Smoking and CVD

...what role for the Cardiologist?

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Consultant Cardiologist
Whipps Cross/BartsHealth NHS Trusts Hospitals, London, UK
### Post-MI setting

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Risk Reduction (%)</th>
<th>Event Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Asp/Clop 25</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>B-Blockers</td>
<td>25</td>
<td>4.5</td>
</tr>
<tr>
<td>Statins</td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>ACEI</td>
<td>25</td>
<td>2.3</td>
</tr>
</tbody>
</table>

- Stopping smoking, ↓36%
Effects of smoking cessation in secondary prevention

Meta analysis of 20 studies (1978 to 2000)
- 12,603 smokers with coronary heart disease
- Follow-up: 3 to 7 years

<table>
<thead>
<tr>
<th></th>
<th>Sustained quitters</th>
<th>Continuing smokers</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>5,659</td>
<td>6,944</td>
</tr>
<tr>
<td>1,044 deaths</td>
<td>1,884 deaths</td>
<td></td>
</tr>
<tr>
<td>RR = 0.64</td>
<td>(CI 95%, 0.58 – 0.71)</td>
<td></td>
</tr>
<tr>
<td>Deaths - 36%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non fatal myocardial reinfarction: - 32%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR = 0.68</td>
<td>(CI 95%, 0.57 - 0.82)</td>
<td></td>
</tr>
</tbody>
</table>

HEALING THE HEART

Why HEART DISEASE is becoming an Asian epidemic, and what you can do to protect yourself

May 2004
65% of the world’s smokers live in 10 countries
The young

- Every day 80,000 to 100,000 youths become regular smokers
- One-fifth of young people begin before they are ten years old
- High exposure to secondhand smoke
- Predicted to kill 250 million children and adolescents alive today

Tobacco Is a Risk Factor for 6 of the World’s 8 Leading Causes of Death

Hatched areas indicate proportions of deaths related to tobacco use.
News Update

Government released the 2015 Hong Kong Smoking Prevalence

2016.02.04

According to the Thematic Household Survey Report No. 59 released by Census and Statistics Department on 4 February 2016, the daily cigarette smoking prevalence of Hong Kong (aged 15 or above) was dropped to 10.5% in 2015 which equivalent to around 641,300 daily cigarette smokers. It is the lowest rate recorded since 1982. The smoking prevalence of male and female daily cigarette smokers were 18.6% and 3.2% respectively.
SMOKING: EFFECT ON CORONARY ARTERY DISEASE


**Progression of existing lesions after 2 years**
- Non-smokers: 37%
- Current smokers: 57%
  - p=0.002

**Formation of new lesions after 2 years**
- Non-smokers: 20%
- Current smokers: 36%
  - p=0.007
Effects of smoking cessation in secondary prevention

After CABG
Risk of reoperation x 2.5 at 1 year for non quitters\(^1\)

After angioplasty
Risk of mortality x 1.4 at 4.5 years for non quitters\(^2\)

Smoking: a particular risk factor

6,448 patients with STEMI

The prevalence of smoking is very important in myocardial infarction under 50 years

....with the same prevalence among men and women

% of smokers by age and gender

Worldwide burden of disease from exposure to second-hand smoke: a retrospective analysis of data from 192 countries

- Second-hand smoke = 603,000 deaths worldwide
- Nearly 2/3 of these deaths are caused by ischaemic heart disease in adult non-smokers

| Condition                                      | Patients 
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower respiratory infections in children &lt;5 years</td>
<td>165,000</td>
</tr>
<tr>
<td>Otitis media in children &lt;3 years</td>
<td>71</td>
</tr>
<tr>
<td>Asthma in children &lt;15 years</td>
<td>1,150</td>
</tr>
<tr>
<td>Asthma in adults</td>
<td>35,800</td>
</tr>
<tr>
<td>Lung cancer in adults</td>
<td>21,400</td>
</tr>
<tr>
<td>Ischaemic heart disease in adults</td>
<td>379,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>603,000</strong></td>
</tr>
</tbody>
</table>

For every one cigarette smoked you will lose 11 minutes of life
Q: How many cigarettes needed to cause a heart attack?
Just one cigarette is enough to trigger a heart attack, says U.S. Chief Surgeon

By CLAIRE BATES
Last updated at 4:34 PM on 9th December 2010
Q: How quickly does a cigarette cause harm?
Smoking 'causes damage in minutes', US experts claim

Smoking damages the body in minutes rather than years, according to research in the US.

The report, published in Chemical Research in Toxicology, shows that chemicals which cause cancer form rapidly after smoking.

Scientists involved in the small-scale study described the results as a stark warning to people considering smoking.

Anti-smoking charity Ash described the research as "chilling" and as a warning that it is ne...
Q: How does a cigarette cause harm?
CIGARETTE SMOKE

Nicotine
- Sympathetic Stimulation
  - Increase Myocardial oxygen demand
- Coronary Vasconstriction
  - Decrease oxygen availability
- Increase HR, BP

Carbon Monoxide

Oxidant Gases
- Decrease oxygen availability
- Free Radicals from Smoke
- Endogenous Activation of Free Radicals

Other Toxic Chemicals
- ↑ Cytokines-Inflammation
- Endothelial Dysfunction
- Insulin Resistance
- Prothrombotic State

Oxidative Stress
- Decreased NO Production
- Platelet Activation / Prothrombotic factors

MYOCARDIAL ISCHEMA / ACUTE CORONARY SYNDROME

DEVELOPMENT AND PROGRESSION OF ATHEROTHROMBOSIS

Geneic factors
Q: How long does it take to quit smoking?
Trying to quit smoking? It will take you FIVE years and seven attempts

By DAILY MAIL REPORTER
Last updated at 12:04 PM on 25th January 2011
Q: What CV benefits with smoking cessation?
CARDIOVASCULAR BENEFITS OF SMOKING CESSION

Short-term benefits

↑ HDL; decreased LDL
↓ Arterial pressure
↓ Heart rate

Improved arterial compliance

↓ Risk of arrhythmic death after myocardial infarction (MI)
↓ Platelet volume

Long-term benefits – reduced risk of:

• Stroke
• Recurrent coronary events after MI
• Arrhythmic death after MI
• Secondary cardiovascular disease (CVD) events

The cycle of nicotine addiction

• Nicotine binding causes an increase in release of Dopamine\(^1,2\)
• Dopamine gives feelings of pleasure and calmness\(^1\)
• The smoker craves Nicotine to release more Dopamine to restore pleasure and calmness\(^1\)
• Competitive binding of Nicotine to nicotinic acetylcholinergic receptors causes prolonged activation, desensitization, and upregulation\(^2\)
• As Nicotine levels decrease, receptors revert to an open state causing hyperexcitability leading to cravings\(^1,2\)

Because CHAMPIX is bound to the receptor, it prevents the binding of nicotine.

CHAMPIX reduces the pleasurable and reinforcing effects of smoking.

Q: Is smoking cessation safe to use in Cardiac patients?
Efficacy and Safety of Varenicline for Smoking Cessation in Patients With Cardiovascular Disease
A Randomized Trial
Nancy A. Rigotti, MD; Andrew L. Pipe, CM, MD; Neal L. Benowitz, MD; Carmen Arteaga, PhD; Dahlia Garza, MD; Serena Tonstad, MD, PhD, MPH

January 2010
# Cardiovascular events and all deaths

<table>
<thead>
<tr>
<th></th>
<th>Varenicline (n = 353)</th>
<th>Placebo (n = 350)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Any adjudicated cardiovascular event</strong>*</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>26</td>
<td>7.4</td>
</tr>
<tr>
<td>Non-fatal MI</td>
<td>7</td>
<td>2.0</td>
</tr>
<tr>
<td>Need for coronary revascularization</td>
<td>8</td>
<td>2.3</td>
</tr>
<tr>
<td>Hospitalization for angina pectoris</td>
<td>8</td>
<td>2.3</td>
</tr>
<tr>
<td>Hospitalization for congestive heart failure</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td>Non-fatal stroke</td>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td>Transient ischemic attack</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td>Peripheral vascular disease (PVD)</td>
<td>5</td>
<td>1.4</td>
</tr>
<tr>
<td>New diagnosis or admission for a procedure to treat PVD</td>
<td>5</td>
<td>1.4</td>
</tr>
<tr>
<td>Death – all causes</td>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td>Cardiovascular death</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td>Non-cardiovascular death</td>
<td>1</td>
<td>0.3</td>
</tr>
</tbody>
</table>

*Reported or observed cardiovascular events or deaths from any cause were reviewed separately and adjudicated under blinded conditions by an independent event committee.

No different to placebo
Neuropsychiatric safety and efficacy of varenicline, bupropion, and nicotine patch in smokers with and without psychiatric disorders (EAGLES): a double-blind, randomised, placebo-controlled clinical trial

Prof Robert M Anthenelli, MD, Prof Neal L Benowitz, MD, Prof Robert West, PhD, Lisa St Aubin, DVM, Thomas McRae, MD, David Lawrence, PhD, John Ascher, MD, Cristina Russ, MD, Alok Krishen, MS, Prof A Eden Evins, MD

Published Online: 22 April 2016

8144 smokers
4028 non-psych; 4116 psych
16 countries, 6 continents
30th Nov 2011- 13th Jan 2015

2037 varenicline
2034 bupropion
2038 NRT
2035 placebo
Continuous Abstinence Rates (CAR)

CHAMPIX provides significantly superior abstinence rates vs. bupropion, NRT patch (NiQuitin®) and placebo in patients with or without a history of psychiatric disorders at weeks 9-12 (p<0.001) and at weeks 9-24 (p<0.005).
CHAMPIX was not associated with a significantly increased risk of NPS adverse events vs. placebo in smokers with or without a history of psychiatric disorders.†1.

<table>
<thead>
<tr>
<th>Cohort</th>
<th>CHAMPIX</th>
<th>Bupropion</th>
<th>NRT Patch (Nicotinell)</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychiatric</td>
<td>67/1026</td>
<td>68/1017</td>
<td>53/1016</td>
<td>50/1015</td>
</tr>
<tr>
<td>n= 4074</td>
<td>6.5%</td>
<td>6.7%</td>
<td>5.2%</td>
<td>4.9%</td>
</tr>
<tr>
<td>Non-Psychiatric</td>
<td>13/990</td>
<td>22/989</td>
<td>25/1006</td>
<td>24/999</td>
</tr>
<tr>
<td>n= 3984</td>
<td>1.3%</td>
<td>2.2%</td>
<td>2.5%</td>
<td>2.4%</td>
</tr>
</tbody>
</table>
Hypertensive smokers have higher cardiovascular risk despite treatment for blood pressure

Up to a 63% higher risk of vascular events in smokers vs non-smokers despite treatment with statins

Heart attack admissions fall after smoking ban

By Clare Murphy
Health reporter, BBC News

There were 1,200 fewer hospital admissions for heart attacks in England in the year after July 2007 - when the smoking ban came in, a study suggests.

The 2.4% drop was much more modest than that reported in some areas where similar bans have been introduced, but may still have saved the NHS over £8m.

Researchers said even a small reduction had "important public health benefits".
Evidence from the UK

Real Price and Consumption of Cigarettes in the UK, 1971-96

Smoking cessation
110 to 280 € per life year gained

A Brief Intervention (?)

- **Ask** ... about smoking status
- **Advise** ... to quit
- **Assess** ... willingness to quit
- **Assist** ... by offering treatment
- **Arrange** ... follow up

ABC is a reminder of what to do

A = Ask about smoking
B = Brief advice to be smokefree
C = Cessation support

Advice to quit versus offer of treatment

Potential algorithm for smoking in the cardiac setting

**Step 1: ASK**

On admission to A&E or CCU, ASK if patient is a smoker and RECORD it if they are.

This can be done by any member of the multi-disciplinary team.

**Smoker: No**

**Smoker: Yes**

*Suggestion: Use self adhesive coloured labels on the notes or patient chart to identify smoking status*

**Step 2: ADVISE**

When the patient’s condition has been stabilised, ADVISE the patient that they should stop smoking in order to reduce their risk of further CV complications. Ask if they are willing to try to stop.

**Willing: No**

**Willing: Yes**

*Ask that they think about the benefits of stopping and that they ask for help if they want to try in the future*

*Reinforce their decision and give the patient some reading material on the benefits of stopping smoking*

**Step 3: REFER and/or TREAT**

REFER the patient to a specialised clinic for smoking cessation support and/or, if appropriate, supply an initial prescription.

**Clinic in same hospital: No**

**Clinic in same hospital: Yes**

*Ask the clinic staff to visit the patient while they are in hospital*

*Write to the patient’s GP regarding their smoking status and actions that have been taken. Request GP follow up.*

What about electronic cigarettes?

...A solution that could lead to the end of tobacco?

Or

...A huge gamble that will harm health and lead young people to smoking?

Better Lung Health For All
Will e-cigarettes encourage children to start smoking?

Most UK children have heard of e-cigarettes.

In one 2015 survey by ASH:

- 13% of 11-18 year olds had tried them at least once.
- 2.4% had used them regularly (once a month or more).

Source: ASH (2015)
What are the benefits of e-cigarettes?

E-cigarettes '95% less harmful than smoking' says report

Vaping: e-cigarettes safer than smoking, says Public Health England
What are the benefits of e-cigarettes?

• Less harmful than conventional cigarettes
  – Far fewer harmful components
Are e-cigarettes safe?

**nicotine**

- Blood
  - Increased clotting tendency

- Lungs
  - Bronchospasm

- Muscular
  - Tremor
  - Pain

- Gastrointestinal
  - Nausea
  - Dry mouth
  - Dyspepsia
  - Diarrhea
  - Heartburn

- Joints
  - Pain

- Central
  - Lightheadedness
  - Headache
  - Sleep disturbances
  - Abnormal dreams
  - Irritability
  - Dizziness

- Heart
  - Increased or decreased heart rate
  - Increased blood pressure
  - Tachycardia
  - More (or less) arrhythmias
  - Coronary artery constriction

- Endocrine
  - Hyperinsulinemia
  - Insulin resistance

*Image: Mikael Häggström, from Wikipedia*
Mechanisms by which nicotine may contribute to Coronary Heart Disease

- Hyperlipididemia
- Endothelial Injury
- Platelet Activation
- Thrombosis
- Coronary Vasoconstriction
- Increased Heart Rate
- Myocardial Contractility
- Hemodynamic Stress
- Increased Circulating Catecholamines
- Arrhythmias
- Vascular Stenosis or Occlusion
- Myocardial Ischemia or Infarction
- Sudden Death

Possible
Probable
Definite

Nicotine
Sympathoadrenal Activation

Carbon Monoxide
Decreased Oxygen Transport

Benowitz, 1991
Waltham Forest Stop Smoking Service
Positive Return Form

Patient Name:  
D.O.B:  

Patient Address:  

Patient Contact No:  

Referred by (Name):  

Please tick as appropriate  

☐ Consultant  ☐ Nurse  ☐ Other (please specify)  

Based at:  
Cardiology Department  
Whipps Cross Road  
Leytonstone E11 1NR  

☐ I would like to stop smoking and I am happy for my details to be forwarded to the specialist stop smoking service  

Patients Signature:  

☐ Patient has been assessed and would like to be contacted in 3 Months  

☐ Patient has been assessed and is Not Interested in stopping smoking  

☐ Patient has been assessed and is an Ex-Smoker  

☐ Patient has been assessed and has Never Smoked  

Please send internally to: Waltham Forest Stop Smoking Service- Orchards Health Centre  
DROP BD12  
or FAX form to: 020 8276 7179 FAO Lynn Hanlon (Tel: 020 8276 7157)
Referrals to stop smoking service
Brief advice works

• You advise just one smoker every day to quit (time taken = 30 seconds)
• Over 40 days this would have taken up 20 minutes of your time, but one of those 40 people will quit long term*
• Over 1 year and you will have prompted six people to stop smoking, using about 2 hours effort from you
• Consider that by investing 2 hours of your time in that year, you’ve saved 3 of those people’s lives!