Developing a Formalized Cardio-Oncology Fellowship and Educational Curriculum

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Disclosures

- I do not have a magic formula about how to build a cardio-oncology fellowship
- I have used my personal experience in cardio-oncology about how a fellowship may look like
- This year, I created a local GME approved fellowship in cardio-oncology at Vanderbilt
- I learn from my mistakes and our cardio-oncology fellowship is constantly evolving
Personal Perspective

• How did I get into cardio-oncology?
• How did I end up at Vanderbilt?
“You are only as good as your options; no more, no less…”
From: Thomas Force
<thomas.force@ten
Date: Friday, September 2013 at 3:25 PM
To: Javid Moslehi
<jmoslehi@partners

Burning Man- talked to him today and told him pending the details, definitely is not going. This could be fun (up to you). Good weekend. Call you want to talk.

Tom
Vanderbilt Cardio-Oncology Program

Clinical Program
Heart Failure
JoAnn Lindenfeld
Thomas Wang
Lynne Stevenson

Genetics
Quinn Wells
Dan Roden

Arrhythmia/EP
Bill Stevenson
Greg Michaud
Roy John

Cardiac Surgery
Ash Shah

Vascular Medicine
Josh Beckman
Esther Kim
Aaron Aday

Translational Core Lab
Yan-Ru Su

Javid Moslehi
David Slosky
Allen Naftilan
Hank Jennings
Eiman Jahangir

Education
Vanderbilt Cardio-Oncology Fellowship

Basic Research Program
Moslehi Laboratory
Donald Okoye
Melissa Moey
Ali Manouchehri
Mary Barber

Translational Research
Thomas Wang
Quinn Wells
Dan Roden

Vascular Biology
David Harrison
Jon Brown
Hind Lal

iPS/Zebrafish
Chaz Hong
Jason Becker
Bjorn Knollmann
Consensus Statement

Cardio-Oncology Training: A Proposal From the International Cardiioncology Society and Canadian Cardiac Oncology Network for a New Multidisciplinary Specialty

How to Develop a Cardio-oncology Fellowship

Michelle N. Johnson, MD, MPH,*, Richard Steingart, MD, Joseph Carver, MD

Fellows-in-Training & Early Career Page

Cardio-Oncology for GenNext

A Missing Piece of the Training Puzzle

Sarju Ganatra, MD, Salim S. Hayek, MD
Cardio-Oncology: Perspectives

- Cardio-oncology as a field is constantly evolving. New drugs, new toxicities, new presentations.
Anthracyclines
Radiation
Heart Failure
CAD
HER2 Targeted Therapies
Cardiomyopathy

Anti-metabolites (5FU)
Ischemia
Vasospasm

VEGF Inhibitors
Hypertension
Heart Failure
Thrombosis

CML TKIs
Imatinib: ?protective
Dasatinib/Nilotinib/
Bosutinib/Ponatinib:
PAH/Vascular/
Atherosclerosis

Anthracyclines
Radiation
Heart Failure
CAD
HER2 Targeted Therapies
Cardiomyopathy

MEK/RAF TKI
Cardiomyopathy

Drugs Affecting UPS
Immunomodulators (IMiDs): thrombosis
Proteasome inhibitors (e.g. bortezomib, carfilzomib): vascular

Cancer
Immunotherapies
Myocarditis, vasculitis
Cancer Survivorship

Anti-metabolites (5FU)
Ischemia
Vasospasm

PI3K Inhibitors
Hypertension
Heart Failure
Thrombosis

CML TKIs
Imatinib: protective
Dasatinib/Nilotinib/Bosutinib/Ponatinib:
PAH/Vascular/Atherosclerosis

HDAC inhibitors
Arrhythmia

PI3K Inhibitors
Hyperglycemia
Metabolic
Myocardial/Arrhythmia

BTK Inhibitors
Ibrututinib:
Arrhythmia/Atrial Fibrillation

World of Cardio-Oncology

Shared Common Risk Factors

- Genetic predispositions
- Cigarette smoking
- Obesity
- Hyperlipidemia
- Sedentary lifestyle
- Diabetes
- Aging

Cardio-Oncology (Intersection between cancer and cardiovascular disease)

Development of cancer and cardiovascular disease

Cancer Treatment
- Radiation
- Traditional chemotherapies
- Targeted cancer therapies
- Other novel cancer therapies

Cardiovascular Involvement from Tumor
- Cardiac amyloidosis from plasma cell dyscrasia
- Cardiac metastasis
- Carcinoid heart disease from carcinoid tumors

Cardiac Tumors
- Myxoma
- Lipoma
- Papillary fibroelastoma
- Rhabdomyoma, sarcoma

Cancer cell death

Vascular Toxicities
- Hypertension
- Venous and arterial thromboembolic events
- Peripheral arterial disease
- Pulmonary hypertension
- Vasospasm
- Proteinuria
- Accelerated atherosclerosis
- Metabolic derangements

Cardiac Toxicities
- Decline in left ventricular ejection fraction (LVEF)
- Congestive heart failure
- Arrhythmia
- Myocarditis
- Pericardial disease
- Pericardial effusion

Prevention Strategies (ABCDE Approach)

A
Awareness Assessment
Aspirin

B
Blood pressure control

C
Cholesterol lowering
Cigarette cessation

D
Diets
Dose of chemotherapy
Diabetes management

E
Exercise, Echocardiogram

Moslehi. NEJM. 2016.
Cardio-Oncology: Perspectives

• Cardio-oncology as a field is constantly evolving. New drugs, new toxicities, new presentations.
• We (as cardio-oncologists) have to evolve with the field.
• You have to bring something unique as a clinician
  – Have to do more than prescribe ACEi and BB, do strain
  – Have to get more specific
    • ”Anything with –ab and -ib is not good”
    • “TKI-induced cardiomyopathy”
Grounding Cardio-Oncology in Basic and Clinical Science

The development of cardio-oncology as a clinical field has been driven by improved therapeutics resulting in a dramatic increase in the number of cancer survivors (~15 500 000 in the United States alone) many of whom experience cardiovascular complications related to their cancer treatments. Both traditional...
Vanderbilt Cardio-Oncology Program

Adapted from Bellinger…Moslehi, *Circulation*. 2015.
Vanderbilt Cardio-Oncology Program

Adapted from Bellinger…Moslehi, *Circulation*. 2015.
What to Include in a Curriculum?

- Outpatient cardio-oncology clinic
  - Half day per week
  - VAMP clinic (Vanderbilt Amyloid Multi-disciplinary clinic)

- Rotating oncology clinics
  - Half day per week

- Inpatient cardio-oncology
  - Interesting cases

- Research
  - Clinical, basic
May 16, 2017

Javid J. Moslehi, MD
Program Director, Cardio-Oncology Fellowship Training Program
383 PRB
Nashville, TN 37232

Dear Dr. Moslehi:

Acting upon the recommendation of the Graduate Medical Education Committee, I am happy to inform you that I support the creation of the Cardio-Oncology Fellowship Training Program for one (1) fellow per year in this one-year fellowship program. It is my understanding that the funding source for this expansion will be the Division of Cardiology, through T-32 funding and supplemented by funding from the Division of Cardiology. Please note that anyone accepted into this program must qualify to be on the T-32 grant, and it may not be possible to accept international graduates into this program if they are unable to be placed on the T-32 grant.

Please note that there will be no hospital support or other transfer money available now or in the future to support this program.
JOINT CARDIO-ONCOLOGY AND HEMATOLOGY CONFERENCE

WEDNESDAY, JUNE 27, 2018
7:30 AM @ PRB 898J

“A Pathophysiologically-Driven Approach to Managing Thrombosis in Cancer Patients”

Gregory Piazza, MD
Assistant Professor, Harvard Medical School
Staff Physician, Brigham and Women’s Hospital
Cardio-Oncology: Perspectives

• Growing number of patients

• Cardio-oncology is really hot!
  – Growing number of patients

• Everyone wants in on it (every cardiology chief and practice head)
  – However, many see cardio-oncology as a means to increase RVUs…$$$ 

• What we should teach fellows

• How to negotiate your first “package”

• What we should teach our fellows (beyond clinical skills) is how become leaders and help advance the field

• HOW TO INNOVATE
Vanderbilt Cardio-Oncology Fellows (2018-2019)

Joe-Elie Salem, M.D.
Faculty in cardiology and clinical pharmacology, Sorbonne University

Funding: Grant

Research Focus: Basic – Moslehi and Roden Laboratories

Weijuan Li, M.D.
Completing cardiology fellowship at Vanderbilt

Funding: 3rd year

Research Focus: Cardio-Oncology in the community

Wouter Meijers, M.D.
Cardiology Fellow at Groningen (Netherlands)

Funding: Grant

Research Focus: Mouse models of ICI-associated cardiotoxicity
Sex Hormones and Electrophysiological Disturbances

Circulation

RESEARCH LETTER

Hypogonadism as a Reversible Cause of Torsades de Pointes in Men

Increased long QT and torsade de pointes reporting on tamoxifen compared with aromatase inhibitors

Virginie Grouthier,1 Benedicte Lebrun-Vignes,2 Andrew M Glazer,3 Philippe Touraine,1 Christian Funck-Brentano,2 Antoine Pariente,4 Carine Courtillot,1 Anne Bachelot,1 Dan M Roden,3 Javid J Moslehi,3 Joe-Elie Salem2,3
the link between
CANCER
and
CARDIOVASCULAR DISEASE
Step 2

Adding new Record ID 62

Record ID: 62

Patient Information

Institution: [blank]

Patients Initials: [blank]

Date of Birth: [blank]

Sex: Male, Female

Race: [blank]

Baseline Cardiac Risks

Total Cholesterol: [blank]

Triglycerides (TG): [blank]

LDL: [blank]

HDL: [blank]

BMI: [blank]

For the below questions select YES if patient currently has or has had condition:

Tobacco history: [Yes, No]

Diabetes: [Yes, No]

Hypertension: [Yes, No]

Coronary artery disease (CAD): [Yes, No]

Stroke: [Yes, No]
Heart Failure Stimulates Tumor Growth by Circulating Factors
Generation of Mouse Models for ICI-Associated Pericarditis and Vasculitis

Vanderbilt Cardio-Oncology Program
Moslehi Laboratory
FELLOWSHIPS & RESEARCH AWARDS
or
SHOW ME THE MONEY!!

Cardiology Fellows Research Report, 12/9/05
Thomas Michel, M.D., Ph.D.

How do I identify a research topic and mentor?

Why get a fellowship grant?

How do I choose which grants to apply for?

Will I be successful?

How do I make the transition to independence?
Conclusions

• We clearly need some sort of qualification for cardio-oncology
  – We have to go beyond systolic heart failure, beyond anthracyclines and trastuzumab and beyond imaging

• We have written a curriculum for how a 6 month/1 year cardio-oncology fellowship would look like
  – Have to be cardiology trained
  – …and want to help advance the field

• We are learning from our experience
Vanderbilt Cardio-Oncology Program

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Education
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Vascular Biology
David Harrison
Jon Brown
Hind Lal

iPS/Zebrafish
Chaz Hong
Jason Becker
Bjorn Knollmann
Hi Javid,
Great to see you as well! Congratulations on authoring such a fantastic manuscript for NEJM; hopefully this sort of high-impact exposure will help to continue to elevate the field.

I think, then, that the best way of doing this, would be to try to come up with some sort of certificate\(^2\) program, in which a time period well less than a year (maybe 3 months) was required, and could be done during one\(^1\)s regular Cardiology fellowship (i.e. in 3\(^{rd}\) year). There would have to be a formal list of what kind of a curriculum/training experiences were required, and a process for a program which wished to offer it to be certified\(^1\). Again, a huge undertaking, though not nearly as huge as what I think would be an ill-fated attempt to go down the ABIM-certification route. Other important considerations would be whether or not to include amyloidosis in such an effort (I would think yes, but it opens up another can of worms).
Disclosures

• Consultation (Paid)
  – Novartis, Pfizer, Bristol-Myers Squibb, Takeda/Millennium, Ariad, Acceleron, Vertex, Incyte, Rgenix, Verastem, Pharmacyclics, StemCentRx, Heat Biologics, Daiichi Sankyo, Regeneron, Myokardia, Redux

• Consultation (Not Paid)
  – AbbVie/Abbott, Janssen/J&J, Amgen, Deciphera
  – U.S. Federal and Drug Administration (FDA)

• Research Grants
  – Pfizer, Bristol-Myers Squibb

• Equity
  – Redux