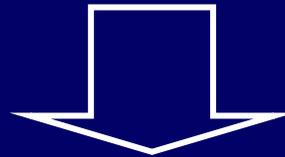


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# Psychosocial and biological determinants of health (pSoBid)

# Social inequality and health

Relative social and economic deprivation

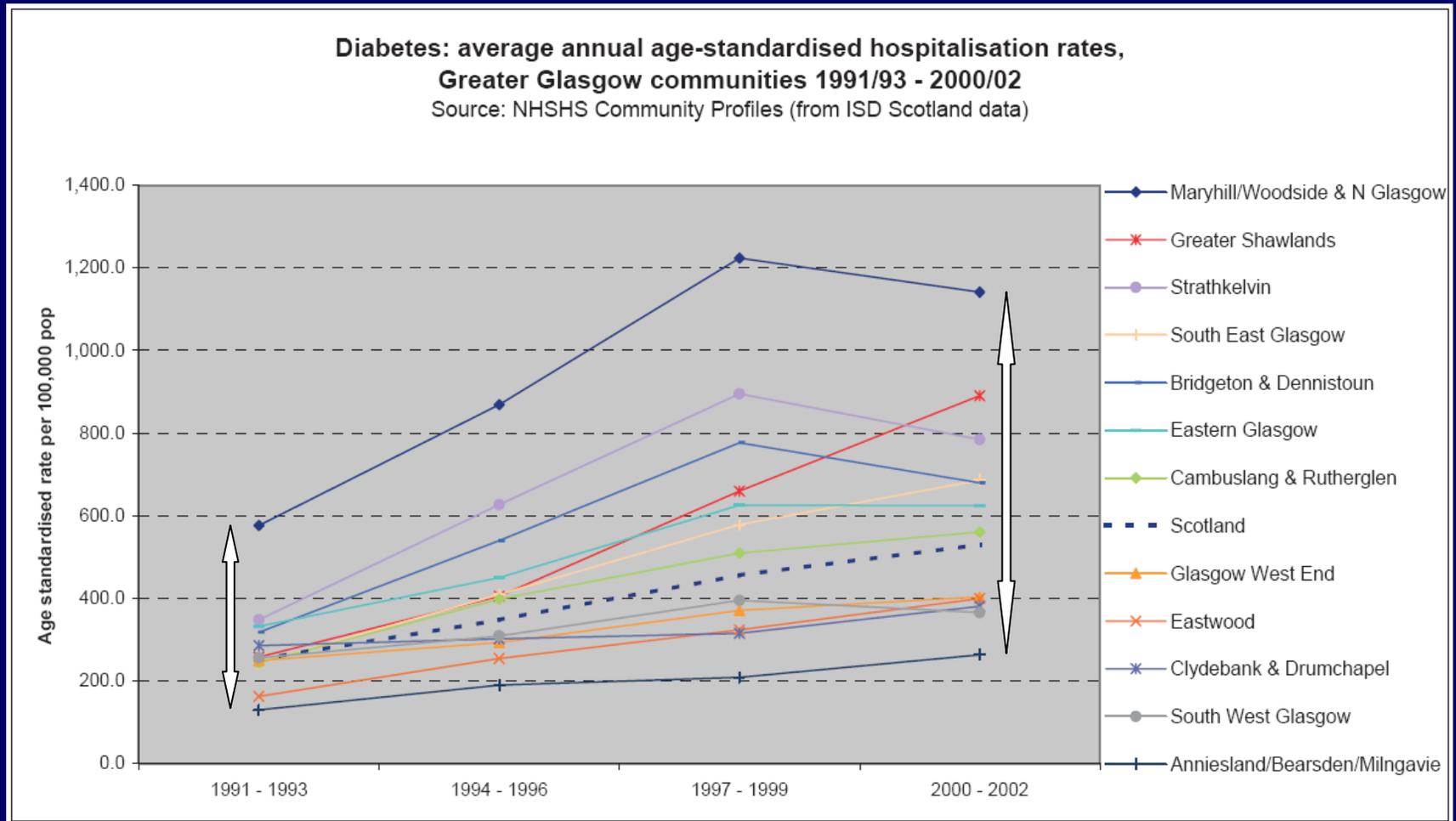


Heart disease    Diabetes    Stroke    Cancer    Asthma  
Rheumatoid Arthritis    Lung disease  
Poorer prognosis in many diseases

Smoking    ↑    poor diet    ↑    blood pressure

Inflammation ↔ Lifelong biological stress

# Diabetes and social inequality



# Innate immunity

Medscape® www.medscape.com

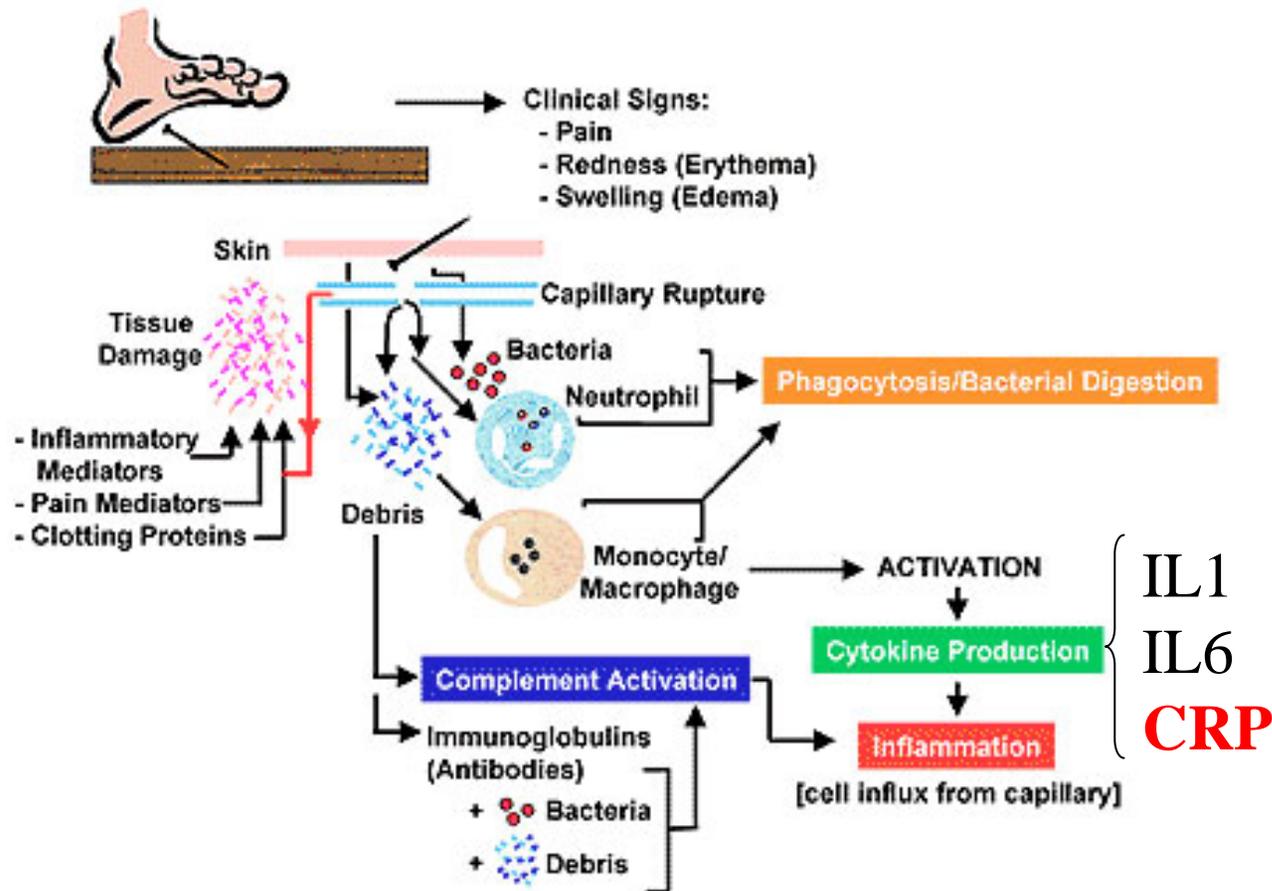
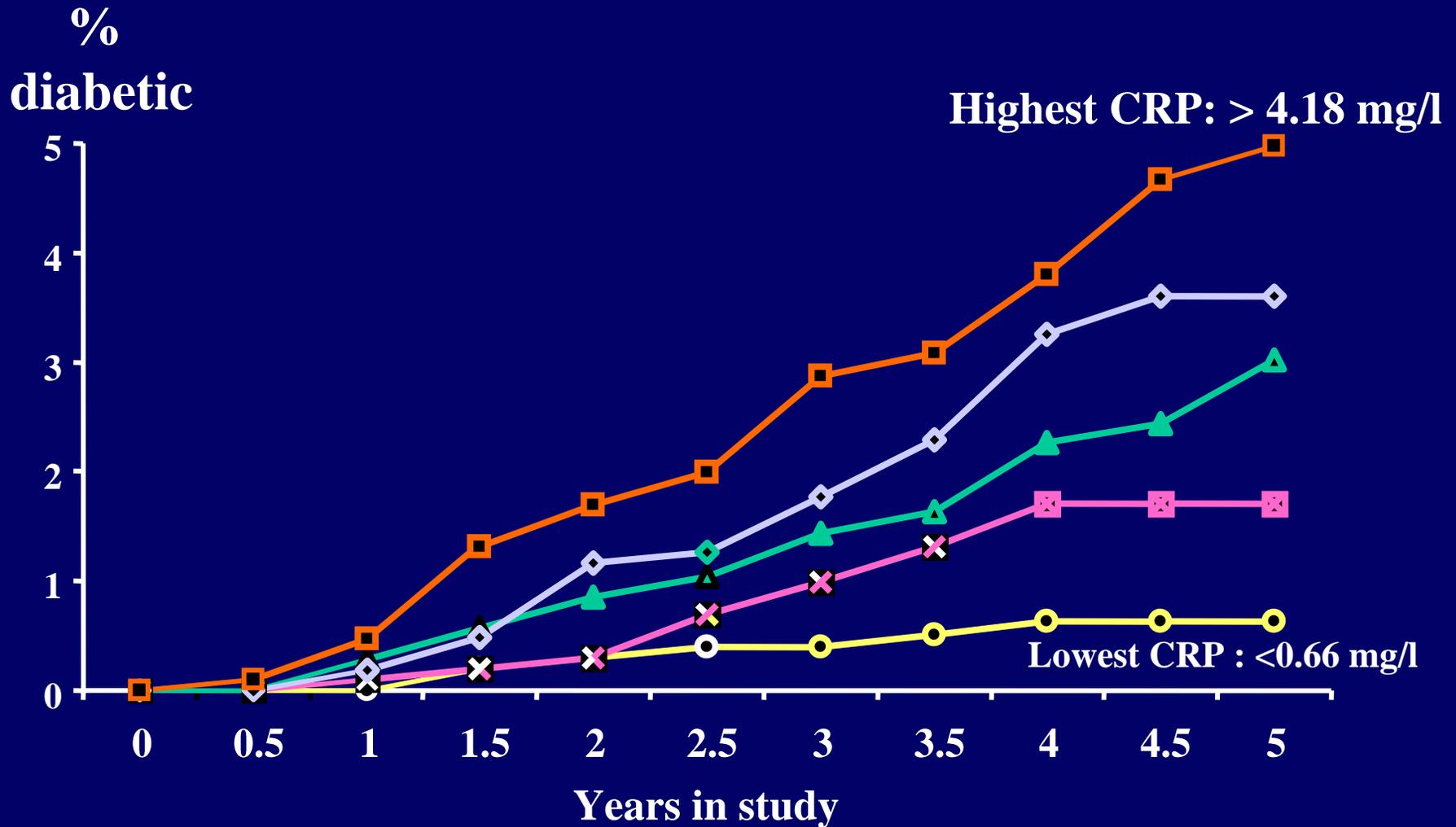


Figure 8. Innate immunity and inflammation.

Inflammation  
rheostat

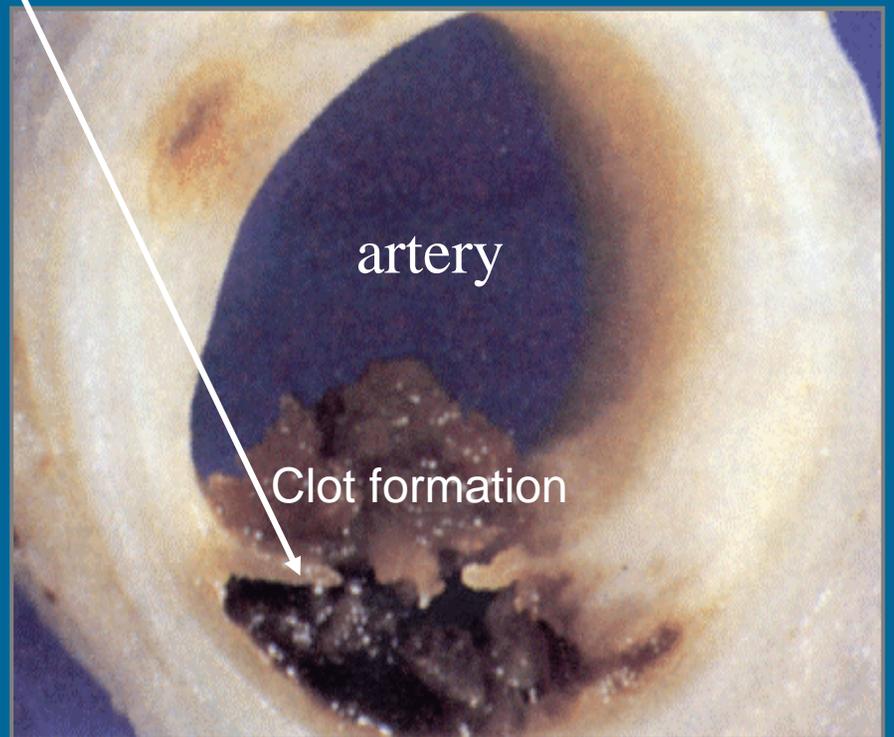
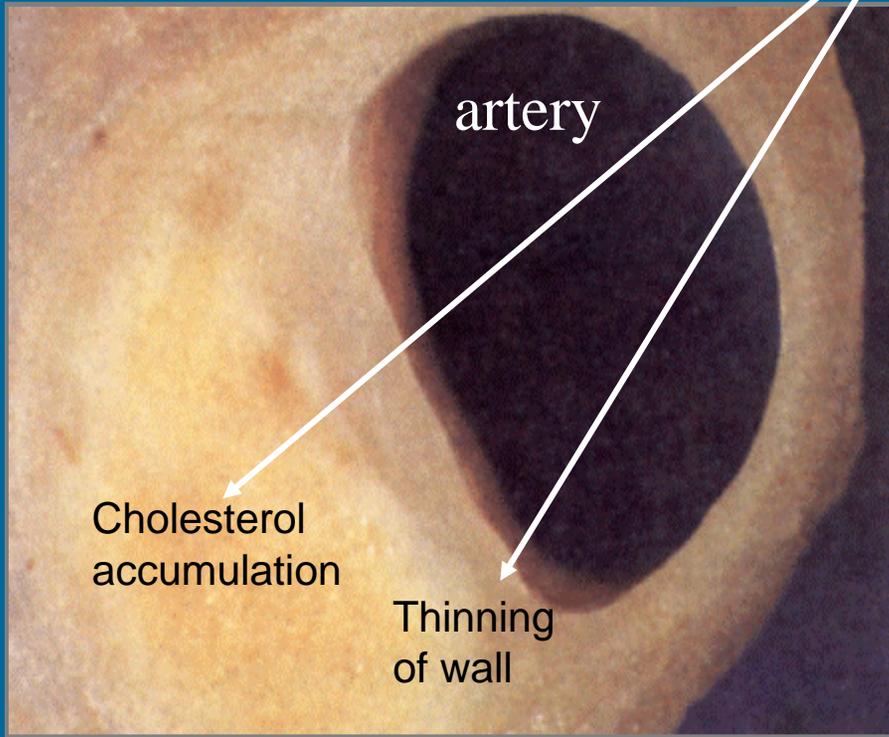


# Inflammation and cumulative risk of type 2 diabetes in the West of Scotland

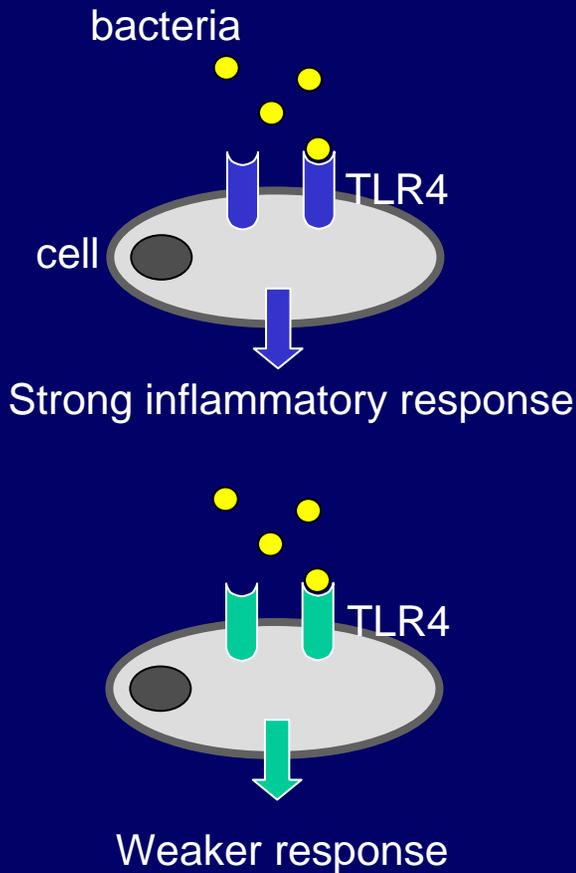


# Inflammation and heart disease

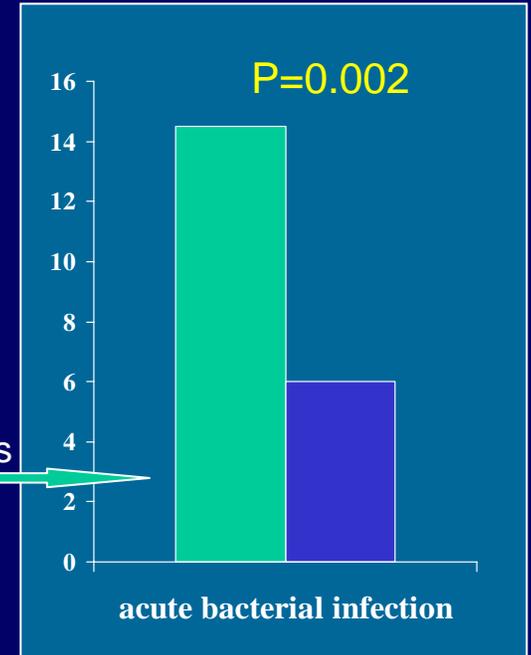
Inflammatory cells (macrophages)



# Ying and Yang of innate immunity trading survival against later chronic disease

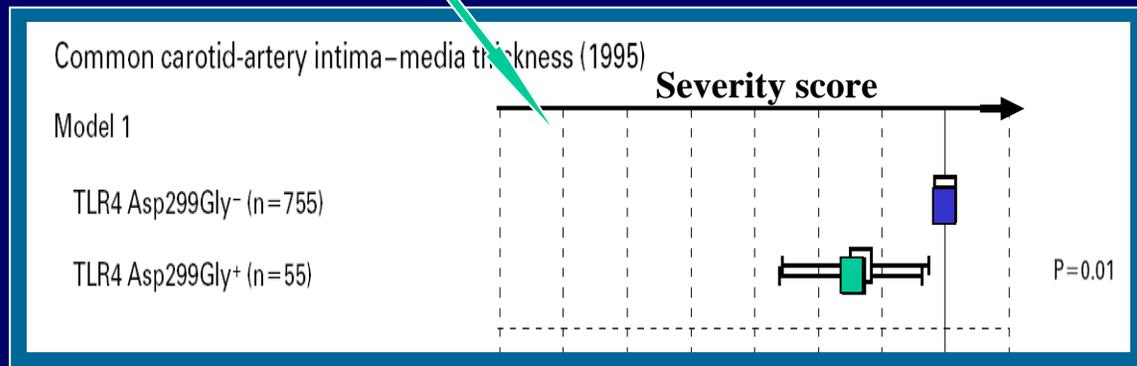


■ TLR4 – usual gene  
■ TLR4 – less responsive variant



■ variant more infections

less heart disease



# Environmental determinants of inflammatory status in WOSCOPS

	Depcat	% smokers	CRP (median) mg/dl	
			Never-smokers	Smokers
affluent	1	36.8	0.71	1.42
	2	35.9	1.00	2.34
	3	39.1	1.11	2.25
	4	44.1	1.21	2.44
	5	46.6	1.13	2.53
	6	49.3	1.25	3.07
deprived	7	55.5	1.48	3.29

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# 'Stress'

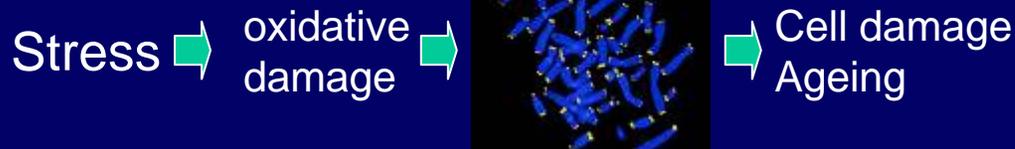
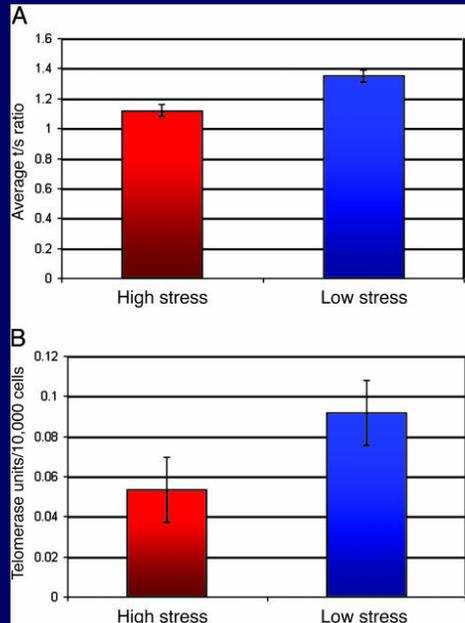
Body's response via the innate immune system, neuroendocrine system (cortisol) to a external or internal stimulus. This response is biological (inflammation, oxidation, hormonal), mental and emotional (involves self).

'Stress' is universal and can be coped with if sporadic, but coping fails if chronic (allostasis)

# Biological response to 'stress'

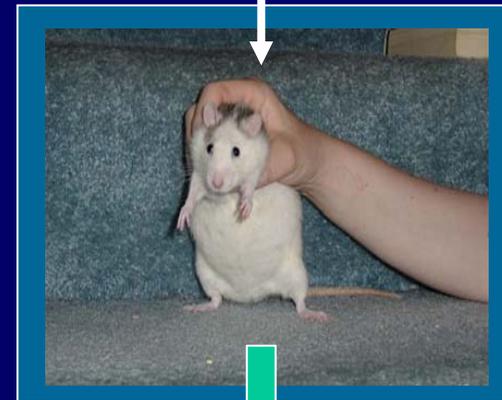
## Emotional stress

Effects of stress on telomere length in female long term carers



## Biological stress

Bacterial toxin (LPS)



progeny

Increased body weight (abdominal fat)  
Insulin resistance  
Enhanced stress response

Dahlgren et al. Am J Physiol 2001;281:E326

Epel et al. PNAS 2004;101:17312.

# pSoBid

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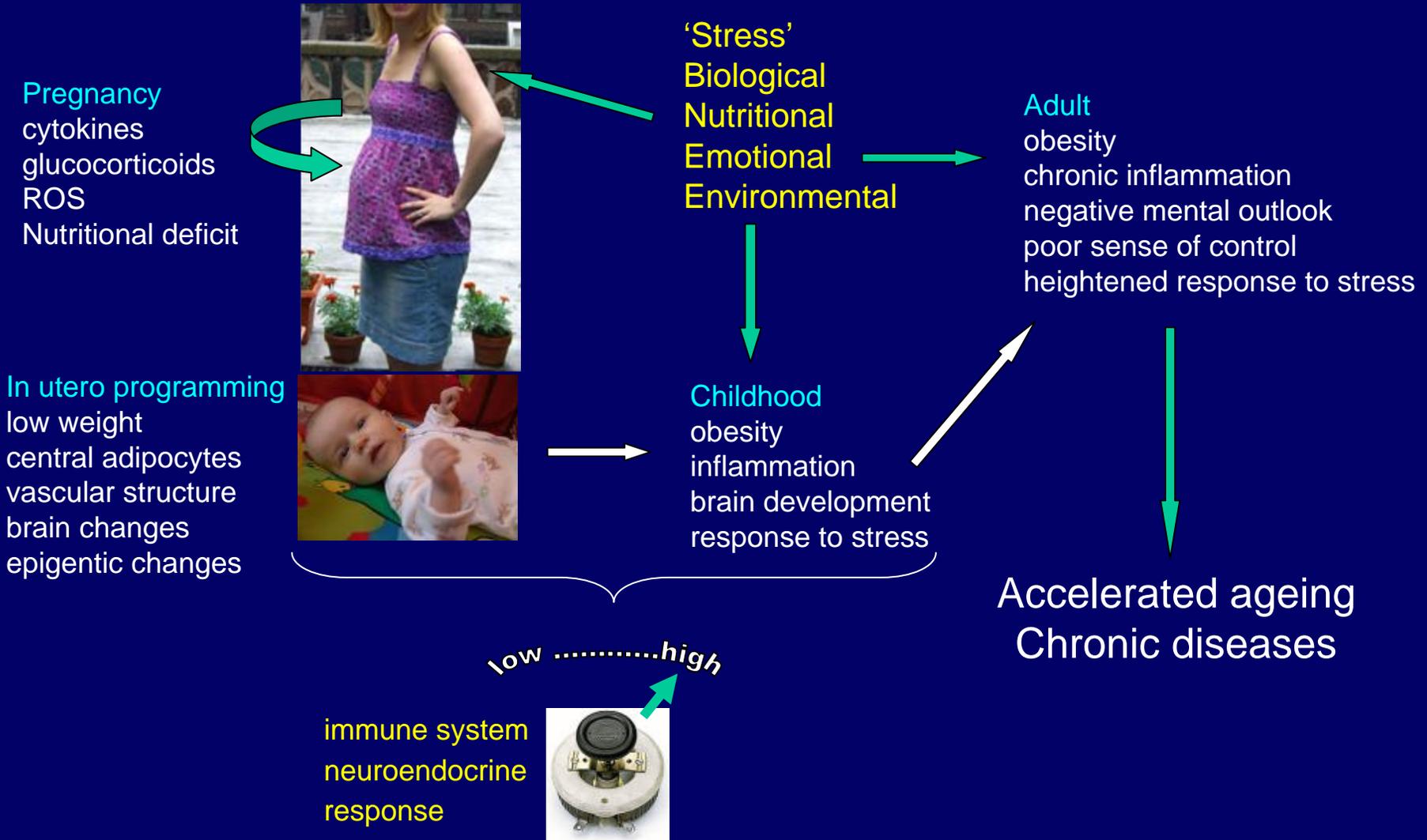
## Research question

*How does deprivation and its associated emotional, biological and environmental stress affect mental and physical health ?*

## Hypothesis

*Deprivation leads to lifelong 'stresses', chronic inflammation and changes in the neuroendocrine (stress response, coping) system*  
– *does this explain the wide range of morbidity?*  
– *is it reversible?*

# Inflammation, and lifelong biological and environmental stress

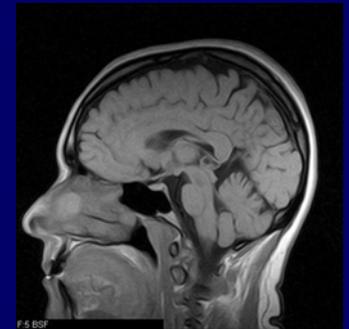
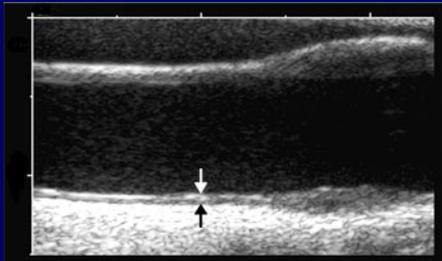
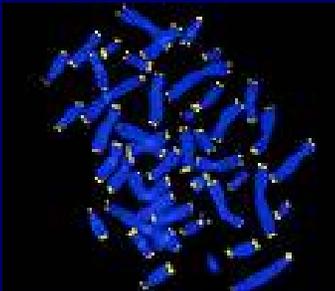


# Psycho-social and biological determinants of ill-health in deprivation (pSoBid1)

Glasgow city postcodes	
Least deprived N=350	Most deprived N=350



- Classical risk factors, BP, smoking, lipids.
- Inflammatory markers- CRP, ICAMs, cytokines.
- telomere length
- **carotid artery wall thickness.**
- **vessel elasticity.**
- cognitive function tests.
- personality tests, locus of control, depression.
- hippocampal volume - MRI
- **social circumstances – current, age 12.**
- **effects of housing relocation.**



## Hypothesis

Deprivation / adverse environment →

Biological stress-inflammation, oxidation →

CHD, diabetes, arthritis, negative mental outlook

# Implications for health improvement strategies

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- There is no simple fix for the ill-health associated with social inequality.
- Classical public health messages are not likely to work as well as hoped – do not address causes, recipients not receptive.
- Family and community based approaches may be fruitful in addition to individual appeals.
- Address major risk factors – cholesterol (diet fat), smoking, blood pressure through lifestyle and drugs (minority).
- Devise and implement programmes that reduce environmental, emotional and biological ‘stress’ across generations.
- Partnership not preaching. Partner at community, family and individual levels.
- Reduce ‘stressors’ and increase ability to cope.
- Test interventions in controlled trials

# Reducing stressors and increasing coping

## Pregnancy

Group and individual support.  
Diet, relaxation, coping therapies.



## Early life support to 2 years

Diet  
Emotional  
Stress reduction for parents and child



## 'Stress'

Biological  
Nutritional  
Emotional  
Environmental

## Adulthood

Diet, exercise  
Housing, communities, and support networks  
Control, ownership of environment  
Employment  
Lifelong education  
Train to cope, CBT lite

## Childhood

Diet, exercise  
Kindergarten initiatives  
Mentoring in Schools (older adults)

## Healthy ageing

Diet, exercise  
Mental capital  
Support communities  
Engagement

low ..... high

## Test

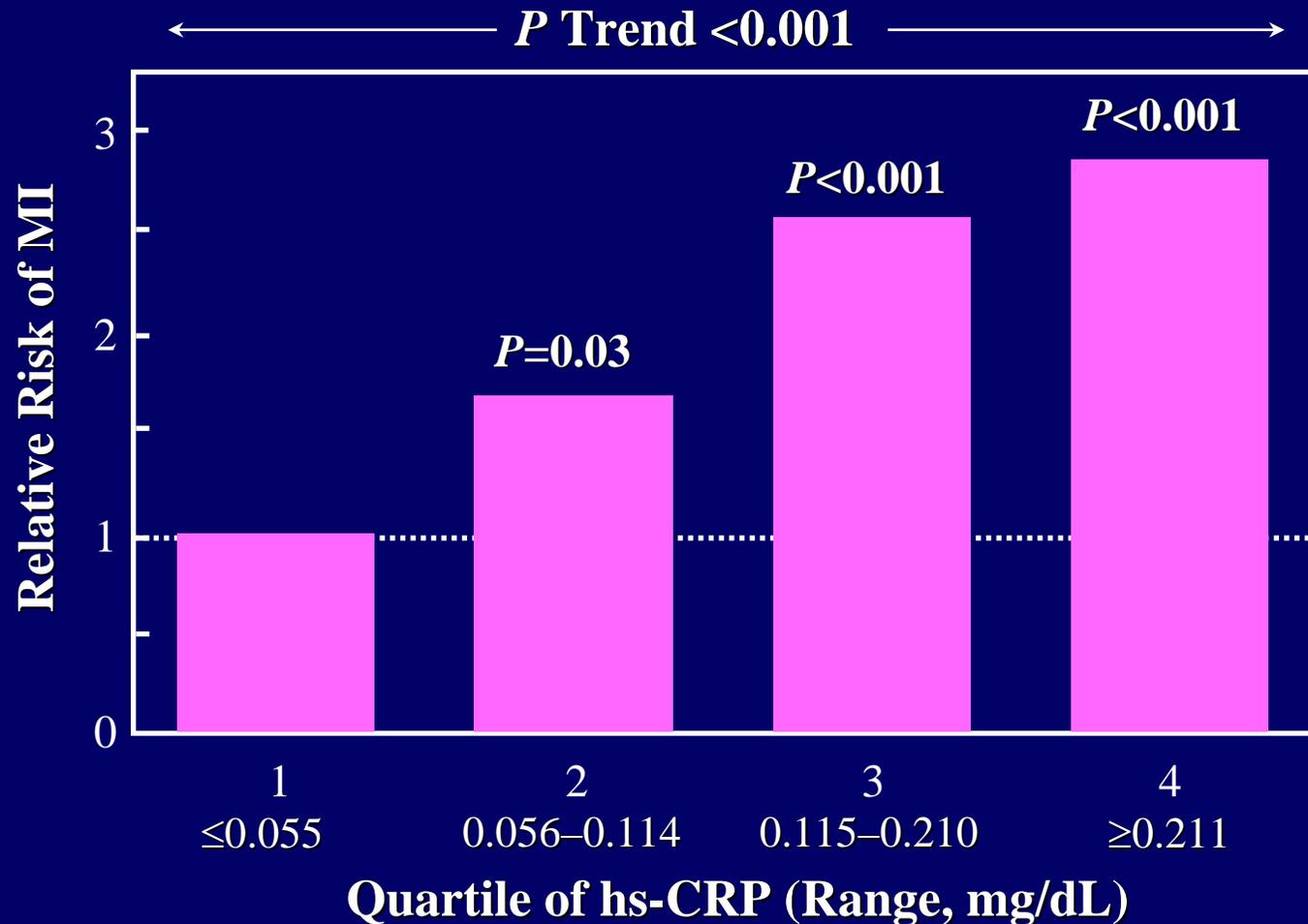
immune system  
neuroendocrine  
response



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END SLIDE

# hs-CRP and Risk of Future MI in Apparently Healthy Men



# Pathogenesis of atherosclerosis

