Global Causes of Death

- NCDs cause 64% (35 million) of global deaths
- 80% (28 million) are in LMICs
- NCDs will cost the world $47 trillion over the next 20 years
- CVD is responsible for around one third of all deaths worldwide

2011

“The inescapable conclusion is that an epidemic of premature CV disease is developing, the brunt of which will be borne by low and middle income countries”.
“The human race has had long experience and a fine tradition in surviving adversity; we now face a task for which we have little experience, the task of surviving prosperity”

Alan Gregg (1890-1957)
Rockefeller Foundation
Modifiable Risk Factors: Prevention Opportunity

Age
Gender
Smoking
BP
Diabetes
Cholesterol

15152 MI patients in 52 countries

9 RFs accounted for 90% of MI in men and 94% in women

INTERHEART Lancet 2004
CVD Prevention Opportunity!

Genetic

Environmental

Clinical Events

Fetus 0 20 40 60 Age (yrs)
New Approach to Atherosclerosis: ‘Investing in your Arteries’

- Exposure to Risk Factors drives disease
- Early Intervention for Lifetime Risk Reduction
Most of us have arterial disease!

32 Year Old Female

Atherosclerosis (%)

0 20 40 60 80 100
<20 20-29 30-39 40-49 ≥50

Tuzcu Circ 2001 103:2075-10
CV Risk Factors in Childhood and Carotid IMT in Adults

Risk factors measured at ages 12-18yrs

No. of risk factors

- 0
- 1
- 2
- 3 or 4

Men

Women

maximum c IMT (mm)

P<0.001

P<0.001

Raitakari et al JAMA 2003;290;2277-2283
LDL Cholesterol and Coronary Heart Disease among Black Subjects by PCSK9^{142X} or PCSK9^{679X} Allele

![Bar chart showing frequency of LDL cholesterol levels in Black Subjects and percentage with Coronary Heart Disease.](chart.png)

No Nonsense Mutation (n=3278) vs. PCSK9^{142X} or PCSK9^{679X} (N=85)

**Coronary Heart Disease (%)**

- No: 88%
- Yes: 28%

*P*=0.008

*Cohen NEJM 2006; 354:1264-72*
Framingham Offspring Study

Incidence of Coronary Heart Disease

0 years
1-10 years
11-20 years

Years of Follow Up From Baseline (55)

Navar-Boggan  Circ 26th jan 2015
Hazards of Smoking and Benefits of Smoking Cessation

113,752 w and 88,496 m aged ≥25y in US

The MRC Unit for Lifelong Health and Ageing (LHA) is the home of the MRC National Survey of Health and Development (NSHD).

The NSHD, the oldest of the British birth cohort studies, is unique in having data from birth to age 65 years on the health and social circumstances of a representative sample (N=5362) of men and women.
### Benefit Even at Low Risk?

- **Statin/more**
- **Control/less**

<table>
<thead>
<tr>
<th>5-year MVE risk at baseline</th>
<th>Events (% per annum)</th>
<th>RR (CI) per 1.0 mmol/L reduction in LDL cholesterol</th>
<th>Trend test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants without vascular disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;5%</td>
<td>148 (0.35)</td>
<td>0.61 (0.45-0.81)</td>
<td></td>
</tr>
<tr>
<td>≥5% to &lt;10%</td>
<td>487 (1.02)</td>
<td>0.66 (0.57-0.77)</td>
<td></td>
</tr>
<tr>
<td>≥10% to &lt;20%</td>
<td>854 (2.52)</td>
<td>0.82 (0.72-0.93)</td>
<td>$\chi^2=9.10$</td>
</tr>
<tr>
<td>≥20% to &lt;30%</td>
<td>294 (4.40)</td>
<td>0.81 (0.65-1.01)</td>
<td>(p=0.003)</td>
</tr>
<tr>
<td>≥30%</td>
<td>121 (7.29)</td>
<td>0.83 (0.58-1.18)</td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>1904 (1.44)</td>
<td>0.75 (0.70-0.80)</td>
<td>p&lt;0.0001</td>
</tr>
</tbody>
</table>

*Cholesterol Treatment Trialists, Lancet 2012*
Opportunity for Lifetime Management of CVD

How to get the Prevention message across to our Colleagues, Patients and Public?
Disenfranchises the young, especially women!

European Heart Journal 2012; 33: 1635-1701
Non-smoking men <45yrs
All women <65yrs
<10% 10yr CHD Risk

56% of US adults (87,000,000) have low (<10%) 10yr and high lifetime (≥39%) risk

Marma Circ Cardiothoracic Qual Outcomes 2010;3:8-14

Marma Circ 2009;120:384-390
Recent CV Guidelines

USA: November 2013

UK: February 2014
56 million people
Mostly Old Men!!!
### Moderate-Intensity Statin Therapy Recommended

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elderly man</td>
<td></td>
</tr>
<tr>
<td>79yr of age</td>
<td></td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>150 mg/dl</td>
</tr>
<tr>
<td>HDL cholesterol</td>
<td>40 mg/dl</td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>120 mmHg</td>
</tr>
<tr>
<td>Not taking antihypertensive medication</td>
<td></td>
</tr>
<tr>
<td>Not diabetic</td>
<td></td>
</tr>
<tr>
<td>Nonsmoker</td>
<td></td>
</tr>
<tr>
<td>Calculated 10-yr risk of CHD or stroke</td>
<td>13.7%</td>
</tr>
</tbody>
</table>

*Kearney NEJM 2014; 370: 275-278*
### Statin Therapy Not Recommended

<table>
<thead>
<tr>
<th>Woman with hyperlipidemia and hypertension</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>46yr of age</td>
<td></td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>230 mg/dl</td>
</tr>
<tr>
<td>HDL cholesterol</td>
<td>55 mg/dl</td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>150 mmHg</td>
</tr>
<tr>
<td>Taking antihypertensive medication</td>
<td></td>
</tr>
<tr>
<td>Not diabetic</td>
<td></td>
</tr>
<tr>
<td>Nonsmoker</td>
<td></td>
</tr>
<tr>
<td>Calculated 10-yr risk of CHD or stroke</td>
<td>2.0%</td>
</tr>
</tbody>
</table>

*Kearney NEJM 2014; 370: 275-278*
Challenge of Communicating Risk and Benefit!

“What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?”
JBS3 : What’s different? “Investing in Your Arteries”

- **Personalised, lifetime** approach to CVD prevention
- New CVD risk calculator with **understandable risk metrics** linked to interventions
- Demonstrate the potential for benefits of RF lowering on a person’s risk over their lifetime.

Empower individuals to take control of their CVD health by promoting lifestyle changes, not just drugs

Heart March 2014 and www.jbs3risk.com
Your heart age is about **54**

On average, expect to survive to age 70 free of heart attack or stroke gaining 3.7 years through interventions

Expected heart attack or stroke free years remaining

**Interventions**

- **Systolic Blood Pressure**
  - Current: 160
  - Improved to: 160

- **Cholesterol Ratio:**
  - Current: 5.60
  - Improved to: 5.6

- **Weight (Kg):**
  - Current: 94.0
  - Improved to: 94

- **Future smoking category:**
  - Improved to: Quit smoking

---

**New UK JBS3 Lifetime Risk Calculator**
JBS3: Start of a new Process

- Changes interactions with patients
- Personalised approach
- Empowers lifestyle
- Not just a statin conversation!
Implementation and Evaluation challenges!

Health Checks

- Understanding
- Behaviour
- Risk factors
- CV events

JBS3
Lifetime CVD Risk Management

Check your heart age

Before you go for your NHS Health Check, you can use this pre-screen tool to get an idea of what your results might show.

Start

Your results

Your heart age is about 47

Compared to a person of the same age, gender and ethnicity without raised risk factors.

- You have a 4.8% risk of having a heart attack or stroke in the next 10 years.
- This means the chance of either of these things happening is low.

Your heart age is higher than your actual age. However, changes to your diet and lifestyle can help lower it.

What affects your heart age?

- Smoking: I smoke 20+ a day

  Stopping smoking is the single biggest change you can make for your health. One year after stopping, your heart attack risk is half that of a smoker.

  You don’t have to go cold turkey alone. There is a wealth of information and support to help you stop.

Get help with quitting

- Blood pressure: 135 Pre-high

  Your blood pressure is described as being pre-high and ideally, it should be below 120/80mmHg. Known as the “silent killer”, high blood pressure rarely has obvious symptoms but left untreated, it increases your risk of heart attack or stroke.

  The good news is, it can be brought under control through lifestyle changes such as losing weight, reducing the amount of salt you eat, exercising regularly and cutting down on alcohol and cigarettes.

Launched on March 2015

Full terms and conditions can be read here

JBS3

ClinRisk
Heart Age NHS Calculator: 08/03/15-15/03/15

Total starts: 1,122,874        Total completes: 461,400
Lifetime CVD Risk Management

Brain age and brain ageing!
Mid Life CV RFs and Dementia

8845 HMO patients
Age 40-43 yrs

Risk Factors

CV composite Score

Hazard Factor

Hypertension
Diabetes
High Cholesterol
Smoking

1
2
3
4

Whitmer Neurology 2005; 64: 277-281
National initiative for preventible dementia based on CV risk factor reduction

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Value 1</th>
<th>Value 2</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Female</td>
<td>N/A</td>
</tr>
<tr>
<td>Age</td>
<td>58 years</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>180 mg/dL</td>
<td>180</td>
<td>0%</td>
</tr>
<tr>
<td>HDL cholesterol</td>
<td>45 mg/dL</td>
<td>45</td>
<td>0%</td>
</tr>
<tr>
<td>BP treatment</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Systolic BP</td>
<td>125 mmHg</td>
<td>125</td>
<td>0%</td>
</tr>
<tr>
<td>Smoking</td>
<td>Yes</td>
<td>No</td>
<td>0%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Our cognitive abilities decline as we get older, with the rate of decline accelerating as we age. Some of this decline can be attributed to vascular risk factors.
How early should prevention start?
Familial Hypercholesterolaemia

IMT difference between FH and sibs against age

Δ IMT (mm) FH v. siblings

Age (years)
**AdDIT:** intervention in adolescent diabetes: ACR and cIMT

<table>
<thead>
<tr>
<th>Statin arm</th>
<th>ACE inhibitor arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>atorvastatin</td>
<td>atorvastatin</td>
</tr>
<tr>
<td>quinapril 125</td>
<td>placebo 125</td>
</tr>
<tr>
<td>placebo 125</td>
<td>placebo 125</td>
</tr>
</tbody>
</table>

[Images of children and logos of JDRF, British Heart Foundation, and Diabetes UK]
Target Smoking and Obesity in the Young
Childhood Adiposity, Adult Adiposity, and Cardiovascular Risk Factors

**BACKGROUND**

Obesity in childhood is associated with increased cardiovascular risk. It is uncertain whether this risk is attenuated in persons who are overweight or obese as children but not obese as adults.

Persons who were overweight or obese during childhood but were nonobese as adults had risks of the outcomes that were similar to those of persons who had a normal BMI consistently from childhood to adulthood (P>0.20 for all comparisons).
CV Risk Reduction: what will work?

- Individual approaches
- Population approaches
- Legislation
Diet and Exercise on Vascular Function in the Young

Detraining after 6 weeks

Continued training

Woo Circ 2004 109 1981-86
Who is responsible for our health?
Child?
Parents?
Government?
Doctors?
Sugar, rum and tobacco are commodities which are nowhere necessaries of life, which are become objects of almost universal consumption, and which are therefore extremely proper subjects of taxation.

*Adam Smith, The Wealth of Nations, 1776*
The performance of the UK in terms of premature mortality

......further progress will require improved public health, prevention, early intervention and treatment activities......and deserves an integrated and strategic response
“It should be the function of medicine to have people die young as late as possible”

Ernest L. Wynder M.D.