Confronting the Epidemics of CVD Worldwide
Prevention + use of technology + treatment = lives saved

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Nuclear Techniques in Human Health
Prevention, Diagnosis, Treatment
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Case 1
51 years old man
Lives in Brazil
obese and diabetic
Heart disease suspected

Case 2
54 years old female
Lives in Brazil
obese and diabetic
Heart disease suspected

Both documented cardiac arrest during exercise – survived
Both very advanced disease – high risk of premature sudden death
Cardiovascular Disease (CVD) Leader of Mortality

17.5 mi Deaths worldwide ~ 80% of are in LMICs

Source: WHO
LIVING IN A LMIC ~ 2 x higher chance of dying from CVD

Figure 59. Cardiovascular disease mortality by World Bank income groups in males and females (per 100,000) (1, 6).

Source: WHO
How to identify the high risk patient?

Multiple Technologies Available

CT

NUCLEAR

stress

rest

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Computed Tomography Angiography

Early diagnosis of disease

Excludes disease with high accuracy
How to identify the high risk patient?

Multiple Technologies Available

CT

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stress

rest
Nuclear Cardiology
A mature technique of 44 years - solid literature

In 1973
Potassium – 43 – planar imaging

In 2017
Technetium – 99m – SPECT
Positron emitters - PET

HW Strauss, BL Zaret, ND Martin, HP Wells, Jr, and MD Flamm, Jr

Noninvasive evaluation of regional myocardial perfusion with potassium 43. Technique in patients with exercise-induced transient myocardial ischemia

Case 3 - 36 years old man
Lives in Brazil - obese and diabetic
Heart disease suspected

High ischemic burden
Advanced Disease
High risk of death
What is common among these 3 patients?

36 years old man  51 years old man  54 years old women

1- Advanced disease in relatively young age (all diabetics)
2- Live in a country where CV mortality is high (# 6 in the world)
3- All lucky to have access to technology and therapy – all survived
4- Costly treatment (revascularization) - disease was advanced
5- Their disease is an economic burden specially in LMICs
6- Cost effective strategies to deliver care is essential to all countries

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The Economic Consequences of Available Diagnostic and Prognostic Strategies for The Evaluation of Stable Angina Patients: An Observational Assessment of the Value of Precatheterization Ischemia

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Atlanta, Georgia; New York, New York; Los Angeles, California; Cleveland, Ohio; Hartford, Connecticut; Durham, North Carolina; Providence, Rhode Island; Chicago, Illinois; Philadelphia, Pennsylvania; and St. Louis, Missouri

Shaw L et al, END study, 1999
How is Nuclear Cardiology Utilization Worldwide?

Assessing the need for nuclear cardiology and other advanced cardiac imaging modalities in the developing world

João V. Vitola, MD, PhD, Leslie J. Shaw, PhD, Adel H. Allam, MD, Pilar Orellana, MD, Amalia Peix, MD, Annette Ellmann, MD, Kevin C. Allman, MD, B. N. Lee, MD, Chanika Srikara, MD, Felix Y. J. Keng, MD, Gianmarco Sambucetti, MD, Maria C. Kless, MD, Raffaele Glubbini, MD, Salaheddine E. Bouyoucef, MD, Zuo-Xiang He, MD, Gregory S. Thomas, MD, MPH, Fernando Mut, MD, and Maurizio Dondi, MD

Background. In 2005, 80% of cardiovascular disease (CVD) deaths occurred in low- to middle-income countries (i.e., developing nations). Cardiovascular imaging, such as myocardial perfusion SPECT, is one method that may be applied to detect and foster improved detection of at-risk patients. This document will review the availability and utilization for nuclear cardiology procedures worldwide and propose strategies to devise regional centers of excellence to address the burden around the world.

Heterogeneous Nuclear Cardiology Utilization

High utilization where mortality is lower
Low utilization where mortality is higher

Nuclear use influenced by

- Economy: GDP
- Healthcare Policies
- Information: Organized scientific groups, Training

Vitola JV, Shaw L, Allam A et al. JNC 2009
Heterogeneous Nuclear Cardiology Utilization and Quality

Current worldwide nuclear cardiology practices and radiation exposure: results from the 65 country IAEA Nuclear Cardiology Protocols Cross-Sectional Study (INCAPS)


Opportunities for improvement on current nuclear cardiology practices and radiation exposure in Latin America: Findings from the 65-country IAEA Nuclear Cardiology Protocols cross-sectional Study (INCAPS)

João V. Vitola, MD, PhD, Fernando Mut, MD, Erick Alexánder, MD, Thomas N. B. Pascal, MD, MPH, PhD, Ganesan Karthikeyan, MD, DM, MSc, Nathan Better, MBBS, FRACP, Madan M. Rehani, PhD, Ravi Kashyap, MD, Maurizio Dondi, MD, Diana Paez, MD, and Andrew J. Einstein, MD, PhD

Einstein AJ et al. Eur Heart J 2015

Vitola JV et al. J Nucl Cardiol 2016
Resources in Cardiology

- Eight best practices for nuclear cardiology
- ECG Interpretation for Nuclear Cardiology Practice
- Myocardial Perfusion Imaging
- Gallery of Cardiology Cases: Asymptomatic Patients
- Atlas of Myocardial Perfusion SPECT Studies

E-Learning

- Diagnosis of myocardial ischemia
- Risk Stratification
- Preoperative risk assessment for non-cardia surgery
- Evaluation of the efficiency of medical therapy
- Congestive heart failure
- Evaluation of chemotherapy-related cardiotoxicity
- Miscellanea
- Endocarditis

NUCARD App

- iPhone and Android devices

http://humanhealth.iaea.org
Investing in prevention + diagnosis + treatment works

High income countries - decline in heart disease mortality

Western Europe

USA

Sources: WHO
Percentage of deaths due to CVD is increasing in LMICs and decreasing in HICs

Roth et al, Circulation 2015
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- Awareness about increasing mortality in LMICs (DM)
- Nuclear imaging is very useful to assess risk and guide management - cost effectively
- Some countries with the highest mortality have the lowest utilization of nuclear cardiology
- Mortality can be decreased by prevention + appropriate use of technology + appropriate treatment (see high income countries)