How to approach the smoker - a leaf from the cardiologist’s book

Associate Professor Robert Young
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New Zealand
Which do you respond to?

“Public Health Approach”
- Non-personalised
- Health warning
- Recommendation

“What people read”

“Personalised Approach”
- Smoker specific risk
- Personal engagement
- Outcome specific

“What people are told and what will happen if they don’t listen”
Only one way to cut lung cancer risk

Dr Robert Young says a susceptibility test for lung cancer risk is no green light for smokers

TOBACCO use and nicotine addiction are enormously important public health issues that warrant a broad-based counterattack.

Tobacco control strategies that include targeted smoking bans, public messaging and higher taxation are the cornerstone of the public health approach and have been shown to help bring smoking rates down.

However, is this public health approach the only effective way to help smokers quit and prevent premature death or prolonged disability? The answer is no.

The cornerstone of prevention of coronary heart disease, another public health issue, has been through risk assessment by the measurement of cholesterol levels prompting appropriate lifestyle change.

Through this personalised risk-based approach, rather than the broad messaging of public health (eating well and exercising regularly), mortality from coronary heart disease has been drastically reduced.

and most lethal complications (90 per cent of those with lung cancer are dead within two years after diagnosis).

The suggestion that smokers receiving a “low risk” result (score) might encourage them to continue smoking is neither supported by the scientific literature nor is it the experience of those who have trialled this or similar tests in smokers.

Such a suggestion is inaccurate on many levels. First, there is no “low risk”. The results from this test assign smokers to lung cancer risk levels of moderate, high or very high.

The Respiragene test is not just a safe test but a valuable tool in the effort to help smokers quit.

of us who help smokers quit. The scientific literature on these issues is clear — most smokers want to quit and are looking for reasons and help to do so.

The last and most compelling reason why Respiragene is not a “green light to smoking” is that our research and the scientific literature simply do not support this view.

In a randomised trial published in a peer-reviewed journal, it was found that a lung cancer risk test based on a single gene reported quit rates of over 20 per cent greater than achieved in those who were not tested for their risk of lung cancer.

Martin Johnston in his article reports the results of a pilot study by our group showing that among randomly recruited smokers who took the Respiragene test, 32 per cent of them had quit six months later.

Importantly, we found that the proportion who quit was spread across the different risk groups and “moderate risk” smokers were not discouraged from quitting. These findings are the subject of a second larger study which if confirmed, would make the Respiragene test one of the most cost-effective smoking cessation approaches. To substitute the results of research and published peer.
Lung cancer test and 6 month follow up
6 month data.

32% quit at 6 months

Changes in smoking before and after genetic testing

Before testing (n=25 smokers)
- Quit: 1
- Abstained 3+ days: 1
- Abstained 1-2 days: 1
- Abstained up to 1 day: 2
- Have cut down cigs/day: 11
- No change in smoking: 10

P<0.05

6 months after testing (n=24 smokers, 1 Died)
- Quit: 8
- Abstained 3+ days: 7
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After genetic testing changes in smoking:
- 21 (84%) greater abstinence (blue) vs 1 (4%) less abstinence (red)
- (2 unchanged (orange)
Smoking and the magnitude of the problem
Smoking and causes of death (preventable)

About 438,000 U.S. Deaths Attributable Each Year to Cigarette Smoking*

- Lung cancer: 123,800 (28%)
- Coronary heart disease: 86,800 (20%)
- Chronic lung disease: 90,600 (21%)
- Other diagnoses: 84,600
- Other cancers: 34,700
- Stroke: 17,400 (4%)

* Average annual number of deaths, 1997–2001.
Smoking and causes of death (preventable)

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Smoking → respiratory related death

About 438,000 U.S. Deaths Attributable Each Year to Cigarette Smol*--*-

- Lung cancer: 123,800
- Coronary heart disease: 86,800
- Chronic lung disease: 90,600
- Other diagnoses: 84,600
- Other cancers: 34,700
- Stroke: 17,400

49% Respiratory

* Average annual number of deaths, 1997–2001.
Smoking cessation

“Not about how long you live but about how well you live your last 10 years”

“Living independently with minimal burden on family and the health care system”
Risk assessment for CAD prevention

Cardiovascular Risk
- FHx and smoking Hx
- Blood pressure
- Fasting lipids
- Fasting glucose
- BMI
- hsCRP

End organ disease
- Exercise stress test
- Angiogram

Treatment Options – targeted to high risk individuals
- Changes in diet
- Exercise and weight control
- Cholesterol lowering drugs
- Drugs - lower BP, anti-platelet activity, vascular remodeling

Framingham score to target treatment
Mortality: CAD↓, COPD↑
Smoking and lung disease

Cigarettes

Lung Cancer

COPD/Emphysema
# Risk assessment for lung disease

## Pulmonary (Lung) Risk
- Smoking Hx
- Occupational Hx

## End organ disease
- CXR
- Spirometry (peak flow)

Wait until symptoms develop and then diagnose
- Asthma*
- Bronchitis
- COPD
- Lung cancer

## Treatment Options
- Smoking cessation
- Bronchodilators
- Inhaled corticosteroids

Symptom relief only
FEV₁ and mortality

- predicts CAD and all cause mortality
- independent of smoking status
- additive with smoking status

Young et al. ERJ 2007
Smoking – attitudes of smokers
Changes in smoking prevalence since 1950

The link between smoking and lung cancer was made public in the 1950s and 1960s.

Public health initiatives in the 1970s continued to reduce smoking rates.

Smoking prevalence has levelled out over the last 20 years.

“Knowledge and fear motivates”

Link made between smoking and lung cancer

Introduction of public health measures eg taxes, advertising bans and health warnings on cigarettes

Chest 2004;126: 1825-31
BMJ 2000; 321: 323-9
Approach to smoking cessation

Taxes
Restrict smoking in public places
Health warnings
Advertising restrictions
General advice

Public policy

Healthcare provider
Taxes
Restrict smoking in public places
Health warnings
Advertising restrictions
General advice

Non-personalised
Ask
Brief advice
Cessation
Do testing

Use tests of risk or organ damage to “personalise” advice

Spirometry to assess lung age (sign of generalised susceptibility to cardiopulmonary complications)

Take genetic susceptibility tests – risk tool to assess future risk

CT scan of the lungs to show lung damage from smoking (nodules)
Risk assessment for CAD prevention

Cardiovascular Risk
- FHx and smoking Hx
- Blood pressure
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Treatment Options – targeted to high risk individuals
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End organ disease
- Exercise stress test
- Angiogram

Framingham score to target treatment
CAD risk profiling – initiator of change

“Reality Check”

“Speed camera”

“Parking Ticket”

“Brush with death”
Smoker’s attitudes to smoking: literature review

• Smokers want to know their risk for smoking related complications (>80%)  
  Nicotine & Tobacco Research 1999; 1: 347-355

• Smokers generally under-estimate their personal risk for lung cancer (>50% of smokers with lung cancer did not think they were at risk)  
  Thorax 2009; 64: 523-531

• Smokers state fear of lung cancer as their greatest concern and that fear of future poor health motivates them to quit (older smokers)  
  Cancer 1994; 74: 2055-2061

• Recognition that risk information has inherent value to patients above that of what doctors might act on  
  » Cancer Epidemiol Biomarkers Prev 2009; 18: 1953-61
Smoking – a model for quitting
# Attitudes to smoking cessation and triggers to relapse among Chinese male smokers

Tingzhong Yang¹, K John Fisher², Fuzhong Li² and Brian G Danaher²

## Table 3: Reasons given for attempting to quit

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**Attitudes to smoking cessation and triggers to relapse among Chinese male smokers**

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Engaging smokers in smoking cessation: role of Respiragene

5As and 5Rs

- Ask
- Advise
- Assess*
- Assist
- Arrange*

- Not ready
- Ready to quit

- Relevance*
- Risks*
- Rewards*
- Roadblocks
- Repetition*
Tension = motivational tension is the level of fear and anxiety a smoker experiences that arises from the combined feeling from beliefs, past experiences and the balance of benefit over harms from continued smoking.

Trigger = “events” that alter the motivational tension to a point a smoker acts on their fears and initiates a quit attempt.

Treatment = the provision of smoking cessation services such as pharmacotherapy, counselling or referral to a specialised smoking cessation service.
Smoking cessation: Tension

Tension
Trigger
Treatment

Smoker = Benefits outweigh the harms

Motivational tension low
• fear/anxiety about smoking
• promotes quitting

Optimistic bias high
• denial about smoking risks
• promotes smoking

West R et al. BMJ 2006; 332: 458-60
Smoking cessation: the 3 Ts

Tension  
Trigger  
Treatment

Quitter = Harms outweigh the benefits

Tip the balance to achieve quitting

Optimistic bias low
• denial about smoking risks
• promotes smoking

Motivational tension high
• fear/anxiety about smoking
• promotes quitting

Personalised data of vulnerability
ie. Respiragene Test

Ex-smoker

Trigger = “Teachable moment”

“Fear is a powerful motivator” but it must be personalised
CAD risk profiling – initiator of change

“Reality Check”

“Speed camera”

“Parking Ticket”

“Brush with death”
Smoking – why people quit
Smoking cessation rate following treatment or event

Smoking cessation: triggers

- Most smokers quit using cold turkey
- For older smokers, future poor health is the most cited reason for quitting
- Developing lung cancer and COPD are the most feared complications
- Most smokers continue to smoke on the basis the benefits outweigh the harms
- Most smokers overestimate the general risk of lung cancer but underestimate their own risk (below average risk = optimistic bias)
- Smokers quit when the motivational tension favour quitting (trigger)

Young RP, et al. 2009 (PMJ)
“Triggers” to smoking cessation

• News - friend or relative with smoking related illness.
• Diagnosis – heart attack, stroke, PAD, cancer, emphysema
• Risk of poor outcome – adverse test result of risk such as elevated cholesterol, elevated blood pressure, poor lung function, elevated genetic predisposition.
Attitudes to smoking cessation and triggers to relapse among Chinese male smokers
Tingzhong Yang*1, K John Fisher2, Fuzhong Li2 and Brian G Danaher2

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Spirometry as a tool for smoking cessation

Powerful educative tool

Shown in some studies to improve quit rates compared to no lung function testing
Reduced FEV$_1$: linked to all cause mortality
Reduced FEV$_1$: linked to all cause mortality

- Low FEV1 (COPD)
  - diagnosed COPD
  - 5x ↑ Lung cancer
  - 5x ↑ heart attack
  - 2-3x ↑ stroke

- Smokers
  - Not Susceptible to Smoke (60%)

- Intermediate Smokers (20%)

Onset of symptoms
Severe disability
Death

FEV1 (% of value at age 25 years)

Age (years)
Lung Age is the chronological age at which a person’s measured pulmonary function is normal for the person’s sex and height.

It is calculated from predicted values.

Advantages

• Real-time curves
  • Flow-volume
  • Volume time

• Built in quality control

• Diagnostic interpretation

• Teachable moment for smokers
Smoking and lung disease

Cigarettes

Lung Cancer
Lung cancer risk increases with age

10 Year Mortality for Lung Cancer by Smoking Status

- Smoker-life long
- Nonsmokers
- Smokers-quit aged 50 yo
- Smokers-quit aged 60 yo
- Smokers-quit aged 70 yo

Incidence ≈ Mortality

Deaths per 100 Men

Age (Years)

25 30 35 40 45 50 55 60 65 70 75 80 85
Risk of lung cancer after quitting

Physicians 50 year prospective study – Doll et al. BMJ

Cumulative % of smokers and ex-smokers diagnosed with lung cancer after quitting at 30, 40, 50 and 60 yrs of age

Quitting age | Risk reduction
--- | ---
Never started | 0%
60 yr | 33%
50 yr | 66%
40 yr | 80%
30 yr | 95%
Never started | 95%
Lung Function and Lung Cancer

Consistently reported risk of 3-6x for lung cancer in smokers with impaired lung function

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<th>Lung cancer</th>
<th>Age</th>
<th>RR 2.8</th>
<th>↓FEV1</th>
<th>RR 6.4</th>
<th>Pk yrs</th>
<th>RR 3.1</th>
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1.8  2.2  1.4

1.8  5.3  2.4
Segmentation of Lung Function Decline

Young RP et al. ERJ 2007; 30: 616-622
Lung cancer occurs in smokers with low FEV$_1$

80% of lung cancer occurs in smokers with FEV$_1$< 90% predicted

Young RP et al. ERJ 2009; 34: 380-386
COPD prevalence is increased in lung cancer independent of age, sex and smoking history.


Young RP et al. ERJ 2009; 34: 380-386

Lung cancer develops in

6/20 with COPD (30%)
4/80 with normal lung function (5%)

Lung cancer cases

-50% have GOLD 2+ COPD
-67% have GOLD 1+ COPD
-87% have COPD ± emphysema
The main thrust of this paper is that smokers are looking for better reasons to quit than just non-personalised public health messages.

Smokers are motivated to quit by triggers that raise motivational tension and that these triggers include tests indicating future ill health.
Smoking cessation: triggers

• Most smokers quit using cold turkey

• For older smokers, future poor health is the most cited reason for quitting

• Developing lung cancer and COPD are the most feared complications

• Most smokers continue to smoke on the basis the benefits outweigh the harms

• Most smokers overestimate the general risk of lung cancer but underestimate their own risk (below average risk = optimistic bias)

• Smokers quit when the motivational tension favour quitting (trigger)

Smoking cessation

• Most smokers quit using cold turkey

• For older smokers, future poor health is the most cited reason for quitting

• Developing lung cancer and COPD are the most feared complications

• Most smokers continue to smoke on the basis the benefits outweigh the harms

• Most smokers overestimate the general risk of lung cancer but underestimate their own risk (below average risk = optimistic bias)

• Smokers quit when the motivational tension favour quitting (trigger)
Smoking cessation in usual care vs genetic testing groups

A gene-based lung cancer risk test (Respiragene) for high risk smokers: a “trigger” to smoking cessation

Dr Robert Young
BMedSc, MBChB, DPhil, FRACP, FRCP
Associate Professor of Medicine and Molecular Genetics
Department of Medicine, University of Auckland, Auckland, New Zealand
Respiragene - Lung cancer susceptibility score

- Based on an algorithm developed in COPD case-control study
- Combines genotypes from protective and susceptible genetic variants (SNPs)
- Makes no assumptions about biological pathways (simple, not hierarchical)
- Modelled on the Gail score - combines age, history of COPD, FHx of lung cancer with genes

Respiragene™ test, motivational tension and quitting

• Personalised tests of risk increase motivational tension

• Respiragene is a gene based personalised test of lung cancer susceptibility

• Respiragene is a test to engage smokers in smoking cessation and a trigger to quitting

• Respiragene does not de-motivate smokers and reminds them that they are at risk of lung cancer
Test for “engagement” and targeting

Lung cancer susceptibility score

- All smokers at some risk for lung cancer above that of non-smokers

- Factors increasing that risk
  - Increasing age
  - Family history
  - COPD
  - “Bad genes”

- Shows risk reduction with quitting

- Educational tool to promote behaviour change (quitting)

- Target for “screening” those at greatest risk

No smoker is lower than “moderate” (elevated) risk for lung cancer vs nonsmokers
Engaging smokers in smoking cessation: role of Respiragene

**5As and 5Rs**

- **Ask**
- **Advise**
- **Assess**
- **Assist**
- **Arrange**

**Respiragene testing**
- to engage smokers in smoking cessation
- assess risk of lung cancer and benefits of quitting
- increase motivation in favour of quitting

**Risks**

**Rewards**

**Relevance**

**Roadblocks**

**Repetition**

**Ready to quit**

- Respiragene result, and cessation options
- Reminder of result on subsequent visits
- Update of risk according to spirometry

*facilitates follow-up visit for a consultation focussed on……*
**Lung cancer susceptibility score**

- All smokers at some risk for lung cancer above that of non-smokers
- Factors increasing that risk
  - Increasing age
  - Family history
  - COPD
  - “Bad genes”
- Shows risk reduction with quitting
- Educational tool to promote behaviour change (quitting)
- Target for “screening” those at greatest risk

No smoker is lower than “moderate” (elevated) risk for lung cancer vs nonsmokers
Intention to quit smoking based on genetic testing for lung cancer risk

- Smokers at “average risk”
  -67%* more likely to quit after testing
  -2% less likely to quit

- Smokers at “above average risk”
  -88% more likely to quit
  -1% less likely to quit

-21% improvement in quit intention

Conclusion
Genetic testing motivates quitting and does not de-motivate smokers from quitting

*70% of smokers want to quit

Survey responses from smokers

- Smokers want a reason to quit and help with quitting
- Over 80% said they would take a test assessing risk of lung cancer if offered.
- After testing with the lung cancer test
  - 100% would recommend to family
  - 96% would recommend to smoking friends
Intention to stop smoking before and after genetic testing
2 week data

Before testing (n=25 smokers)

Quit
Quit <1 month
Quit 3-6 months
Quit 6-12 months
Quit 1-5 years
Quit >5years

After testing (n=25 smokers)

Quit
Quit <1 month
Quit 3-6 months
Quit 6-12 months
Quit 1-5 years
Quit >5years

After genetic testing intention to quit:
14 (56%) brought forward quitting (blue) vs 3 (12%) delayed quitting (red)
(8 unchanged (orange))
Changes in smoking before and after genetic testing
2 week data

Before testing (n=25 smokers)
- Quit
- Abstained 3+ days
- Abstained 1-2 days
- Abstained up to 1 day
- Have cut down cigs/day
- No change in smoking

After testing (n=25 smokers)
- Quit
- Abstained 3+ days
- Abstained 1-2 days
- Abstained up to 1 day
- Have cut down cigs/day
- No change in smoking

After genetic testing changes in smoking:
12 (48%) greater abstinence (blue) vs 2 (8%) less abstinence (red)
(11 unchanged (orange))

P<0.05
Respiragene: preliminary data in smoking cessation

Changes in smoking before and after genetic testing

Before testing (n=25 smokers)

- Quit: 1
- Abstained 3+ days: 1
- Abstained 1-2 days: 1
- Abstained up to 1 day: 2
- Have cut down cigs/day: 11
- No change in smoking: 10

6 months after testing (n=24 smokers, 1 Died)

- Quit: 8
- Abstained 3+ days: 7
- Abstained 1-2 days: 2
- Abstained up to 1 day: 3
- Have cut down cigs/day: 3
- No change in smoking: 1

After genetic testing changes in smoking:
21 (84%) greater abstinence (blue) vs 1 (4%) less abstinence (red)
(2 unchanged (orange))
Lung cancer test and 6 month follow up
6 month data.

32% quit at 6 months

Changes in smoking before and after genetic testing

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After genetic testing changes in smoking:
21 (84%) greater abstinence (blue) vs 1 (4%) less abstinence (red)
(2 unchanged (orange)
Questions?

Smoking cessation in usual care vs genetic testing groups

Smoking cessation rate following treatment or event

Optimistic bias
- denial about smoking risk
- promotes smoking

Motivational tension
- fear/anxiety about smoking
- promotes quitting

Personalised data of vulnerability

Ex-smoker

Lung Cancer Susceptibility Score

Lung Cancer Risk Score (Range 0-12)

High Risk
- Smoker
- Very High Risk

Average
- Smoker
- Moderate Risk

Ex-Smokers
- Smoking substantially increases the risk

Non-Smokers
- Risk reduction with quitting

Test results
Respiragene - Lung cancer susceptibility score

- Based on an algorithm developed in COPD case-control study
- Combines genotypes from protective and susceptible genetic variants (SNPs)
- Makes no assumptions about biological pathways (simple, not hierarchical)
- Modelled on the Gail score - combines age, history of COPD, FHx of lung cancer with genes

Gene test for lung cancer

NZ scientists develop test to predict smoking risk

‘They saved my life’

Couple win big: $250,000 plus a baby

Slain girl's dad on sex charges

Disclosure
Lung cancer susceptibility score

- Educational tool to personalise risk and raise awareness of lung cancer
- Refines existing risk conferred by smoking exposure
- Based on age, FHx of lung cancer, COPD and SNP markers
- Target 40+ yr old who are smokers and ex-smokers (quit after 40 yo)
- Aim to motivate smoker to quit or ex-smoker to avoid relapse
- Referenced against the “average” smoker’s risk (Moderate Risk)
- Shows risk reduction with quitting

No one is lower than “average” risk for lung cancer