Novel Modality and Approach for Early Cardiovascular Disease Risk Assessment: update 2018

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M. El Shahawy, MD, MS,
FACP, FESC, FSCCT, FASH,FASPC FACC, FAHA,
President International Society for CVD Prevention [ISCVP]

Clinical Professor of Medicine Universities of Florida and South Florida
Medical Director Cardiovascular Health Assessment Center and President Cardiovascular Center of Sarasota, Sarasota, Florida, USA

SARASOTA MEMORIAL HOSPITAL

Over 800 Beds
Over 800 Physicians on Staff
4000 Employees
20th Largest Public Hospital in US
27,000 Admissions per year
3 Time Magnet Nursing Status
Number One Ranking for MI Care
You are more than welcome to visit our hospital in Sarasota, Florida

Disclosure of financial relationships:

M. El Shahawy, MD, MS, FESC, FACC, FAHA

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Faculty member CME: Expert exchange and NACE

Major stock shareholder: None
The first symptom of asymptomatic atherosclerosis is a sudden cardiac death or acute MI in:

A. 20 %  
B. 40%  
C. 50 %
QUESTION #2

Our body is a giant network of vessels:
A. Over 20,000 miles and 50% of it is microvascular and barely visible.
B. Over 40,000 miles and 70% is microvascular and barely visible
C. Over 60,000 miles and 99.99% of it is microvascular and barely visible

QUESTION #3

The micro vessels function very similarly and their endothelial function is the most important part of the vascular health.
A. True
B. False
QUESTION #4

Most Doctors don’t realize that our body is a giant network of micro vessels

A. True
B. False

QUESTION #5

Which risk factor scoring system will you choose for your own CV risk assessment?

A. Scoring system based on Screen for Risk Factors of Atherosclerosis and Treat Risk Factors of Atherosclerosis based on statistical data
   OR
B. Scoring system based on Screen for Atherosclerosis (the Disease) Regardless of Risk Factors and Treat based on the Severity of the Disease and its Risk Factors
Learning Objectives
Emphasize that Atherosclerosis is:
• Very Prevalent Silent Disease and starts in Childhood
• About 60% of the asymptomatic study population had Polyvascular atherosclerosis
• The importance of early screening and detection of asymptomatic CV disease
Familiarize with new tools used at our Center for early screening and detection of CVD

Why there is a need for New CVD Risk Scoring System
In >50% of victims, the first symptom of asymptomatic atherosclerosis is a sudden cardiac death or acute MI.
The real problem:
Not knowing the risk

Traditional Risk Factors Miss the Majority of High Risk Patients

Akosah et al. JACC 2003:41 1475-9

~50% Apparently Healthy People (New)
~50% CHD Patients (Recurring)

Tools available for CVD risk assessment are numerous
We need data! Evidence Based
How To Assess CV Risk?

1. The old CV scoring System [FRS]
2. SCORE - European Risk Score
3. ACC/AHA Scoring system
4. The new CV scoring System [RRS] for early detection of CVD

Sometimes You Do not need Risk Score Calculator To Recognize high risk Patient
Classical example for high Risk for CVD:
Framingham Risk Score for CVD Risk Assessment

Framingham Risk: 10-year risk of coronary event

- Age
- Gender
- Total cholesterol
- HDL cholesterol
- Systolic blood pressure
- Smoking
New ACC/AHA Risk score[2013]

Same Risk factors like Framingham

Plus

RACE and DIABETES

The new ACC/AHA Guidelines are still not optimal because the recommendation is based on epidemiological cut off points not personalized structural and physiological assessment.
Why is the need for new early CVD risk scoring system?

- Given the limitation of current risk assessment methods such as FRS and the recent awareness about the importance of the endothelial dysfunction in the pathogenesis of atherosclerosis, a great deal of research has focused on the need for more sensitive and specific methods for early detection of CVD.

[from Risk Factors To Risk Markers]

- This have been the guiding principle for the development of the Early CVD Risk Scoring System [ECVDRS], which has been utilized at our CVDA Center since April 2008.

Most Doctors don’t realize that our body is a giant network of vessels (OVER 60,000 MILES) and 99.99% of it is microvascular and barely visible.

These micro vessels function very similarly and their endothelial function is the most important part of the vascular health.
Time to move beyond Global Risk factor assessment to personalized identification of Early functional and structural abnormalities
This novel approach will result in better CV risk stratification and initiation of appropriate therapeutic strategy.

Novel Method for early CVD Risk Assessment

Screening Tests for Early Detection And Determination of Cardiovascular Risk Category

Early CVD Risk Score also known as Rasmussen risk score [RRS]
What are the Components of this Novel System for Early Detection and Determination of Cardiovascular Risk Category?

[Early CVD Risk Score]

Screening Tests for Early Detection And Determination of Cardiovascular Risk Category Include Tests for:

1. Vascular Evaluation
2. Cardiac Evaluation
3. Modifiable Disease Contributors
1. Vascular Evaluation:

- Arterial Elasticity (Pulse Contour Analysis)
  - Large Artery (C₁)
  - Small Artery (C2)
- Rest & exercise BP (3-min treadmill at 2.3ml/hr & 7% elevation)
- Carotid Intima-Media Thickness [CIMT] and AAA
- Retinal digital photography
- Urine for micro albumin/creatinine ratio

2. Cardiac Evaluation

- Electrocardiogram
- Cardiac ultrasound (LVID, LVWT, LV mass)
- Plasma pro BNP (Biosite)
3. Modifiable Disease Contributors

- Fasting lipids (TC, HDL, NHDL, LDL, Trig)
- Fasting blood sugar
- hsCRP
- BMI and Waist measurement
- Detailed HX of total Life Style including Nutrition, Exercise, Smoking, and FHX

### Early CVD Risk score

Rasmussen Risk Score (RRS)

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Normal</th>
<th>Borderline</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resting Blood Pressure</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Exercise Blood Pressure</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Large Artery Elasticity ($C_1$)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Small Artery Elasticity ($C_2$)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Carotid IMT</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Retinal Vasculature</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Microalbuminuria</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Electrocardiogram</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>LV Ultrasound</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>BNP</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>0-20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Categories of Risk by Early CVD Risk Score

LOW ....................... <3
MEDIUM .................... 3-5
HIGH ........................ >5

Predictive Value of early CVR Disease Score for CVD Events

Duprez et al. JASH 2011; 5: 401-409
How to check for Arterial Elasticity (Pulse Contour Analysis)???

Simple, Non-Invasive, FDA-Cleared Instrument
CIMT *

CIMT can add incremental value to CVD risk prediction. In meta analysis of 8 observational studies, 37,197 pts followed for 5.5 years, future risk for MI and stroke were increased by 10% and 13% respectively per an absolute CIMT difference of 0.1mm.

CIMT increases with age. In one study CIMT ranged from:
- for age 45: 0.73 to 0.90 mm
- age 55: 0.9 to 1.06 mm
- age 65: 1.04 to 1.37 mm

Depending upon gender and race

*CIMT=Carotid intima media thickness
Prevalence, Impact, and Predictive Value of Detecting Subclinical Coronary and Carotid Atherosclerosis in Asymptomatic Adults

The BioImage Study

Usman Baber, MD, MS,• Roxana Mehran, MD,• Samantha Sartori, Ph.D,• Mikkel Malby Schoos, MD, Ph.D,• Henrik Stilesen, MD, DMSc,• Pieter Muntendam, MD,• Mario J. Garcia, MD,• John Gregson, Ph.D,• Stuart Pocock, Ph.D,• Erling Falk, MD, DMSc,• Valentin Fuster, MD, Ph.D

Why early screening for CVD risk stratification with more accurate risk score method must be mandated by those who care about our health ???
Examples in Detail of studies done at our CV Health Assessment Center, Sarasota, Florida

Utilizing ECVDRS as compared to FRS
METHODS:
For the purpose of this study we evaluated 666 consecutive female patients, who presented to our Center for Cardiovascular Disease (CVD) risk evaluation, all asymptomatic, age from 26 to 86, the majority of them were self referred. An ECVDRS and FRS were calculated for each patient.

Results:
All female patients were stratified as low risk by FRS. But the majority were found to be intermediate to high risk by Early Cardiovascular disease risk Scoring system [ECVDA]
Results:

436 (65%) untreated
230 (35%) treated

208 (48%) Low Risk by ECVDRS
14 (7%) Abnormal Elasticity
8 (4%) Abnormal CIMT
0 Elevated BNP
50 (24%) Elevated CRP

147 (34%) Intermediate Risk By ECVDRS
69 (47%) Abnormal Elasticity
33 (22%) Abnormal CIMT
2 (1%) Elevated BNP
48 (33%) Elevated CRP

81 (18%) High Risk By ECVDRS
70 (86%) Abnormal Elasticity
35 (43%) Abnormal CIMT
10 (12%) Elevated BNP
36 (44%) Elevated CRP

Conclusions Regarding CVD risk Assessment in Female

I. Abnormal vascular elasticity and CIMT are a powerful tools for early CVD risk assessment in asymptomatic, untreated patients

II. Early Identification of those early intermediate and high risk patients will justify initiation of treatment to prevent or delay the onset of morbid events

III. Early CVD prevention program for women should be remanded as life saving test as done with mammography.

(More women die from CVD than from Breast Cancer)
Examples in Detail of studies done at our CV Health Assessment Center, Sarasota, Florida

Utilizing ECVDRS as compared to ACC/AHA

Presented at the annual meeting of Europrevent in Lisbon May 2015 & ASH annual Meeting 2015
Examples in Detail of studies done at our CV Health Assessment Center, Sarasota, Florida

Utilizing ECVDRS in Asymptomatic obese subjects as compared to FRS

Obesity is disease

Presented at the annual meeting of Europrevent in Malaga/Spain April 2017
Decades of obesity even without comorbidities in asymptomatic subjects is associated with significant cardiovascular structural and functional abnormalities

Presented at the annual meeting of the European congress of cardiology/Euro prevent
On April 6/2017
Malaga/ Spain

Conclusions:

• Early atherosclerotic CV disease is very prevalent but still not recognized early enough to delay or avert the onset of cardiovascular morbid events.
• Sub clinical Atherosclerosis is silent killer

• It is time that Early CVD prevention program to be recommended by healthcare authorities as done with mammography and colonoscopy.
Key Points

• **Almost most CVD are preventable but not curable**

• Cutting edge Tools are now available for early detection of CVD

• Early assessment and management of CV risk are essential

• One ounce of early CVD prevention is better than pounds of late cure

Take home Messages
TAKE HOME MESSAGE

Traditional cardiovascular risk factors for early detection and risk stratification for CVD are not reliable

TAKE HOME MESSAGE #2

Early cardiovascular functional and Structural abnormalities i.e. C2, CIMT and Abnormal rise in BP are prevalent even in asymptomatic subjects without co-morbidities
TAKE HOME MESSAGE

# 3

Early CV/Stroke risk markers destined to progress can now be early recognized by Novel non-invasive testing

TAKE HOME MESSAGE

# 4

EARLY therapy aimed at this progression could drastically reduce CV/stroke morbid events in the 21st century and not just save your Heart and the Brain, but also reduce the cost of health care
Take Home Message  5

Medical management must shift its emphasis from treatment of advanced disease to **Prevention of Disease Progression**

TAKE HOME MESSAGE  
# 6

One Ounce of Early CVD prevention is better than pounds of late attempts for cure
Take Home Message # 7

Remember almost most CVD are preventable but not curable

TAKE HOME MESSAGE # 8

• It is Time to give your Cardiovascular system the attention it needs by expert and dedicated team utilizing cutting edge diagnostic tools
  • [Be good to your heart !!!]
ONE OUNCE OF Early CVD PREVENTION IS BETTER THAN POUNDS OF late attempts for CURE

- All Patients must 
  undergo Global and personalized risk assessment for CVD and future 
  Cardiovascular Events to determine treatment strategy.
  Is the Patient really Low Intermediate or High Risk???
Final Advice

Optimizing the use of evidence based and personalized Medicine in early diagnosis and management of Cardiovascular Disease as recommended by our center would reduce or delay the onset of CV Disease and would Save Lives

Also keeping in mind that TLC (nutrition, exercise, cessation of smoking and weight reduction) are of paramount importance
Self Control

Walking the dog--- MS Style!
Last departing Take home Message

Our Goal and mission must be to decrease, delay or best eliminate Cardiovascular Disease

We are ALL

Preventive Health care Providers
Children Should Know Their Grandparents and Become Great Grandparents Themselves

Grand Parents should live long enough to enjoy their grand children
Children Should Know Their Grandparents and Become Great Grandparents Themselves
Grand Parents should live long enough to enjoy their grand children and grand children should grow up to know their grand parents
[December 2008]
Thank You

Improvement Never Ends . .

This material was prepared by Florida Medical Quality Assurance, Inc., under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy.

END
Possible Global Risk Assessment Tools

References

• Framingham Risk Calculator

• NCEP Risk Calculator

• Diabetes PHD

• Reynolds Risk Score
  – www.reynoldsriskscore.org/
Possible Global Risk Assessment Tools

References

• Framingham Risk Calculator

• NCEP Risk Calculator

• Diabetes PHD

• Reynolds Risk Score
  www.reynoldsriskscore.org/
Effect of Valsartan on Blood Pressure Waveform

Baseline Visit       6-months Valsartan       12-months Valsartan

Endothelial Dysfunction Leads to Imbalance of Factors Resulting in Vascular Disease

Normal Endothelium

Vascular tone
Retards platelet and leukocyte adhesion
Inhibits SMC migration/proliferation

Barrier to LDL-C
Degrades VLDL-C and triglyceride (lipase)

Vasoconstriction

Abnormal Endothelium

LDL-C    HTN    Diabetes    Smoking

Dysfunction

↑ Platelet/leukocyte adhesion
SMC migration and growth
↑ Lipid deposition
↓ Clearance

SMC=smooth muscle cell.

Carotid Intima Medial Thickness (CIMT) and Small Artery Elasticity (C2) as a powerful tool for early Cardiovascular Disease (CVD) Risk Stratification as compared with High-Sensitivity C-Reactive Protein (H-CRP) Regardless of Sex.

July 26/2010

M. El Shahawy, MD, MS, FESC, FACC, FAHA,FSCCT
Clinical Professor of Medicine University of Florida and South Florida, Medical Director Cardiovascular Disease Assessment Center Sarasota Memorial Hospital (SMH), Sarasota, Florida (Fl), USA, Miglena Entcheva, MD, Cardiovascular Disease Assessment Center SMH, Sarasota, Fl, USA, and Jay N. Cohn, MD, FACC, Clinical Professor of Medicine University of Minnesota, Minneapolis, Minnesota, USA.