

Piyush Chandra¹, Satish Nath¹, Jaishankar Krishnamoorthy², Guru Prasad Sogunuru²

Received: 29 January 2021 / Revised: 29 May 2021 / Accepted: 11 June 2021
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> J Nucl Cardiol. 2021 Feb;28(1):320-327. doi: 10.1007/s12350-020-02333-8. Epub 2020 Sep 7.

Reversible perfusion pattern in hypertrophied papillary muscles evident on myocardial perfusion imaging with CZT-based cardiac-specific camera

Shelvin Kumar Vadi¹, Ashwani Sood², Prashant Panda³, Uma Debi⁴, Mohamed Yaser Arafath⁴, Madan Parmar¹, Ajay Bahi³, Bhagwant Rai Mittal¹

Affiliations + expand
PMID: 32895858 DOI: 10.1007/s12350-020-02333-8

> J Nucl Cardiol. 2020 Oct;27(5):1611-1619. doi: 10.1007/s12350-019-01733-9. Epub 2019 May 13.

Association of use of proton pump inhibitors and H₂ antagonists with stomach wall uptake in ^{99m}Tc-methoxy-isobutyl-isonitrile (MIBI) myocardial perfusion imaging

Harpreet Singh¹, Bhagwant Rai Mittal¹, Ashwani Sood², Neeraja Bollampally¹, Arun Kumar Reddy Gorla¹, Vaishnavi Dasagrandhi¹, Madan Parmar¹

Affiliations + expand
PMID: 31087263 DOI: 10.1007/s12350-019-01733-9

> J Nucl Cardiol. 2020 Oct;27(5):1640-1648. doi: 10.1007/s12350-018-1436-z. Epub 2018 Sep 12.

Prognostic value of left ventricular mechanical dyssynchrony indices in long-standing type II diabetes mellitus with normal perfusion and left ventricular systolic functions on SPECT-MPI

Dharmender Malik ¹, Bhagwant Rai Mittal ¹, Ashwani Sood ², Madan Parmar ¹,
Komalpreet Kaur ¹, Ajay Bahl ³

Affiliations + expand

PMID: 30209757 DOI: 10.1007/s12350-018-1436-z

> Indian J Nucl Med. Jan-Mar 2021;36(1):14-20. doi: 10.4103/ijnm.IJNM.140.20. Epub 2021 Mar 4.

Optimization of Ordered Subset Expectation Maximization Parameters for Image Reconstruction in Tc-99m Methoxyisobutylisotrile Myocardial Perfusion SPECT and Comparison with Corresponding Filtered Back Projection-Reconstructed Images

Pankaj Dheer ¹, Priyanka Gupta ¹, Sameer Kamalakar Taywade ¹, Averlicia Passah ¹,
Anil Kumar Pandey ¹, Chetan Patel ¹

Affiliations + expand

PMID: 34040290 PMCID: PMC8130694 DOI: 10.4103/ijnm.IJNM.140.20

Free PMC article

> J Nucl Cardiol. 2020 Nov 5. doi: 10.1007/s12350-020-02414-8. Online ahead of print.

Clinical and gated SPECT MPI parameters associated with super-response to cardiac resynchronization therapy

Claudio T Mesquita ¹, Amalia Peix ², Fernando de Amorim Fernandes ³, Raffaele Giubbini ⁴,
Ganesan Karthikeyan ⁵, Teresa Massardo ⁶, Chetan Patel ⁵, Luz M Pabon ⁷,
Amelia Jimenez-Heffernan ⁸, Erick Alexanderson ⁹, Sadaf Butt ¹⁰, Aika Kumar ¹¹, Victor Marin ¹²,
Olga Morozova ¹³, Diana Paez ¹³, Ernest V Garcia ¹⁴

Affiliations + expand

PMID: 33152098 DOI: 10.1007/s12350-020-02414-8

> J Nucl Cardiol. 2021 Feb;28(1):55-64. doi: 10.1007/s12350-018-01589-5. Epub 2019 Jan 25.

Value of intraventricular dyssynchrony assessment by gated-SPECT myocardial perfusion imaging in the management of heart failure patients undergoing cardiac resynchronization therapy (VISION-CRT)

Amalia Peix ¹, Ganesan Karthikeyan ², Teresa Massardo ³, Mani Kalavani ², Chetan Patel ²,
Luz M Pabon ⁴, Amelia Jimenez-Heffernan ⁵, Erick Alexanderson ⁶, Sadaf Butt ⁷, Aika Kumar ⁸,
Victor Marin ⁹, Claudio T Mesquita ¹⁰, Olga Morozova ¹¹, Diana Paez ¹¹, Ernest V Garcia ¹²

Affiliations + expand

PMID: 30684258 PMCID: PMC7921049 DOI: 10.1007/s12350-018-01589-5

Free PMC article

> J Nucl Cardiol. 2020 Dec;27(6):2436-2437. doi: 10.1007/s12350-019-02023-0. Epub 2020 Jan 13.

Somatostatin analogue scintigraphy in myocardial inflammation: An interesting image

Vivek Baghel ¹, Prateek Kaushik ¹, Sandeep Seth ², Chetan Patel ³

Affiliations + expand

PMID: 31933155 DOI: 10.1007/s12350-019-02023-0

Frame
of Fame

Frame
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> J Nucl Cardiol. 2021 Jan 10. doi: 10.1007/s12350-020-02474-w. Online ahead of print.

Assessment of myocardial sympathetic innervation with 18F-FDOPA-PET/CT in patients with autonomic dysfunction: feasibility study in IPD patients

Harish Goyal ¹, Anshul Sharma ¹, Chetan Patel ^{2,3}, K K Deepak ⁴, Madhavi Tripathi ¹, Priyanka Gupta ¹, Rajeev Kumar ¹, Chandra Shekhar Bal ¹, Vinay Goyal ⁵

Affiliations + expand
PMID: 33426586 DOI: 10.1007/s12350-020-02474-w

> J Nucl Cardiol. 2020 Oct 20. doi: 10.1007/s12350-020-02397-6. Online ahead of print.

Reproducibility of global LV function and dyssynchrony parameters derived from phase analysis of gated myocardial perfusion SPECT: A multicenter comparison with core laboratory setting

Fernando de Amorim Fernandes ¹, Amalia Peix ², Raffaele Glubbini ³, Ganesan Karthikeyan ⁴, Teresa Massardo ⁵, Chetan Patel ⁴, Luz M Pabon ⁶, Amelia Jimenez-Heffernan ⁷, Erick Alexanderson ⁸, Sadaf Butt ⁹, Alka Kumar ¹⁰, Victor Marin ¹¹, Olga Morozova ¹², Diana Paez ¹², Claudio T Mesquita ¹³, Ernest V Garcia ¹⁴

Affiliations + expand
PMID: 33083983 DOI: 10.1007/s12350-020-02397-6

> *Pediatr Cardiol.* 2021 Apr;42(4):891-897. doi: 10.1007/s00246-021-02557-6. Epub 2021 Jan 29.

Feasibility and Utility of Adenosine Stress Echocardiography in Children Following Post-Arterial Switch Operation: A Comparison with Technetium 99m-Sestamibi Myocardial Perfusion SPECT (MPS)

Kunal Kumar ^{#1}, Anshul Sharma ^{#1}, Chetan Patel ¹, S Ramakrishnan ², Sambhunath Das ³, Tsering Sangdup ⁴, Rakesh Kumar ¹, A K Bisoi ⁴

Affiliations + expand
PMID: 33511467 DOI: 10.1007/s00246-021-02557-6

> J Nucl Cardiol. 2020 Aug;27(4):1274-1284. doi: 10.1007/s12350-019-01704-0. Epub 2019 Apr 11.

Effect of cardiac resynchronization therapy on septal perfusion and septal thickening: Association with left ventricular function, reverse remodelling and dyssynchrony

C Patel ¹, M Kalalvani ², G Karthikeyan ³, A Peix ⁴, A Kumar ⁵, T Massardo ⁶, A Jiménez-Heffernan ⁷, C T Mesquita ⁸, M Pabon ⁹, S Butt ¹⁰, E Alexanderson ¹¹, V Marin ¹², O Morozova ¹³, D Paez ¹³, E V Garcia ¹⁴

Affiliations + expand
PMID: 30977094 DOI: 10.1007/s12350-019-01704-0

Editorial > J Nucl Cardiol. 2020 Aug;27(4):1168-1170. doi: 10.1007/s12350-020-02027-1. Epub 2020 Apr 3.

Is myocardial viability related to left ventricular dyssynchrony?

Chetan D Patel ¹, Vivek Baghel ²

Affiliations + expand
PMID: 32242309 DOI: 10.1007/s12350-020-02027-1

Frame
of Fame

Frame
of Fame

National Guidelines: 'Conduction blocks and pacing the task'

Editorial

Background & History: The word "Guideline" literally means 'A set of non-specific rules or principles that provides direction to action or behaviour'. A medical guideline is a document with the aim of guiding decisions and criteria regarding diagnosis, management and treatment in medical practice. Such documents have been in use for thousands of years. The world's oldest surviving surgical document – "The Edwin Smith papyrus" may well be considered as the first documented medical guidelines. The text written in hieratic script in ancient Egypt around 1600 B.C was translated in 1930. It describes anatomical observations, the examination, diagnosis, treatment, and prognosis of 48 types of medical / surgical problems in exquisite detail. The treatments described included closing wounds with sutures, preventing and curing infection with honey and mouldy bread, stopping bleeding with raw meat, and immobilisation of head and spinal

cord injuries.

For a very long time these guidelines were based on tradition or authority. However modern medical guidelines are based on the principles of 'Evidence Based Medicine' and is formulated after thorough examination of existing evidence. A doctor is obliged to know the medical guidelines of his or her domain; at the same time has the right to decide whether to follow the recommendations of a guideline for an individual patient's treatment or not.

Formulation of Guidelines: Guidelines are usually framed at national or international levels by medical associations or statutory governmental bodies. For example in the United Kingdom, clinical practice guidelines are published primarily by the National Institute of Health and Care Excellence (NICE). Similarly in Germany there is German Agency for Quality in Medicine which coordinates a national program for disease management guidelines.

These and many more national organisations are now members of the 'Guidelines International Network (G-I-N)' an international network of organisations and individuals involved in clinical practice guidelines. Special computer software packages known as 'guideline execution engines' have been developed to facilitate the use of medical guidelines in concert with an electronic medical record (EMR) system. The 'Guideline Interchange Format (GLIF) is a computer representation format for clinical guidelines that can be used with such engines.

Relevance of Medical Guidelines in current practice: Clinicians, policy makers, and insurance payers see guidelines as a tool for consistent and efficient healthcare delivery. Guidelines address the tenets of Evidence Based Medicine i.e., Clinical judgement, available scientific evidence and patient values and preferences. Principle benefits of guidelines include:

- Improves the quality of care received by patients.
- Improves quality of decision making and consistency of care.
- Maintains uniformity across centres that perform procedures.
- Helps patients make informed decisions.
- Popularize the under-utilized services and influence public health policy.
- Offers medico legal protection for practitioners.

Adherence to guidelines is a representation of commitment to

excellence. Implementation of established national guidelines can serve as reference for private and Govt insurers. Guidelines are a common point of reference for prospective and retrospective audits of clinical practice. Most of the Nuclear Medicine Physicians are involved in establishing standard operating protocol (SOP) at their respective centres of practice. SOP serves as the standard of reference for National healthcare audits and accreditation. Considering the diversity in global ecosystem, it is imperative to drive the task of establishing National guidelines for practice of Nuclear Medicine in India.

Problems: Guidelines may lose their clinical relevance as time passes by and newer research emerges, hence they require timely updating. Literature suggests that up to 20% of strong recommendations from practice guidelines may have to be retracted, especially when based on opinion rather than trials. Guidelines may be riddled with both methodological problems and conflict of interests. Also the quality of guidelines may vary substantially, especially for guidelines that are published on-line and have not had to follow methodological reporting standards often required by reputable clearinghouses. Another major pitfall in many guidelines is that patients and caregivers are frequently excluded from clinical guidelines development, in part because there is a lack of guidance for how to include them in the process. Guidelines may end up making recommendations that are stronger than the supporting evidence.

Appropriate use of Guidelines: Given the enormous advantage the 'guideline driven practice' has as evident above, it is not without its share of disadvantages. We must keep in mind that Guideline based medicine is population specific and not patient specific, by not accounting for individual biological variations noted with every disease. We should guard against guidelines that do not account for disease's Pathophysiology but purely on recommendation of experts based on their observation in large patient cohorts or guidelines motivated by an industry driven study with an under recognized bias. Sponsored studies with negative reports are rarely reported in literature these days. Montaigne once said that we can be more knowledgeable with other's knowledge but we can't get wiser with other's wisdom. Hence guidelines as useful they are in today's times should not totally replace the wisdom of the treating physician which is gathered over years. This will assure optimal care for not just population as a whole but for every individual affected with disease.

Way ahead in establishing National Guidelines for practice of Nuclear Medicine in India: Nuclear Medicine is a rapidly evolving specialty and is now spread across the length and breadth of the country. Formulating a national guideline for practice of Nuclear Medicine in India is not child's play. It would require a mammoth effort to formulate guidelines relevant to practice of Nuclear Medicine in India. The following is a reasonable check list / step

wise process towards formulating national guidelines (adapted from CMAJ, February 18, 2014, 186(3)). Funding is also an important roadblock in the endeavour to formulation of national guidelines. However, inspite of all the roadblocks; with a strong will of the organization and the support of its members it is definitely possible to formulate national guidelines.

References:

1. Wikipedia
2. Schünemann HJ, Wiercioch W, Etzeandia I, et al. Guidelines 2.0: systematic development of a comprehensive checklist for a successful guideline enterprise. CMAJ 2014 Feb 18;186(3):E123-42. doi: 10.1503/cmaj.131237. Epub 2013 Dec 16.
3. Ivan D. Florez, Rebecca L. Morgan, et al. Development of rapid guidelines: 2. A qualitative study with WHO guideline developers. Health Research Policy and Systems (2 0 1 8) 1 6 : 6 2 <https://doi.org/10.1186/s12961-018-0329-6>

Topic	Description
1. Organization, budget, planning and training	Involves laying out a general but detailed plan describing what is feasible, how it will be achieved and what resources are required to produce and use the guideline. The plan should refer to a specific period and be expressed in formal, measurable terms.
2. Priority setting	Refers to the identification, balancing and ranking of priorities by stakeholders. Priority setting ensures that resources and attention are devoted to those general areas (e.g., chronic obstructive pulmonary disease, diabetes, cardiovascular disease, cancer, prevention) where health care recommendations will provide the greatest benefit to the population, a jurisdiction or a country. A priority-setting approach needs to contribute to future plans while responding to existing, potentially difficult circumstances. ^{10,167}
3. Guideline group membership	Defines who is involved, in what capacity, and how the members are selected for the guideline development and at other steps of the guideline enterprise.
4. Establishing guideline group processes	Defines the steps to be followed, how those involved will interact and how decisions will be made.
5. Identifying target audience and topic selection	Involves describing the potential users or consumers of the guideline and defining the topics to be covered in the guideline (e.g., diagnosis of chronic obstructive pulmonary disease).
6. Consumer and stakeholder involvement	Describes how relevant people or groups who are not necessarily members of the panel but are affected by the guideline (e.g., as target audience or users) will be engaged.
7. Conflict of interest considerations	Focuses on defining and managing the potential divergence between an individual's interests and his or her professional obligations that could lead to questioning whether the actions or decisions are motivated by gain, such as financial, academic advancement, clinical revenue streams or community standing. Financial or intellectual or other relationships that may affect an individual's or organization's ability to approach a scientific question with an open mind are included.
8. Question generation	Focuses on defining key questions the recommendations should address using the PICO (patient/problem, intervention, comparison, outcome) framework, including the detailed population, intervention (including diagnostic tests and strategies) and outcomes that will be relevant for decision-making (e.g., should test A be used, or should treatments B, C, D or E be used in chronic obstructive pulmonary disease?).
9. Considering importance of outcomes and interventions, values, preferences and utilities	Includes integrating, in the process of developing the guidelines, how those affected by its recommendations assess the possible consequences. These include patient, caregiver and health care provider knowledge, attitudes, expectations, moral and ethical values, and beliefs; patient goals for life and health; prior experience with the intervention and the condition; symptom experience (e.g., breathlessness, pain, dyspnea, weight loss); preferences for and importance of desirable and undesirable outcomes; perceived impact of the condition or interventions on quality of life, well-being or satisfaction, and interactions between the work of implementing the intervention, the intervention itself, and other contexts the patient may be experiencing; preferences for alternative courses of action; and preferences relating to communication content and styles, information and involvement in decision-making and care. This can be related to what in the economic literature is considered <i>utilities</i> . An intervention itself can be considered a consequence of a recommendation (e.g., the burden of taking a medication or undergoing surgery) and a level of importance or value is associated with that.
10. Deciding what evidence to include and searching for evidence	Focuses on laying out inclusion and exclusion criteria based on types of evidence (e.g., rigorous research, informally collected), study designs, characteristics of the population, interventions and comparators, and deciding how the evidence will be identified and obtained. It also includes but is not limited to evidence about values and preferences, local data and resources.
11. Summarizing evidence and considering additional information	Focuses on presenting evidence in a synthetic format (e.g., tables or brief narratives) to facilitate the development and understanding of recommendations. It also involves identifying and considering additional information relevant to the question under consideration.
12. Judging quality, strength or certainty of a body of evidence	Includes assessing the confidence one can place in the obtained evidence by transparently evaluating the obtained research (individual studies and across studies) and other evidence applying structured approaches. This may include, but is not limited to, evidence about baseline risk or burden of disease, importance of outcomes and interventions, values, preferences and utilities, resource use (cost), estimates of effects and accuracy of diagnostic tests.
13. Developing recommendations and determining their strength	Developing recommendations involves use of a structured analytic framework and a transparent and systematic process to integrate the factors that influence a recommendation. Determining the strength of the recommendations refers to judgments about how confident a guideline panel is that the implementation of a recommendation exerts more desirable than undesirable consequences.
14. Wording of recommendations and of considerations about implementation, feasibility and equity	Refers to choosing syntax and formulations that facilitate understanding and implementation of the recommendations. Such wording is connected to considerations about implementation, feasibility and equity, which refer to the guideline panel's considerations about how the recommendation will be used and what impact it may have on the factors described.
15. Reporting and peer review	Reporting refers to how a guideline will be made public (e.g., print, online). Peer review refers to how the guideline document will be reviewed before its publication and how it can be assessed (e.g., for errors), both internally and externally, by stakeholders who were not members of the guideline development group.
16. Dissemination and implementation	Focuses on strategies to make relevant groups aware of the guidelines and to enhance their uptake (e.g., publications and tools such as mobile applications).
17. Evaluation and use	Refers to formal and informal strategies that allow judgments about: evaluation of the guidelines as a process and product; evaluation of the use or uptake, or both; and evaluation of impact and whether or not the guideline leads to improvement in patient or population health or other consequences.
18. Updating	Refers to how and when a guideline requires revision because of changes in the evidence or other factors that influence the recommendations.

Nuclear Cardiology Practice in UK: Challenges faced during Covid-19

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Impact of the pandemic on Nuclear Cardiology service provision in a busy Nuclear Cardiology department in the UK.

The effect of the current pandemic due to COVID-19 on the National Health Service (NHS) was first realised in mid-February 2020 and plans were laid out by Public Health England (PHE) during the subsequent weeks. At that point, the transmissibility was assumed to be due to droplets by close contact. Social distancing and enhanced hand hygiene measures were introduced along with lockdown for general public in latter part of March 2020. At the same time as NHS/PHE plans for service provision, national and international societal guidelines started emerging. American Society of Nuclear Cardiology (ASNC) had published a comprehensive guidance for safely carrying out perfusion imaging (1). These are some of the general points that were considered by our department to deliver cardiac

imaging as well as general nuclear medicine and oncology PET imaging. Our department provides both two-day SPECT and single day PET perfusion images and the choice under normal conditions depended on clinical indications as per ASNC guidelines (2) and referrer preference and availability of slots.

1. Patient scheduling: The capacity was reduced significantly due to requirement for social distancing of staff and patients as waiting and scanning areas had to be rearranged to ensure that we followed the two-meter distancing rules. In addition, only clinically urgent scans were prioritised during the lockdown phase. As we have access to both PET and SPECT perfusion imaging, preference was given to PET slots due to rapid rest/stress scanning protocol and

limited amount that the patient had to stay in the department (1 hour for PET versus 3 hours each for SPECT two day protocol). This had an impact on patient waiting times. It required a lot of iterations to get the scheduling right with input from booking staff, technologists, physicists, and physicians.

2. Choice of stress agent and modality: As exercise test is considered to be an aerosol generating procedure (AGP), this was not performed during the initial months of the pandemic. AGPs require a minimum air exchange, this made it difficult to schedule exercise or combined vasodilator exercise tests for SPECT imaging. This resulted in predominant use of vasodilators alone for SPECT along with problems of reduced bowel clearance without exercise and need to repeat scans to allow clearance. Most centres don't have access to perfusion PET.

3. Waiting room capacity: Most departments including nuclear medicine, were not built with social distancing in mind. This proved to be one of the major limiting factors in service provision. Pre pandemic, scan slots and scheduling had to take into consideration the time of patient returning for the scan and for oncology PET, the resting bays. The requirement for social distancing and the unpredictability of repeating images or additional images made scheduling extremely challenging in terms of patient waiting areas and workflow. It is a difficult balance to ensure waiting times

targets for NHS are achieved without the infrastructure to meet strict health and safety guidelines.

These are some of the key areas which impacted our service delivery and planning. As the pandemic continues to impact all health services across the world, it is important to consider factors unique to individual departments and countries that can affect patient access and management. For e.g., while guidelines recommend use of perfusion PET or quick SPECT protocols using solid state scanners, lack of access to these will make implementation of guidelines impossible. It is also important to communicate the current resources to the referrers and general practitioners so that they can make use of the reduced resources more effectively.

References

1. https://www.asnc.org/files/Skali_et_al-2020_Journal_of_Nuclear_Cardiology.pdf
2. <https://www.asnc.org/files/Guidelines%20and%20Quality/ASNCandSNMMIJointPETPositionPaper2016.pdf>

Guidelines Watch 2021

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Editor's Choice

The recently published information statement on practical guide for interpreting and reporting cardiac PET measurement of myocardial blood flow by Bateman et al., in January 2021, emphasizes on strategies to develop infrastructure for myocardial blood flow imaging, protocol design for imaging, training technologists, optimization of quality control, and formulation of clinically meaningful reports incorporating MBF values.

The article stresses on the importance of

- Proper patient preparation in terms of good intravenous access.
- Proper understanding of Tracer, its Kinetics and the Model used for quantification.
- Pharmacological stressor – consistency of infusion protocol and

tracer injection.

- Knowing your PET detector, its count rate capabilities and identification of artifacts related to detector saturation.
- Timing of data acquisition – which should start prior to tracer administration.
- Motion free dynamic acquisition and Mode of acquisition (2D vs 3D).
- Tracer Kinetic: Compartment vs Retention Model
- Imaging analysis:
 - a. Motion correction: on as needed basis for compartment model.
 - b. Attenuation correction: Proper alignment of emission and transmission images.
 - c. Quality check for motion and CT artefact.
 - d. Blood pool ROI: Proper, consistent and crisp ROI

e. Myocardial ROI and its accurate segmentation by avoiding spill over from liver, GI, lung and other extra cardiac activity.

Step by Step approach of MBF imaging

- Knowing your tracer and its kinetics, and model for quantification
- Strategies of MBF measurement.
- Understanding the assumptions of kinetic model used and never violating the assumptions.
- Understanding the software used for quantification.
- Image analysis:
 - a. Perform corrections for motion in PET console and repeat the image reconstruction.
 - b. Check co-registration of emission and transmission images in all views.
 - c. Review the integrity and consistency of Blood pool and myocardial ROI in stress and rest images.
 - d. Check the quality of Time activity curve (TAC), which should begin prior to tracer injection. Up slopes and dips of TAC of blood pool and myocardial ROI should be consistent with tracer kinetics.

These parameters seek quest for introspection amongst readers on the preparedness and adequacy of imaging facilities to start quantitative myocardial imaging. The need for in-house cyclotron to synthesize $^{13}\text{N-NH}_3$, cost involved in $^{82}\text{Sr-Rb}$ generator vs the number of referred cases, precludes

utility of wide spread quantitative cardiac imaging. Except for a few institutional imaging facilities, many newly installed PETCT scanners in India do not accompany with ECG gating hardware. There are quite a few investment protected dual ring PETCT scanners with which dynamic PET imaging is impossible. There is a substantial need for resource development in terms of training technologists about dynamic PET imaging, educating NM physicians about the process of MBF quantification and incorporating clinically meaningful MBF values in routine myocardial perfusion imaging.

Reference:

Bateman, T.M., Heller, G.V., Beanlands, R. et al. Practical guide for interpreting and reporting cardiac PET measurements of myocardial blood flow: an Information Statement from the American Society of Nuclear Cardiology, and the Society of Nuclear Medicine and Molecular Imaging. *J. Nucl. Cardiol.* 28, 768-787 (2021). <https://doi.org/10.1007/s12350-021-02552-7>

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Recently published must read
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Review

> Curr Cardiol Rep. 2020 May 19;22(6):40. doi: 10.1007/s11886-020-01284-3.

Advances in PET-Based Cardiac Amyloid Radiotracers

Cesia Gallegos¹, Edward J Miller²

Affiliations + expand

PMID: 32430600 DOI: 10.1007/s11886-020-01284-3

Randomized Controlled Trial

> Circ Cardiovasc Imaging. 2020 Apr;13(4):e009986.
doi: 10.1161/CIRCIMAGING.119.009986. Epub 2020 Apr 9.

Clinical and Economic Implications of Inconclusive Noninvasive Test Results in Stable Patients With Suspected Coronary Artery Disease: Insights From the PROMISE Trial

Akash Goyal¹, Neha Pagidipati¹, C Larry Hill¹, Brooke Alhanti¹, James E Udelson²,
Michael H Picard³, Patricia A Pellikka⁴, Udo Hoffmann⁵, Daniel B Mark¹, Pamela S Douglas¹

Affiliations + expand

PMID: 32268807 PMCID: PMC7153546 DOI: 10.1161/CIRCIMAGING.119.009986

> Eur J Nucl Med Mol Imaging. 2021 Apr 21. doi: 10.1007/s00259-021-05349-5.
Online ahead of print.

Prognostic value of myocardial perfusion scintigraphy in asymptomatic patients with diabetes mellitus at high cardiovascular risk: 5-year follow-up of the prospective multicenter BARDOT trial

Federico Caobelli^{# 1}, Philip Haaf^{# 2 3}, Gianluca Haenny³, Matthias Pfisterer³,
Michael J Zellweger^{4 5}, BARDOT Investigators

Affiliations + expand

PMID: 33884468 DOI: 10.1007/s00259-021-05349-5

Multicenter Study

> JACC Cardiovasc Imaging. 2020 Jun;13(6):1337-1347.
doi: 10.1016/j.jcmg.2020.02.023. Epub 2020 May 13.

Diagnostic Accuracy of [¹¹C]PIB Positron Emission Tomography for Detection of Cardiac Amyloidosis

Sara Rosengren¹, Tor Skibsted Clemmensen², Lars Tolbod³, Sven-Olof Granstam⁴,
Hans Eiskjær², Gerhard Wikström⁵, Ola Vedin⁵, Tanja Kero⁶, Mark Lubberink⁷,
Hendrik J Harms³, Frank A Flachskampf⁴, Tomasz Baron⁴, Kristina Carlsson⁸,
Fabian Mikkelsen², Gunnar Antoni⁹, Niels Frost Andersen¹⁰, Steen Hvitfeldt Poulsen²,
Jens Sørensen¹¹

Affiliations + expand

PMID: 32417330 DOI: 10.1016/j.jcmg.2020.02.023

Comparative Study > JACC Cardiovasc Imaging. 2020 Mar;13(3):774-785.
doi: 10.1016/j.jcmg.2019.02.028. Epub 2019 Jun 12.

5-Year Prognostic Value of Quantitative Versus Visual MPI in Subtle Perfusion Defects: Results From REFINE SPECT

Yuka Otaki¹, Julian Betancur¹, Tali Sharir², Lien-Hsin Hu³, Heidi Gransar¹, Joanna X Liang¹, Peyman N Azadani¹, Andrew J Einstein⁴, Mathews B Fish⁵, Terrence D Ruddy⁶, Philipp A Kaufmann⁷, Albert J Sinusas⁸, Edward J Miller⁸, Timothy M Bateman⁹, Sharmila Dorbala¹⁰, Marcelo Di Carli¹⁰, Balaji K Tamarappoo¹, Guido Germano¹, Damini Dey¹, Daniel S Berman¹, Piotr J Slomka¹¹

Affiliations + expand
PMID: 31202740 PMCID: PMC6899217 DOI: 10.1016/j.jcmg.2019.02.028

> JACC Cardiovasc Imaging. 2020 Nov;13(11):2400-2411. doi: 10.1016/j.jcmg.2020.03.021.
Epub 2020 Jun 17.

Diagnostic Accuracy of Cardiac Computed Tomography and 18-F Fluorodeoxyglucose Positron Emission Tomography in Cardiac Masses

Emanuela Concetta D'Angelo¹, Pasquale Paolisso¹, Giovanni Vitale¹, Alberto Foà¹, Luca Bergamaschi¹, Ilenia Magnani¹, Giulia Saturi¹, Andrea Rinaldi¹, Sebastiano Toniolo¹, Matteo Renzulli², Domenico Attinà³, Luigi Lovato³, Giacomo Maria Lima⁴, Rachele Bonfiglioli⁴, Stefano Fanti⁴, Ornella Leone⁵, Maristella Saponara⁶, Maria Abbondanza Pantaleo⁶, Paola Rucci⁷, Luca Di Marco⁸, Davide Pacini⁸, Carmine Pizzi⁹, Nazzareno Galiè¹

Affiliations + expand
PMID: 32563654 DOI: 10.1016/j.jcmg.2020.03.021

> Eur Heart J Cardiovasc Imaging. 2020 Jan 1;21(1):58-66. doi: 10.1093/ehjci/jez152.

Predictors of 18F-sodium fluoride uptake in patients with stable coronary artery disease and adverse plaque features on computed tomography angiography

Jacek Kwicinski^{1,2}, Damini Dey¹, Sebastian Cadet¹, Sang-Eun Lee³, Balaji Tamarappoo¹, Yuka Otaki¹, Phi T Huynh¹, John D Friedman¹, Mark R Dweck⁴, David E Newby⁴, Mijin Yun³, Hyuk-Jae Chang³, Piotr J Slomka¹, Daniel S Berman¹

Affiliations + expand
PMID: 31211387 DOI: 10.1093/ehjci/jez152

> JACC Cardiovasc Imaging. 2020 Jun;13(6):1353-1363. doi: 10.1016/j.jcmg.2020.03.020.

DPD Quantification in Cardiac Amyloidosis: A Novel Imaging Biomarker

Paul R Scully¹, Elizabeth Morris², Kush P Patel¹, Thomas A Treibel¹, Maria Burniston², Ernst Klotz³, James D Newton⁴, Nikant Sabharwal⁴, Andrew Kelion⁴, Charlotte Manisty¹, Simon Kennon⁵, Muhiddin Ozkor⁵, Michael Mullen⁵, Neil Hartman⁶, Perry M Elliott¹, Francesca Pugliese⁷, Philip N Hawkins⁸, James C Moon¹, Leon J Menezes⁹

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PMID: 32498921 PMCID: PMC7264710 DOI: 10.1016/j.jcmg.2020.03.020

'A beat
not to

A beat
not to miss,

Dil to Pagal Hai



FUN CARDIAC

TRIVIA



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Parumala, Thiruvalla, Kerala

1?

What is Broken Heart Syndrome?



2?

Before attempting heart transplant in humans, the team including Dr. Christiaan Bernard attempted / experimented on heart transplantation in which animal?

3?

Which animal has three hearts?



4?

Animal with the fastest beating heart?

5?

Which animal has the slowest beating heart?

6?

Which animal has a lopsided heart?

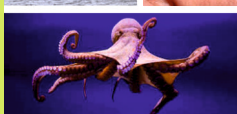
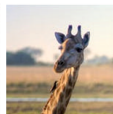


7?

Which animal can repair its heart?

8?

Which animal among these have the highest HMI (heart to body mass index / ratio)?



9?

Which day of the year a cardiologist is least likely to get leave?

10?

CARDIAC SYNDROME X is?



11?

Which day of the week has highest incidence of heart attacks?

12?

What is Kounis syndrome?



13?

Identify these two common flowering plants with cardiac relevance??



14?

Which animal has the highest documented blood pressure?



Answers

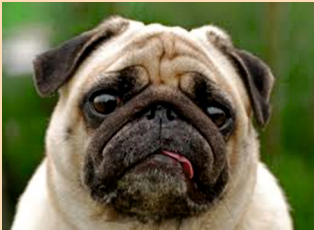
1

Takotsubo cardiomyopathy or stress-induced cardiomyopathy

Broken heart syndrome is a group of symptoms similar to those of a heart attack, occurring in response to a physical or emotional stress.

2

Dogs



3

OCTOPUS



One of the hearts functions as the systematic heart that pumps oxygenated blood to the other body parts. Two of the three hearts are referred to as brachial hearts and pump blood through the gills for oxygenation.

4

Etruscan Shrew / Pygmy Shrew



Heart beats at a rate of 1200-1500 beats per minute.
Almost like 25 beats/second

Answers

5

Several whale species have heart rates as slow as 10 to 30 beats a minute.



6

Giraffe



7

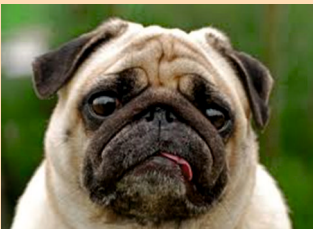
ZEBRA FISH



The tropical, freshwater aquarium fish has a heart with amazing regenerative properties, quickly closing injuries and mending itself back to almost full function.

8

Dogs



Dog's heart to its body mass - 0.8 percent. Almost all other animals including elephants, mice and humans have a 0.6 percent ratio.

Answers

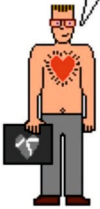
9

New Year

10

Cardiac Syndrome X

Textbook angina...
and my arteries
are completely clear
on angiography!



Microvascular angina

Small arteries constrict
too easily, fail to dilate

Generally good outlook.

Metabolic Syndrome X

↓HDL
↑↑fasting
trigly-
cerides

All this scientific talk
about "truncal obesity"
gives new meaning to
"the dangers of crack!"



Insulin resistance/
glucose intolerance

Truncal obesity

Hypertension

Bad coronary risk

Two Different Syndromes

11

Mondays

12

Kounis syndrome is defined as acute coronary syndrome (symptoms such as chest pain relating to reduced blood flow to the heart) caused by an allergic reaction.

13

NERIUM OLEANDER & FOXGLOVE (*Digitalis purpurea*)

14

Giraffes



Giraffes have demonstrated blood pressure levels as high as 300/200

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