Nuclear Cardiology and Cardiac CT
ESC Working Group
EUROPEAN SOCIETY OF CARDIOLOGY®

Newsletter Number 10 February 2009 Editor: Joanne Schuijf

Message from the Chairman

Dear Friends,

As new Chairman of the Working Group it is a great pleasure for me to send my greetings to all of you. I hope that these next two years will be of intense activity and growth of our WG which now includes two of the most relevant non invasive imaging modalities in cardiology. I am confident that all members of the nucleus and members of our Senate devoted to our WG will help to offer to all of you useful and stimulating scientific and educational activities, as in the tradition of the WG. Certainly, we will be supported by the great attention that the European Society of Cardiology is addressing to the role of working groups and of recently constituted Councils.

As you will find in this newsletter several upcoming events are being organized in 2009, including the ICNC9 meeting in Barcelona, the traditional Course at the Heart House and a brainstorming meeting in the island of Capri in the middle of the Mediterranean Sea next September. In addition, thanks to the collaboration of nucleus and senate members, several scientific proposals were submitted for the 2009 ESC annual meeting in Barcelona, enabling, as for previous years, a substantial contribution of our WG to the final scientific program.

Last but not least, myself and the friends of the nucleus will do our best to further increase memberships and active participation from the periphery to the life of our working group, and, therefore, we strongly encourage all members to let us know at any time suggestions and comments that they might believe useful for improving the activities of our WG.

Sincerely,

Pasquale Perrone Filardi

SUMMARY REPORT OF NUCLEAR CARDIOLOGY AND CARDIAC CT SESSIONS AT ESC CONGRESS MUNICH 2008

Report contributed by Marco Mazzanti, MD, FESC

Nuclear Cardiology & Cardiac CT were represented at ESC 2008 meeting in Munich in:

- Two Main Sessions
- Two CT sessions "Read with Experts"
- Three Symposiums
- Two Clinical Seminars
- One Dedicated Satellite session + one more presentation of cardiac CT
- One Featured Research
- Two Oral abstracts Session for Nuclear Cardiology and one for Cardiac CT
- Two Poster abstract sessions for Nuclear Cardiology
- Three Poster abstract sessions for Cardiac CT

The principal themes regarded:

- **Combination of anatomic and functional assessment**
- **Dual energy CT for coronary artery stenosis and myocardial ischemia**
- **Multi-Modality imaging in CAD (appropriateness & early disease)**
- **Radiation issue**
- **Clinical issues (Risk Stratification, diagnosis, prognosis and for CRT candidates selection / response to therapy)**
- **Clinical issues (the techniques in special populations (Diabetes, ecc)**

- Both **main sessions** presented the value of combined anatomic and perfusion evaluation and focused on the complementary role of nuclear imaging and cardiac CT. Image fusion and a novel approach on molecular imaging were also discussed.
- Of interest one **symposium** focused the attention on a single imaging modality by the view of the other field. The second pointed up the importance of appropriateness of imaging procedures as well as the importance of early disease detection. Also it presented the clinical usefulness in asymptomatic patients and how nuclear imaging can guide therapy from a prognostic point of view. Risk stratification and the choice of modalities for anatomical vs. perfusion strategy were discussed during the third CT symposium.
- About safety (radiation dose, etc.) and cost-benefit analysis of early diagnostic strategies, clinical **seminars and satellite sessions** were the table of discussion of the role of Nuclear Cardiology and CT techniques. During the CT Satellite session state of the art in conjunction with novel applications were illustrated.

- **Featured research session** discussed long term outcome of patients with chronic total occlusions:
"In patients incompletely revascularized by PCI with a total occlusion in a main coronary artery, nuclear non-invasive imaging monitoring provides significant independent information concerning the subsequent risk of cardiac events. ***Galassi et al***"
Also the impact of coronary CT angiography on the behavior of physicians and patients in

asymptomatic patients has been analyzed:
"CTA screening tool motivates physician to perform more secondary tests and revascularization procedures. The survival benefits are questioned in asymptomatic individuals. ***Chang et al****"*

- Nuclear Cardiology Oral abstract session showed:
Prognostic value *of stress SPECT imaging in patients with multivessel coronary artery disease and previous coronary revascularization:*
"*In patients with 3-vessel CAD and previous revascularization stress 99m-Tc sestamibi SPECT is a useful modality to stratify patients into low and high risk subgroups.* ***Schepis et al"****.*
Risk stratification *of patients with Chronic CAD:*
"*MPI at rest and after stress provides an independent prognostic information in patients with chronic IHD, both revascularized and treated medically.* ***Gimelli et al"***
Gatekeeper Model*: Coronary CT angiography and myocardial perfusion imaging to detect flow-limiting stenoses. Usefulness for coronary revascularization?*
"The combined noninvasive approach CTA/MPI has an excellent accuracy to detect flow-limiting coronary stenoses compared to the gold standard QCA/MPI and may be used as a gatekeeper for CA and revascularization procedures. ***Gaemperli et al."***

- Cardiac CT Oral abstract session reported:
Prognostic value *of coronary computed tomography in patients with suspected coronary artery disease: a single center clinical experience with 2 years follow-up:*
"CTCA demonstrates a 100% negative predictive value for major cardiac events at 24 months follow-up in patients with normal coronary arteries. Cardiac event rate increases with CAD severity and is higher in patients with obstructive disease at CTCA. CTCA provides incremental information over clinical risk factors and CAC. ***Aldrovandi et al"****.*
Diagnostic Value *of combined 64-slice computed tomography angiography and stress myocardial perfusion imaging for detection of coronary artery disease:*
"The lower specificity and PPV of 64-slice CTA provides a limited impact on clinical decision-making in routine clinical practice, however combined CTA and stress MPI noninvasively provide improved diagnostic accuracy for the detection of coronary artery stenosis.MPI at rest and after stress provides an independent prognostic information in patients with chronic IHD, both revascularized and treated medically. ***Sato et al"***

- **Nuclear Cardiology Poster** sessions reported:
Diagnosis: *Stunned myocardium in transient left ventricular apical ballooning: a serial study of dual 123IBMIPP and thallium-201 SPECT:*
"Transient LV apical ballooning might essentially be myocardial stunning by dual myocardial SPECT imaging. Myocardial fatty acid metabolism was more severely impaired than myocardial perfusion during the acute phase, and correlated to the improvement of LV function in this disease. ***Sato et al"***

The accuracy of MIBI SPECT in comparison to Fractional Flow Reserve (FFR) to detect ischaemic territories in patients with multi-vessel coronary artery disease: "Although MIBI is positive for ischaemia in a proportion of patients with MVCD it has poor concordance with FFR and under-/over-estimates number of ischaemic territories in 71% of patients in comparison to FFR. ***Melikian et al"***

Special Populations & management: *Dipyridamole / rest gated SPECT for evaluating silent myocardial ischemia in hypertensive and diabetic patients: "In this large scale population of high risk treated pts, the prevalence of silent myocardial ischemia is significantly greater in HT pts with DM. These findings should be clinically relevant in order to select those pts who will present silent CAD and therefore who require intensive subsequent management.* ***Mazzanti et al"***

Gatekeeper Model: *Gate-keeper to coronary angiography: comparison of myocardial perfusion SPECT and exercise testing: "Based on available prognostic literature, using MPS for risk stratification in the present population less pts would have been referred to cath compared to ET (13% vs. 27%, p<.01), suggesting that cardiac imaging (as here MPS) may be a more effective gate-keeper for cath compared to ET."* ***Muzzarelli et al"***

CHF*: Phase analysis of gated myocardial perfusion SPECT correlates well with tissue Doppler imaging for the assessment of left ventricular dyssynchrony and predicts response to* ***CRT:*** *"A good correlation was observed between HBW and phase SD, derived from a modified algorithm for phase analysis on GMPS, and TDI for the assessment of LV dyssynchrony. Potentially, these GMPS variables may be useful to accurately predict response to CRT.* ***Boogers et al"***

- Cardiac CT Poster sessions showed:

Plaque Characterization *Influence of age and cardiovascular risk factors on the presence of calcified and non-calcified coronary atherosclerotic plaque detected by coronary CT angiography: "Even after correction for age, cardiovascular risk factors have a differential effect on the prevalence of calcified and non-calcified coronary atherosclerotic plaque detected by coronary CT angiography. Smoking is associated with the presence of non-calcified plaque, while hyperlipidemia is associated with the presence of calcified plaque.* ***Achenbach et al"***

Coronary plaque characteristics on multi-slice computed tomography and intravascular ultrasound in patients with type 2 diabetes: "A larger plaque burden and more advanced calcified lesions were observed in patients with diabetes by both MSCT and IVUS. Interestingly, advanced plaques coexisted with features of potential vulnerability to rupture on VH IVUS. Thus, MSCT may be used to identify advanced coronary artery disease, although VH IVUS provides further refinement. ***Pundziute et al"***

Diagnosis: *Coronary angiography is of limited additional value to detect significant coronary artery disease in symptomatic patients referred for coronary angiography with a high calcium score: "A negative CTCA virtually rules out significant CAD. However, a CS >400 leads to*

limited additional value of CTCA. This is due to a high prevalence of CAD and a high number of false positive findings due to blooming artefacts. Therefore, we recommend not to perform a CTCA in patients with a CS >400 but to refer these patients to CCA directly. ***Meijs et al"***

The absence of coronary arterial calcification does not rule out the presence of significant coronary stenosis in individuals with acute chest pain: "The implementation of a "zero calcium score criteria" to safely discharge individuals who present to the ED with chest pain could potentially lead to a significant number of misdiagnosed cases and a higher morbidity in this patient population. A better definition of the associations of risk factors and ethnicity with the presence of significant non-calcified plaques in individuals who present to the ED with acute chest pain may potentially enhance the effectiveness and safety of a CAC gateway approach. ***Yoon et al"***

Tri-dimensional fusion image improves the evaluation of myocardial perfusion: "When using 3D SPECT/64-CTCA fusion images, an improvement of the specificity and of the PPV was observed. In particular, the evaluation of myocardial perfusion in coronary segments with important calcification or stent was more precise. In conclusion, this methodology, which integrates both sets of SPECT/64-CTCA information, offers an incremental diagnostic value. ***Goldstein et al"***

Evaluation of chronic CAD: *Non-invasive multi-slice computed tomography coronary angiography versus invasive coronary angiography and fractional flow reserve for the evaluation of coronary artery disease: "Lesions on CTA frequently do not result in functional abnormalities on FFR. Importantly however, a normal CTA can accurately rule out the presence of hemodynamically significant lesions.* ***Van Werkhoven et al"***

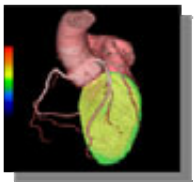
For more information on the ESC Congress 2008, including webcasts, e-slides and more, go to:

http://www.escardio.org/congresses/esc2008/Pages/welcome.aspx

EVINCI Study

Evaluation of Integrated Cardiac Imaging

for the Detection and Characterization of Ischemic Heart Disease



Summary of the EVINCI study; A European multi-centre, multi-modality cardiac imaging project

Contributed by Danilo Neglia, MD, PhD

An advanced phase of negotiation has been reached with the European Commission (EC) for a proposed three-year, multi-centre project, with cardiac multi-modality imaging as the major focus. If the EC contract will be signed this year, the EVINCI (EValuation of INtegrated Cardiac Imaging) study will start in January 2009. It will be one of the two projects dealing with cardiac imaging among the almost 200 projects approved in the FPVII Health of the EC.

The Study was initially designed within the WG5 of the ESC and includes 17 partners in nine European countries. Specifically 14 clinical centres (three in Spain, four in Italy, and one each in Paris, Zurich, Munich, London, Leiden, Turku and Warsaw) will be involved. The European Society for Cardiology (ESC) will disseminate results; CFC Consulting in Milan will provide project management, and InforSense, in London, will provide the informatic background for integrated analysis of multiparametric data and for development of advanced softwares dedicated to innovative multi-modality imaging clinical reporting systems.

Dr. Danilo Neglia, Head of the PET and PET-CT Unit at the Institute of Clinical Physiology, National Research Council, in Pisa, Italy, with the help of **Dr. Juhani Knuuti** and the support of the WG5, will coordinate the project.

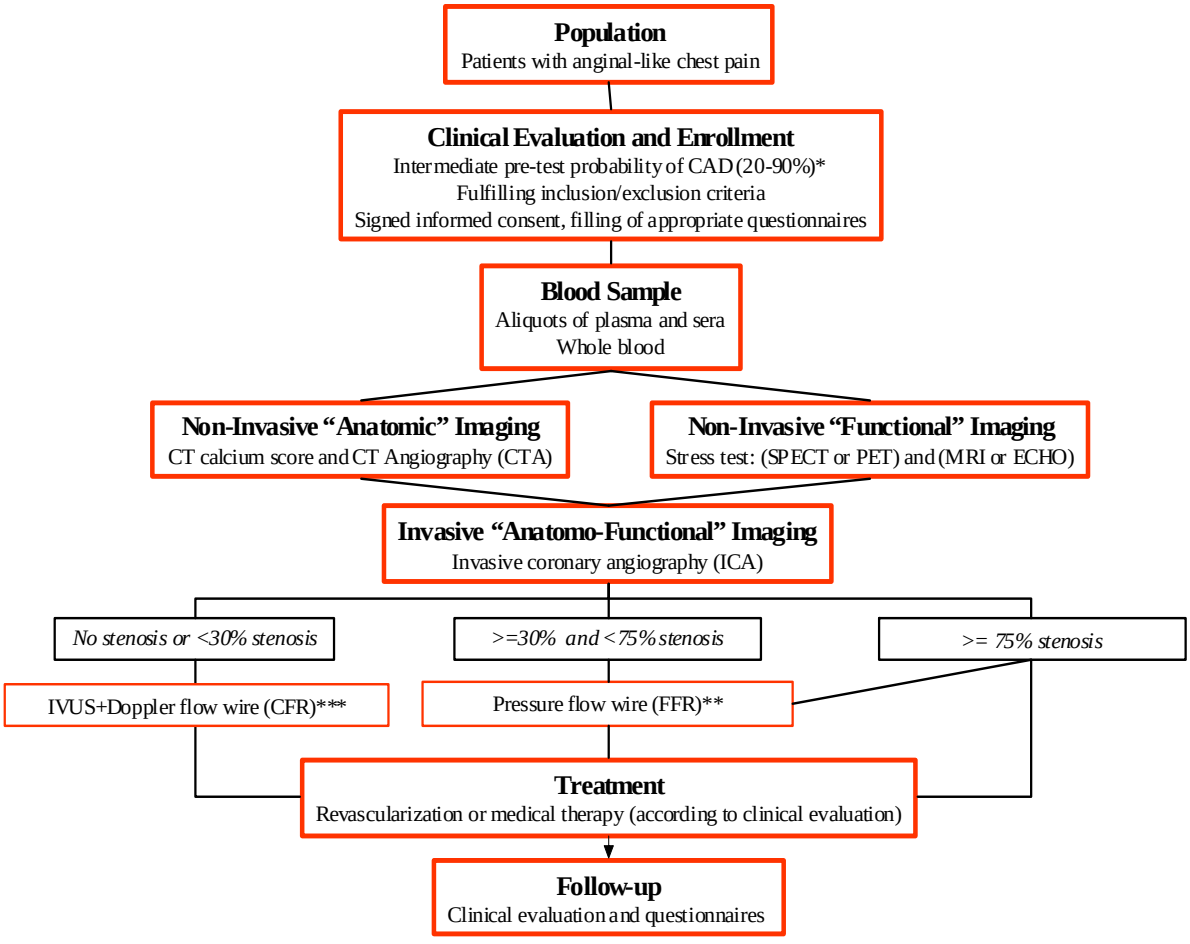
EVINCI promises to be a relevant study, because its major goal is to provide objective evidence of the clinical role of multimodality imaging for the early diagnosis, complete characterization and targeting of treatment in patients with suspected Coronary Artery Disease (CAD). CAD is the major cause of morbidity and mortality in developed countries and one of the major sources of sanitary costs.

A wide population of patients will be selected with an intermediate probability of CAD based on individual risk factors, clinical observation, biohumoral profile and a preliminary stress ECG test. In this subset of patients non-invasive imaging is expected to be most cost-effective. Every patient, fulfilling inclusion and exclusion criteria and providing an informed consent, will be submitted to a complete non-invasive imaging evaluation.
Multi-slice CT will be used to define coronary anatomy. Radionuclide imaging (either SPECT or PET) will be performed to measure myocardial perfusion at rest and during stress. In each patient the possible effects of myocardial ischemia on ventricular function will also be assessed by either Magnetic Resonance (MR) or Echocardiography (Echo) during stress.

Patients will then undergo heart catheterization as a reference method to define the presence and the extent of coronary disease and its effects in limiting coronary flow reserve. Finally, the patients will be followed up for a maximum of three years and events will be recorded.
Patients participating to the EVINCI Study will be followed and treated by their referring clinicians according to current good clinical practice and European guidelines. The clinicians will be advantaged in their decision making by the additional information that will be available in each patient.

Procedural risks, radiation exposure and costs will be strictly monitored during the protocol and a cost-benefit analysis will be one of the expected outputs of the study.
The major end point of EVINCI will be to assess the ability of non-invasive multimodality imaging to recognize in the single patient not only if coronary disease is present but if it mainly involves the major coronary arteries or the microvessels and most importantly if it causes ischemia and hence should be aggressively treated.

Flow-chart of the study



Other relevant outputs would be the standardization of non-invasive imaging procedures throughout Europe and the development of new informatic tools for advanced reporting of multimodal cardiac imaging.
The expected benefits from the EVINCI results include early diagnosis and accurate characterization of coronary disease by multimodality imaging in anginal patients avoiding unuseful invasive procedures. If this approach will demonstrate to be accurate, we could expect in the future that heart catheterization could be mainly reserved to interventions, i.e. to revascularize coronary stenosis known to cause myocardial ischemia. Multimodality imaging approach could be apparently more costly in the beginning but could prove to be cheaper at the end. In the cost/risk-benefit workpackage of the study, this hypothesis will be evaluated. Moreover, it should also be possible to define the most cost-effective diagnostic work-up for the recognition of "significant" CAD among the different imaging modalities or combination of modalities. Interestingly, it could also be possible to recognize patients who don't have full blown CAD (a stenosis to be revascularized) but are at high risk of future events due to early and/or functional abnormalities of the coronary system. We know that these patients, if unrecognized and left untreated, are at increased risk of developing myocardial infarction or heart failure. Again, resources used to recognize this population will save lifes and will spare future sanitary costs. Finally, results coming from the EVINCI Study could help in the future to tailor specific imaging modalities or combination of techniques to specific patients. Chosing the most cost-effective approach for the specific clinical question will avoid redundancy in using technology in medicine. A particular advantage of the experimental design of the EVINCI Study consists in the presence of independent core-labs for each different imaging modality. This approach could ensure a fair comparison of different modalities even if this is not the major goal of the study.

The WG5 of the ESC on Nuclear Cardiology and Cardiac CT made an incredible effort to help in the design and to support the EVINCI project since its beginning. It was a shared opinion that this could be a landmark study in cardiology, potentially able to change the approach to coronary artery disease in the near future. The process began almost two years ago and now investigators are crossing fingers waiting for the final signature of the contract with the EC.

One of the problems is that the budgeting from the EC is underestimated for the actual costs of this study. Apart from enrolling 700 patients, our study will probably involve about 100 operators, because every centre should provide specialists for different modalities. It's a very big study. However, since many relevant clinical centers and universities are involved throughout Europe a substantial local economical support and possible external support from the Industry are expected.

FOCUS on upcoming events:

ICNC-9 Barcelona

Contributed by Robert Hendel MD, FACC, FAHA, FASNC

The International Conference of Noninvasive Cardiac Imaging (ICNC) is a key international scientific event for nuclear cardiology and cardiac CT imaging. Every two years, practitioners from all over the world gather to learn about new advances and to exchange scientific ideas and experiences in a unique environment. The upcoming meeting in Barcelona will provide an exciting and diversified scientific programme which offers a full spectrum of educational opportunities ranging from continuing education to cutting-edge presentations of new and original scientific research.

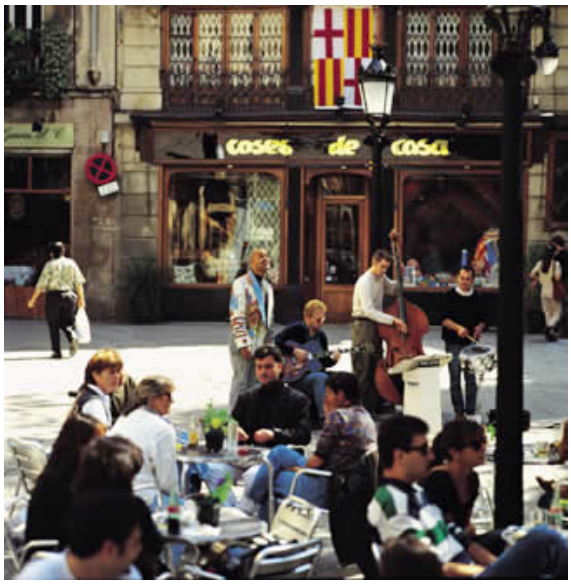
The ICNC-9 Programme will feature:

- Recent advances in technical and clinical issues concerning nuclear cardiology and cardiac CT.
- Essential discussions of current nuclear cardiology techniques and their clinical value
- Competitive sessions in which the results of original scientific research in the field of nuclear cardiology and cardiac CT.
- Vital information concerning cardiology for the nuclear physician, a summary of important concepts of coronary and ventricular physiology, stress testing, cardiac pharmacology and therapeutics.
- Case presentations with the world's leading authorities in nuclear cardiology and cardiac CT; innovative sessions on the art interpretation and clinical problem solving.
- A dedicated CT track every day, during every timeslot.

ICNC-9 Highlights

- Extensive didactic programme with specialised tracts for core nuclear cardiology principles, and advanced tract with original scientific presentations and posters, a technical-focused series of presentations
- "Read with the Expert" sessions.
- Abstract Book CD-Rom for all registered delegates
- 18 CME points and 16 ARRT points
- Wide variety of cardiac imaging vendors
- A variety of social activities:

  - Opening ceremony with artistic and culture highlight of the Catalan region on Sunday, 10 May 2009
  - Fun Run on Tuesday, 12 May 2009
  - Gala Dinner on Tuesday, 12 May 2009 which will be held on Montjuic, near the conference centre, with a spectacular view of the city.



We hope to see you at ICNC9 in Barcelona. Please make your plans early, as this promises to be a conference to remember!

Robert Hendel *Juhani Knuuti*

ICNC-9 Co-Chairpersons

POINT OF VIEW
LIASON - JAPAN

Trends in nuclear cardiology in Japan

Contributed by Nagara Tamaki,
Professor and Director, Department of Nuclear Medicine,
Hokkaido University, Sapporo, Japan
natamaki@med.hokudai.ac.jp

Nuclear cardiology remains a major procedure in Japan. Approximately 400,000 myocardial perfusion studies are taken in 2007 which is the second most common nuclear medicine procedures next to bone scan (about 500,000 per year). The number of gamma camera is about 1,600 in 1,200 hospital and clinics. About 70% of the gamma camera is dual head SPECT cameras but none of cardiac dedicated camera is approved in Japan. About half of myocardial perfusion scans are done under exercise or pharmacological stress using adenosine or dipyridamole.

There are two major concerns in nuclear cardiology in Japan. One is that most of cardiologists prefer direct coronary angiography to perform percutaneous coronary intervention (PCI) in patients suspected or proven coronary artery disease. The number of PCI procedures is strikingly higher per population as compared to other developed countries. Although recent multicenter trial report indicated no significant benefit for patient outcome by PCI over the medical treatment for those with coronary artery disease in USA, Japanese multicenter trial reports indicated slight but significant improvement in patient outcome by PCI over the medical treatment.

Another concern is that due to emotional fear to radiation and radioactive materials, nuclear medicine procedures are severely restricted and regulated. Such regulation may cause higher cost for new construction of nuclear medicine facilities and also relatively higher cost in radiopharmaceuticals. For instance, myocardial perfusion scan may cost about 70,000 yen (700 dollars), as compared to only about 20,000 yen (200 dollars) for cardiac CT. Many major hospital have recently applied for DPC (diagnostic procedure combination) system, which may fix the medical fee per day for most of in-patients. Therefore, relatively high cost procedures, such as myocardial perfusion scan might be easily skipped and diagnostic coronary angiography might be preferably performed in patients. In addition, relatively lower cost cardiac CT may be preferred to nuclear perfusion scan for out-patients. The statistical analysis from Japan Radioisotope Association report indicated that the number of myocardial perfusion study is slightly decreased by 6% as compared to that at five years before, which seems to be the general trends in all the nuclear medicine studies in Japan.

The Japanese Society of Nuclear Cardiology has started tutorial courses, including small group film reading about nuclear cardiology in 8 different regions. In 2007, over 1,000 young fellows and residents attended this nuclear cardiology course to learn how and when to use nuclear cardiology with a suitable textbook published from Japanese Society of Nuclear Cardiology. This educational course will make better understanding the value of this important procedure.

Upcoming events and international meetings

ICNC9 - Nuclear Cardiology and Cardiac CT

Barcelona, Spain
May 10-13, 2009

Cardiac Nuclear & CT imaging in Clinical Practice

Sophia Antipolis, France
May 28-30, 2009

Directed at cardiologists, nuclear physicians and cardiac radiologists, this course will provide a basic grounding together with the opportunity to refresh knowledge of advanced topics for those already involved in the subject.

The basic principles underlying scintigraphic and CT imaging will be explained, including radiopharmaceuticals, imaging equipment, image processing and radiation. Protocols for image acquisition, processing and reporting will be discussed. The value of radionuclide and CT imaging in different clinical settings will be addressed, including screening for coronary artery disease, acute and chronic chest pain and heart failure.

Furthermore, the differences between the non-invasive imaging techniques will be discussed extensively including MRI and stress echocardiography. Every course day will include extensive case reviews, presented in the "read with the expert" sessions.

For more information, please visit: HTTP://WWW.ESCARDIO.ORG/EDUCATION/COURSES/NUCLEAR-CARDIOLOGY/PAGES/PROGRAMME.ASPX

1st Nordic Symposium on Cardiac CT

June 11-12, 2009, Silkeborg, Denmark

HTTP://NCCT2009.EU/

ESC Congress 2009

Barcelona, Spain
August 29 - September 2, 2009

Don't miss the abstract submission deadline: 14 February 2009.

WG5 Fall 2009 Brainstorm Meeting

Capri, Italy
September 17-20, 2009

For more information on meetings and events, please visit the website of the Working Group

HTTP://WWW.ESCARDIO.ORG/COMMUNITIES/WORKING-GROUPS/NUCLEAR-CARDIOLOGY/PAGES/WELCOME.ASPX