1) Clinical Opportunities
2) Research: Challenges & Opportunities
3) A Personal Search and Approach
4) “Clinician / Academician”
5) “Researcher”
6) “Educator”
1a) PROJECTED GLOBAL DEATHS BY CAUSE, ALL AGES, 2005

Total Deaths: 80% in Low and Middle Income Countries

Fuster V, Voûte J. Lancet 2005; 366:1512
Modified from WHO 2005 - Chronic Diseases and Health Promotion
(b) Which Conditions Should be Given Priority in Low Income Countries?

- Cardiovascular Diseases: 30%
- Communicable (HIV, Malaria, Tb): 30%
- Maternal, Infant: 30%
- Cancer: 13%
- Other NCDs, injuries & mental health: 18%
- Respiratory: 7%
- Diabetes: 2%

WHO CVD – Aug 2007 - Chair, Dr Shanthi Mendis
CVD deaths for the year 2040 over the year 2000
Foot DK et al JACC 2000;35:1067
(a) United States, Cardiovascular Deaths & Hospitalizations

**LITTLE CHANGE**

POSTPONED (PREVENTION ?, BETTER Rx ?)

**INCREASED (BETTER Rx)**

CDC / NCHS / NHLBI Circ. 2006; 113:85 – ECONOMIC BURDEN - $368 Bill
(b) Out of Pocket Expenditure on Health

<table>
<thead>
<tr>
<th>Country</th>
<th>Developing</th>
<th>Developed</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>60%</td>
<td>15%</td>
</tr>
<tr>
<td>India</td>
<td>82%</td>
<td>10%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>70%</td>
<td>14%</td>
</tr>
<tr>
<td>Myanmar</td>
<td>82%</td>
<td>15%</td>
</tr>
<tr>
<td>Nigeria</td>
<td>79%</td>
<td>16%</td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WHO CVD – Aug 2007 - Chair, Dr Shanthi Mendis
PROJECTED CVD MORTALITY FROM 2000 to 2030 – AGE, COUNTRY

- Portugal (10%)
  - 73% 75+
  - 18% 65-74
  - 6% 55-64
  - 3% 45-54
  - 3% 35-44

- USA (12%)
  - 70% 75+
  - 18% 65-74
  - 9% 55-64
  - 3% 45-54
  - 3% 35-44

- Brazil (28%)
  - 46% 75+
  - 26% 65-74
  - 8% 55-64
  - 2% 45-54
  - 2% 35-44

- India (35%)
  - 31% 75+
  - 34% 65-74
  - 22% 55-64
  - 10% 45-54
  - 2% 35-44

- S. Africa (41%)
  - 32% 75+
  - 27% 65-74
  - 23% 55-64
  - 12% 45-54
  - 6% 35-44

% Working Age

Leeder, The Earth Institute, Columbia Univ, New York, 2004
Fuster et al., Circ 2007 (In Press)
Interdisciplinary Background: Future Focus

Yesterday

- Primary Cardiac Care
- Acute Cardiac Care
- Cardiac Surgery

Today

- Specialist
- Interventionalist
- EPS

Tomorrow

- Bioimaging
- Genetic Screening
- Outcomes / Economics

Source: MS Analysis 2007
CARDIOVASCULAR “DEMAND CATALYSTS”

1) Aging population with more chronic cardiac patients.
2) The “epidemics” of obesity and type 2 diabetes.
3) The decline of managed care’s gatekeeper model.
4) Better informed public, clinical trials and expectations.
5) Technological and procedural innovations.
6) More widespread use of cardiovascular screening tests.
7) Increasing awareness among women.
8) Crisis by no increase in female cardiologists & IMGs

Modified from WB Fye. Circ 2004; 109:813
PHYSICIAN WORKFORCE IN THE UNITED STATES, 1980-2003
MAJOR PROFESSIONAL ACTIVITY

MY FUTURE
ACADEMIC CARDIOVASCULAR MEDICINE - 2007

1) Clinical Opportunities
2) Research: Challenges & Opportunities
3) A Personal Search and Approach
4) “Clinician / Academician”
5) “Researcher”
6) “Educator”
Six research papers authored by nine of America’s most distinguished economists - working independently of each other

The report documents that “extended healthy lives” of Americans, in great part due to advances in medical research ($45 billion annually), generates dramatic returns ($ trillions annually)

“If you think research is expensive, try disease” (Mary Lasker, 1901-1994)
2) Physician-scientists are catalysts of translational research.
3) FROM GENES TO HEALTH AND HEALTH TO GENES 1,2,3

TRANSLATIONAL

GENES ⇔ CELL ⇔ TISSUE ⇔ PHYSIOL. ⇔ PHENOTYPE ⇔ POPUL. ⇔ HEALTH

TRAINING / MENTORS

ENABLING APPROACHES

Imaging: Non Inv. Molec.
Clinical Proteomics
Inform. / Science / Techn.
Behav. Instrum./ Technol.
Clinical Trials Infrastr.

SPECIFIC AIMS

Genetics /Proteomics /Embryogenes
Regenerative Biol./ Replac.Therapy
Immunobiol./ Inflammation / Thromb
Public Health / Genom.Proteo.

1 NHLBI SPARK I 1998-2002


3 NHLBI – Site Visit - March 17,2006
FUNDING FOR BIOMEDICAL RESEARCH BY SOURCE, 1994-2003

Moses et al., JAMA 2005; 294:1333
1. CHANGES IN US BIOMEDICAL RESEARCH OVER THE PAST 25 YRS

Distribution of Successful R01, R23, R29, or R37 Applicants by Age


It would be preferable for academic medical centers to cease relying so heavily on the NIH for research funding. 
Loscalzo. NEJM 2006; 354:1665
INDUSTRY SHRINKS ACADEMIC SUPPORT

$27.4 Bill  ↑ 42%
$7.3 Bill  ↑ 18%
$2.8 Bill  ↑ 23%
$2.8 Bill  ↑ 17%

Funding Source:
- U.S. government
- Institutional
- State and local government
- Industry
- Other

Percent Change (2001 to 2004)

Science 2006; 312:671
2. PERCENTAGE OF AMERICANS WANTING MORE MONEY SPENT ON PUBLIC HEALTH RESEARCH - SURVEYS OF 8 STATES (N=6400)

Woolley, SM Propst. JAMA 2005; 204:1380 (Harris Polls)
NIH LOAN REPAYMENT PROGRAM (LRP) ACTIVITY
2002-2005 - INCENTIVE
(CLINICALLY ORIENTED RESEARCH)

Notes From the Director
National Heart, Lung, and Blood Institute
Fostering New Investigators

1. Increased Pay Line
2. Full Award Duration
3. Expedited Review
4. Other Approaches
   a) Increase the yield of K Awards
   b) Comprehensive network that includes significant mentoring and career development components, laboratory and project management training and grant writing experiences.
   c) “Mentoring bank”

EB Nabel Circulation, 2005; 112: 2217
NHLBI - SOURCES OF SUPPORT INFORMATION

National Institutes of Health; National Heart, Lung, and Blood Institute (NIH/NHLBI)
http://www.nih.gov
http://www.nhlbi.nih.gov

Award Program Announcements — “K Kiosk”
http://grants2.nih.gov/training/careerdevelopmentawards.htm

The Original How to Write a Research Grant Application

Adviser, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering. National Academy Press
http://www.nap.edu/readingroom/books/mentor/
http://books.nap.edu/catalog/5789.html

W Balke. JACC 2005; 46(Suppl A):8A
OTHER BRIDGING FUNDING OPPORTUNITIES FOR YOUNG INVESTIGATORS

American Heart Association
http://www.americanheart.org

American College of Cardiology
http://www.acc.org

GSK
http://www.cvfoundation.org

W Balke. JACC 2005; 46(Suppl A):8A
HA National Scientist Development Grant
HA Fellow To Faculty Transition Award
CCF/Merk Fellowship in Cardiovascular Disease. The Metabolic Syndrome
CCF/GE Healthcare Cardiovascular Career Development Awards in Cardiovascular Imaging
CCF/Pfizer Career Development Award in Clinical Cardiovascular Medicine
CCF/ Guidant Foundation Fellowship and Career Development Award in Women’s Cardiovascular Health
Other Foundations: Sarnoff, Doris Duke, Robert Wood Johnson, Glaxo Smith Kline, Schearing-Plough

O Bonow. JACC 2005; 46:(Suppl A):15A
3. MEDICAL STUDENT INTEREST IN RESEARCH

(Source: AAMC Questionnaire)
NUMBERS OF MATRICULATING MD-PhD STUDENTS IN THE UNITED STATES, 1990-2004

Academic Year

Total No. of Matriculants

Men

Women

MY FUTURE
ACADEMIC CARDIOVASCULAR MEDICINE - 2007

1) Clinical Opportunities
2) Research: Challenges & Opportunities
3) A Personal Search and Approach
4) “Clinician /Academician ”
5) “Researcher ”
6) “Educator ”
How to Become a Cardiovascular Investigator: A Symposium

Directed by Valentin Fuster, MD, PhD, FACC
Co-directed by Robert O. Bonow, MD, FACC
1. A Personal Search and Three Step Approach

WHAT I AM GOOD AT → MOVE ON → ENJOY / SUCCEED

The Three Commandments of Success

A) MENTOR: OUTSTANDING AND COMMITED
“The scientific chiefs will be rated on mentorship of juniors as well as research productivity”

B) INFORMATION & PURSUE IN DEPTH
“The harder I work, the luckier I get"
“Luck favors only the prepared mind"
“Take time to think”

C) FOCUS, FOCUS, FOCUS
“Ideally a high-risk and a low-risk project”
### 2. CHARACTERISTICS
 ***CREATIVITY OR INNOVATION***

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passion</td>
<td>“Talent”</td>
</tr>
<tr>
<td>Risk</td>
<td>“Unknown”</td>
</tr>
<tr>
<td>Organization</td>
<td>“Physician Scientist”</td>
</tr>
<tr>
<td>Liberal</td>
<td>“Unbiased, Humble”</td>
</tr>
<tr>
<td>Idealistic</td>
<td>“Dream, no false expectations”</td>
</tr>
<tr>
<td>Friendly</td>
<td>“Family team”</td>
</tr>
<tr>
<td>Intense work</td>
<td>“8 to 5?, No weekends?”</td>
</tr>
<tr>
<td>Consistant</td>
<td>“Accept Fluctuations”</td>
</tr>
</tbody>
</table>

---

Genetic and Acquired

3. CARDIOVASCULAR RESEARCH

SOURCES OF SATISFACTION

• Chance to do good
• Intellectually challenging
• Thrill of discovery
• Colleagues-laboratory, institutional, world-wide
• Attend conferences, Give lectures
• Consulting to industry and government

JL Breslow - In: How to Become A Cardiovascular Investigator (Bethesda Sept 2001 - NHLBI/AHA/ACC - V Fuster, RO Bonow)
1) Clinical Opportunities
2) Research: Challenges & Opportunities
3) A Personal Search and Approach
4) “Clinician /Academician”
5) “Researcher”
6) “Educator”
Professional Clinical Investigator: 80% in clinical trials, outcomes research or epidemiology. Advanced training (i.e., MD, MPH, etc.)

Clinical Investigator: In patient care as a team player with professional clinical investigator. No special training

Physician Scientist: 80% laboratory research in the interface with the clinic. Advanced research training (MD or MD/PhD). The most threatened in major medical centers.

Translational Scientist: Clinically oriented research (from molecules to outcomes) as a team player. Advanced research training (PhD).
Organizational Challenges

MY FUTURE
ACADEMIC CARDIOVASCULAR MEDICINE - 2007

1) Clinical Opportunities
2) Research: Challenges & Opportunities
3) A Personal Search and Approach
4) “Clinician / Academician”
5) “Researcher”
6) “Educator”
1. The Choice of Research Projects(s)

2. Writing a Paper(s)

3. General Literature Update

4. I am really a Doctor?
2) The CNIC Building

- 23000 m² for research
- € 60 million
- Capacity for 300 scientists + 100 other staff

- 2007-2008 – Imaging Ciclotron
- 2007-2008 – Pigs Zebra Fish
Innovative Model of Funding: 7 Years

Ministerio de Sanidad y Consumo

Instituto de Salud Carlos III

62%

38%
Mission & Vision

1. To promote Excellence in Cardiovascular Research
   Basic and Clinical

2. Identify and Inspire
   Tomorrow’s Scientists

THE CNIC SHOULD PRODUCE A GENUINE IMPROVEMENT
IN SPANISH RESEARCH
AND IN CARDIOVASCULAR HEALTH IN SPAIN AND WORLDWIDE
Mission & Vision
Training program for young people - “CNIC Joven”

Aim
To bring biomedical research closer to young people and create a reserve of future top researchers in the cardiovascular area

- **Programe ACERCATE:** Senior High-school students
- **Programe CICERONE:** UNIVERSITY students
- **Programe INVESMIR:** PHYSICIANS in specialist training
- **Programe CARDIOJOVEN:** Young CARDIOLOGISTS
- **Programe PREDOCTORAL** Biomedical Scientist – Thesis
- **Programe POSTDOCTORAL** Biomedical PhD – 2 or 3 years

INTERNATIONAL
EDUCATIONAL GUIDE

1. The Choice of Research Projects(s)

2. Writing a Paper(s)

3. General Literature Update

4. I am really a Doctor?
THE CHOICE OF RESEARCH PROJECTS

Two Projects
- Going on (less risky)
- Not going on (risky, hobby)

Infrastructure
- Mentor general and specific (anywhere)
- Literature

Feasible
- Time to devote
- Funding
- Role in the team

Action
1. The Choice of Research Projects(s)

2. Writing a Paper(s)

3. General Literature Update

4. I am really a Doctor?
WRITING A PAPER

**Project(s)**
- Almost done

**Literature, Mentor (Infrastructure)**

**Feasible**
- Time to devote
- Role in the team

**Action**
- Start on “white paper” - Turn title to discussion
- Time: one month to write
  one week to review
  two weeks to re-write

**Publication**
- At two years
- Then sequence of papers
1. The Choice of Research Projects(s)

2. Writing a Paper(s)

3. General Literature Update

4. I am really a Doctor?
GENERAL LITERATURE UPDATE

**Journals**
Nature
Nature Medicine
Science
JCI
New England J Medicine
JAMA
Lancet
Annals of Internal Medicine
Circulation
Circulation Research
JACC
Nature Cardiovascular Heart
European Heart Journal

**Action**
Six hours per month
Screening, reading and filing
EDUCATIONAL GUIDE

1. The Choice of Research Projects(s)
2. Writing a Paper(s)
3. General Literature Update
4. I am really a Doctor?
FACTORS THAT DETERMINE PLACEBO OR CONTEXT EFFECT
(BASED ON 25 TRIALS)

Treatment characteristics (eg, color, size, shape of drug)

Patient's characteristics (eg, treatment and illness beliefs, anxiety, adherence)

Patient-practitioner relationship (eg, suggestion, reassurance, compassion)

Context effects

Health-care setting (eg, home or hospital, room layout)

Practitioners's characteristics (eg, status, sex, treatment, and illness beliefs)

DiBlasi et al., Lancet 2001; 357:757
### DIAGNOSTIC CRITERIA

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Examples</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional capacity</td>
<td>Class III</td>
<td>Talking</td>
</tr>
<tr>
<td>Physiology</td>
<td>R cardiac failure</td>
<td>Teaching</td>
</tr>
<tr>
<td></td>
<td>atrial fibrillation</td>
<td></td>
</tr>
<tr>
<td>Anatomy</td>
<td>Sev MS, mil AI</td>
<td>Time</td>
</tr>
<tr>
<td>Etiology</td>
<td>Rheum Heart Dis</td>
<td>Thinking</td>
</tr>
</tbody>
</table>

### MANAGEMENT CRITERIA

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>T.T.T.T.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural history</td>
<td>Trials</td>
</tr>
<tr>
<td>Unnatural history</td>
<td>Trials</td>
</tr>
</tbody>
</table>
ETIOLOGIC AND ANATOMIC-PHYSIOLOGIC CLUES

1. Hypertensive heart disease
2. Diseases of the aorta
3. Pulmonary hypertension
4. Rhythm and conduct. abnormalities
5. Coronary artery disease
6. Acquired valvular heart disease
7. Congenital heart disease
8. Infective endocarditis
9. Cardiac tumors
10. Myocardial disease
11. Pericardial disease
12. Trauma
13. Hyper- and hypokinetid states
14. Drug side effects
1. Systemic Hypertension

- Synchronous palpation of radial-femoral pulses
- Ventic hypertrophy (HHD): Palpation, S₄, ECG
- Ventic diastolic dysfunction: dyspnea with good EF (echo)
- Ventic failure: Contributor (age, CAD cardiomyopathy)
  - O₂ consumption: afterload, heart rate, contractility, preload
- Coronary disease:
  - Risk factor: Atheroscler (diastolic hypertension), post-MI
  - ↑ Angina pectoris: O₂ consumption
- Potassium depletion: Very common
  - If chronic, ECG more reliable than serum K level
  - Orange juice, 8 oz; tomato juice, 8 oz; banana
    (13 meq) (14 meq) (16 meq)
1. Hypertensive heart disease
2. Diseases of the aorta
3. Pulmonary hypertension
4. Rhythm and conduct. abnormalities
5. Coronary artery disease
6. Acquired valvular heart disease
7. Congenital heart disease
8. Infective endocarditis
9. Cardiac tumors
10. Myocardial disease
11. Pericardial disease
12. Trauma
13. Hyper- and hypokinetic states
14. Drug side effects
### Diagnostic Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Examples</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional capacity</td>
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<tr>
<td>Physiology</td>
<td>R cardiac failure atrial fibrillation</td>
<td>Teaching</td>
</tr>
<tr>
<td>Anatomy</td>
<td>Sev MS, mil AI</td>
<td>Time</td>
</tr>
<tr>
<td>Etiology</td>
<td>Rheum Heart Dis</td>
<td>Thinking</td>
</tr>
</tbody>
</table>

### Management Criteria

- Diagnosis: T.T.T.T.T.
- Natural history: Trials
- Unnatural history: Trials
### GENERAL PREVENTION GUIDELINES FOR CANCER, CVD AND DIABETES IN ADULTS

<table>
<thead>
<tr>
<th>TEST</th>
<th>AGE 20</th>
<th>30</th>
<th>40</th>
<th>50+</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>Each regular health care visit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>Each regular health care visit (or at least once every 2 years if BP &lt; 120/80 mm Hg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lipid Profile</td>
<td>Every 5 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Glucose test</td>
<td>Every 3 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Breast Exam (CBE) and Mammography</td>
<td>CBE every 3 yrs</td>
<td>Yearly CBE and Mammography</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pap test</td>
<td>Yearly</td>
<td>Every 1-3 years; depends on type of test and past results.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colorectal Screening</td>
<td></td>
<td></td>
<td>Frequency depends on test preferred</td>
<td></td>
</tr>
<tr>
<td>Prostate specific antigen test and/digital rectal exam</td>
<td></td>
<td></td>
<td>Offer yearly, assist informed decisions</td>
<td></td>
</tr>
</tbody>
</table>

ACS/ADA/AHA - Circ 2004; 109:3244
MY FUTURE ACADEMIC CARDIOVASCULAR MEDICINE -2007

1) Clinical Opportunities
2) Research: Challenges & Opportunities
3) A Personal Search and Approach
4) “Clinician / Academician”
5) “Researcher”
6) “Educator”
2b) AVERAGE 4-YEAR MEDICAL SCHOOL TUITION COSTS COMPARED WITH AVERAGE POSTGRADUATE YEAR 1 (PGY-1) WAGES 1977-2004 - DISINCENTIVE

ASSESSMENT OF CURRENT JOB MARKET FOR CARDIOLOGY SENIOR FELLOWS (2002 vs 1997)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>2002</th>
<th>1997</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>70%</td>
<td>15%</td>
</tr>
<tr>
<td>Very Good</td>
<td>18%</td>
<td>25%</td>
</tr>
<tr>
<td>Good</td>
<td>47%</td>
<td>11%</td>
</tr>
<tr>
<td>Fair/Poor</td>
<td>1%</td>
<td>13%</td>
</tr>
</tbody>
</table>
3b) CAMPAIGN TO REVITALIZE ACADEMIC MEDICINE
GOALS OF THE PROJECT

How should academic medicine look in the 21st century?

How can we increase the impact of academic medicine on the rest of medicine and on health and healthcare?

How should academic medicine be positioned internationally within medicine and also in the wider intellectual arena?

How can recruitment to and job satisfaction of those working in academic medicine be increased?

Tugwell - Heart 2004; 90:833
## CNIC - Mission & Vision

### Cardiovascular

<table>
<thead>
<tr>
<th>Heart Failure</th>
<th>Hyper tension</th>
<th>CAD</th>
<th>Arrhythmias</th>
<th>Structural Heart Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular Developmental Biology</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Regenerative Cardiology</td>
<td></td>
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<tr>
<td>Vascular Biology and Inflammation</td>
<td></td>
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<tr>
<td><strong>Cardiovascular Epidemiology and Population Genetics</strong></td>
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<td></td>
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<tr>
<td>Atherothrombosis and Imaging</td>
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</tbody>
</table>

### Intramural & Extramural