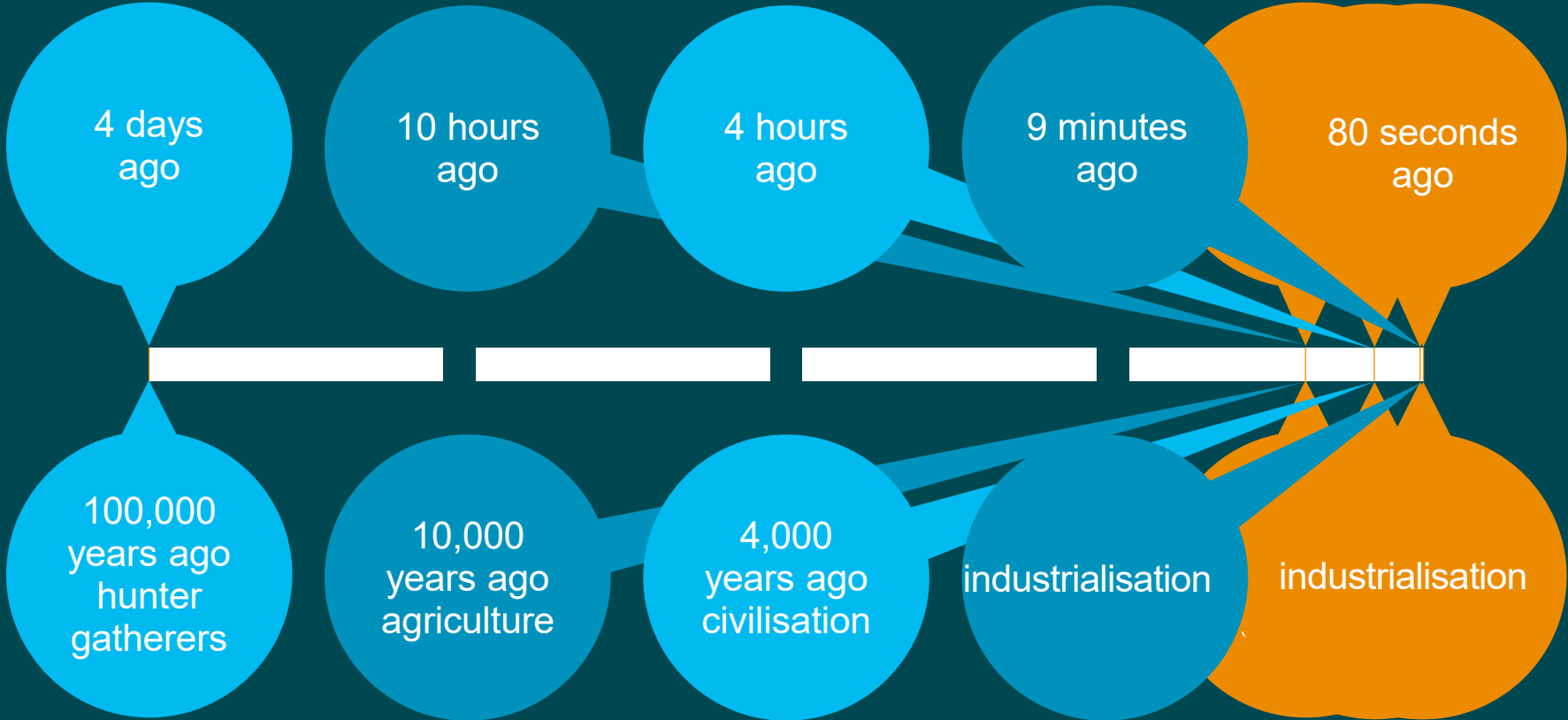


# The Natural Health Service: adding health value to business

Dr William Bird MRCGP MBE  
2<sup>nd</sup> March 2016



If we take an hour to equal 1,000 years, then four days is 100,000 years – the time from the origin of mankind to today



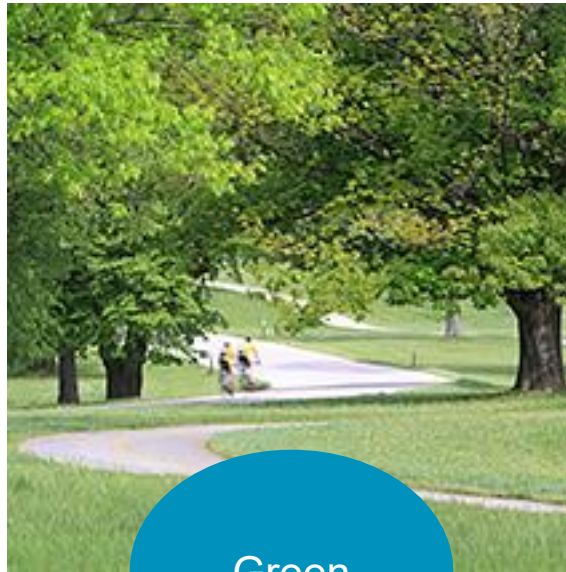
# Our factory setting is to be in a sociable group, supportive environment and have a purpose

People



Sociable

Place



Green

Purpose



Valued



People



Loneliness

Place



Hostile

Purpose



Rejection

## Fear and Chronic Stress

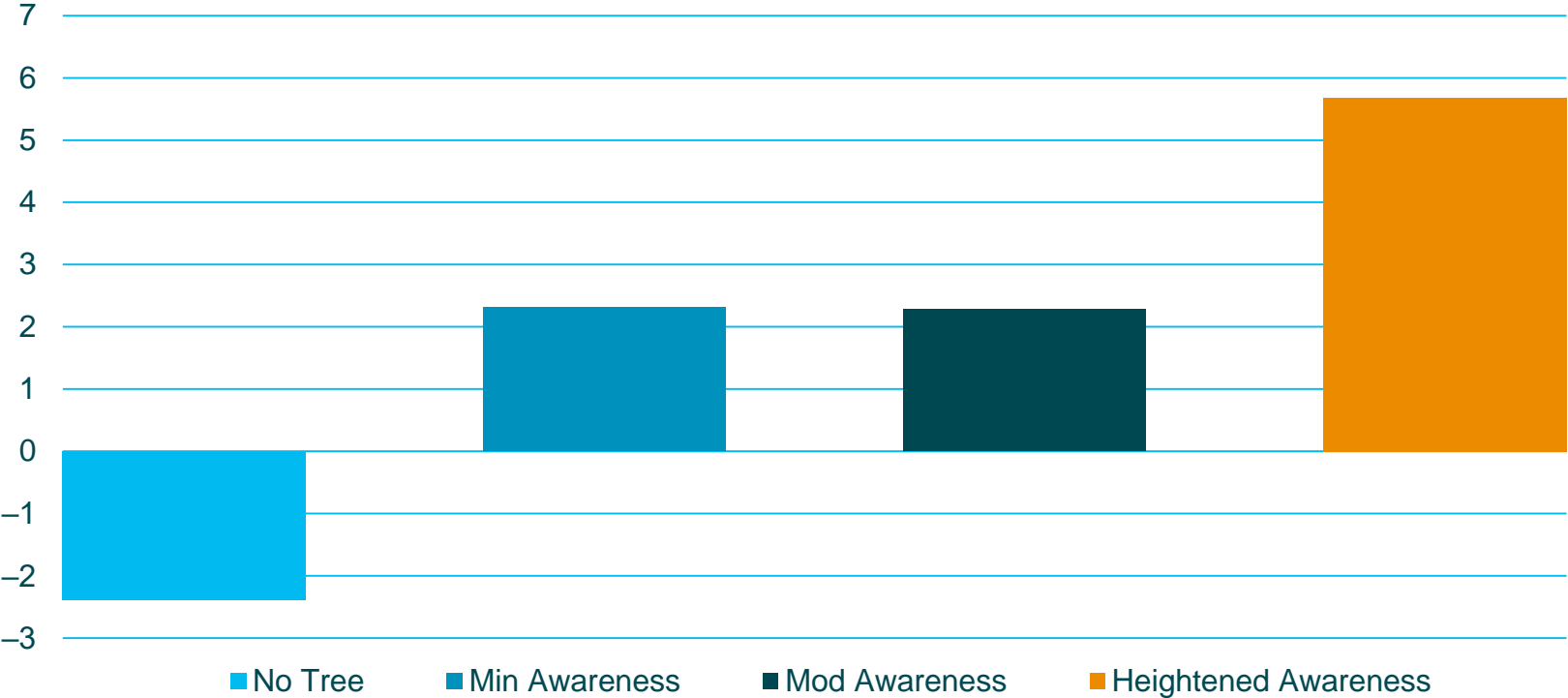






# The Effect of Trees on Cognitive Performance

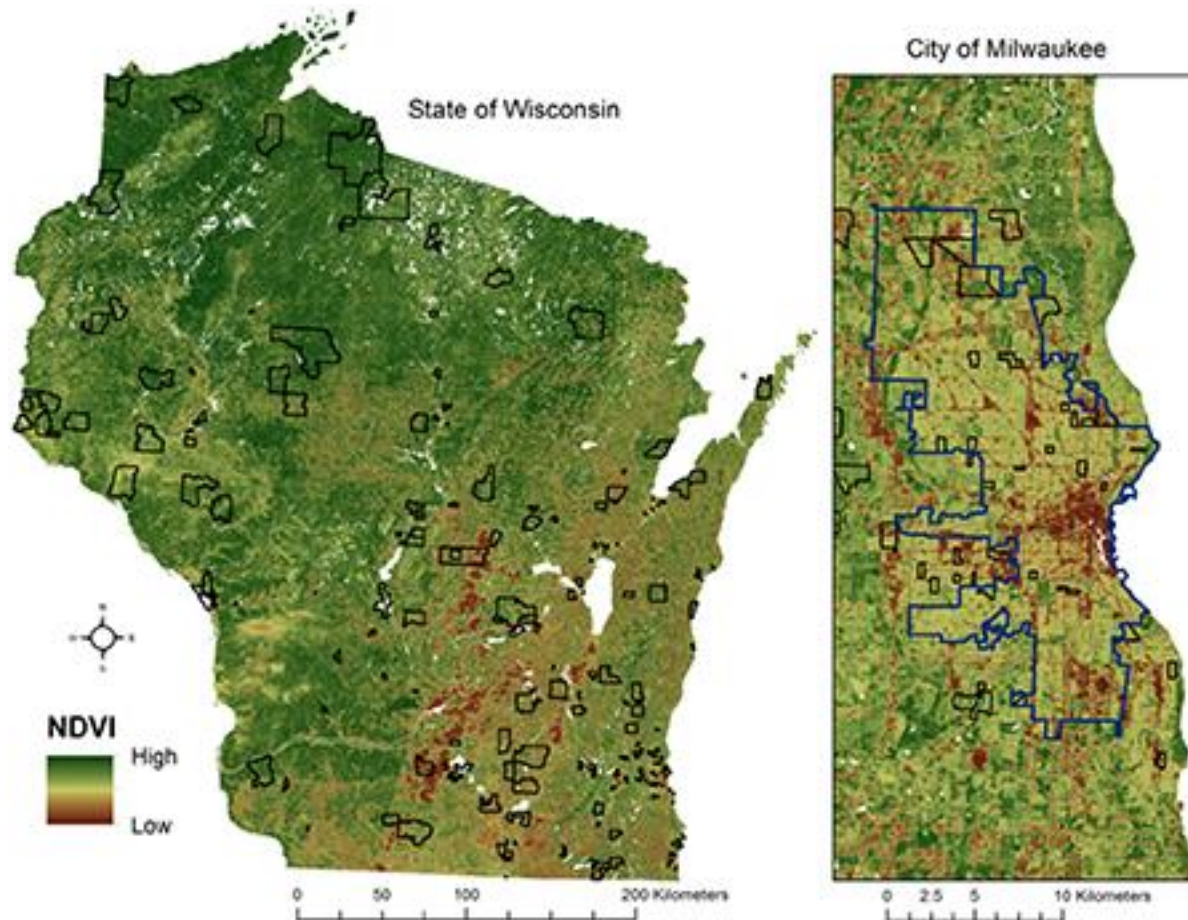
Digit Span Backward Test



Lin, Ying-Hsuan, et al. "Does awareness effect the restorative function and perception of street trees?" Cognitive Science 5 (2014): 906.



# Exposure to Neighbourhood Green Space and Mental Health



Beyer, Kirsten MM, et al. Int.J of environmental research and public health 11.3 (2014): 3453-3472

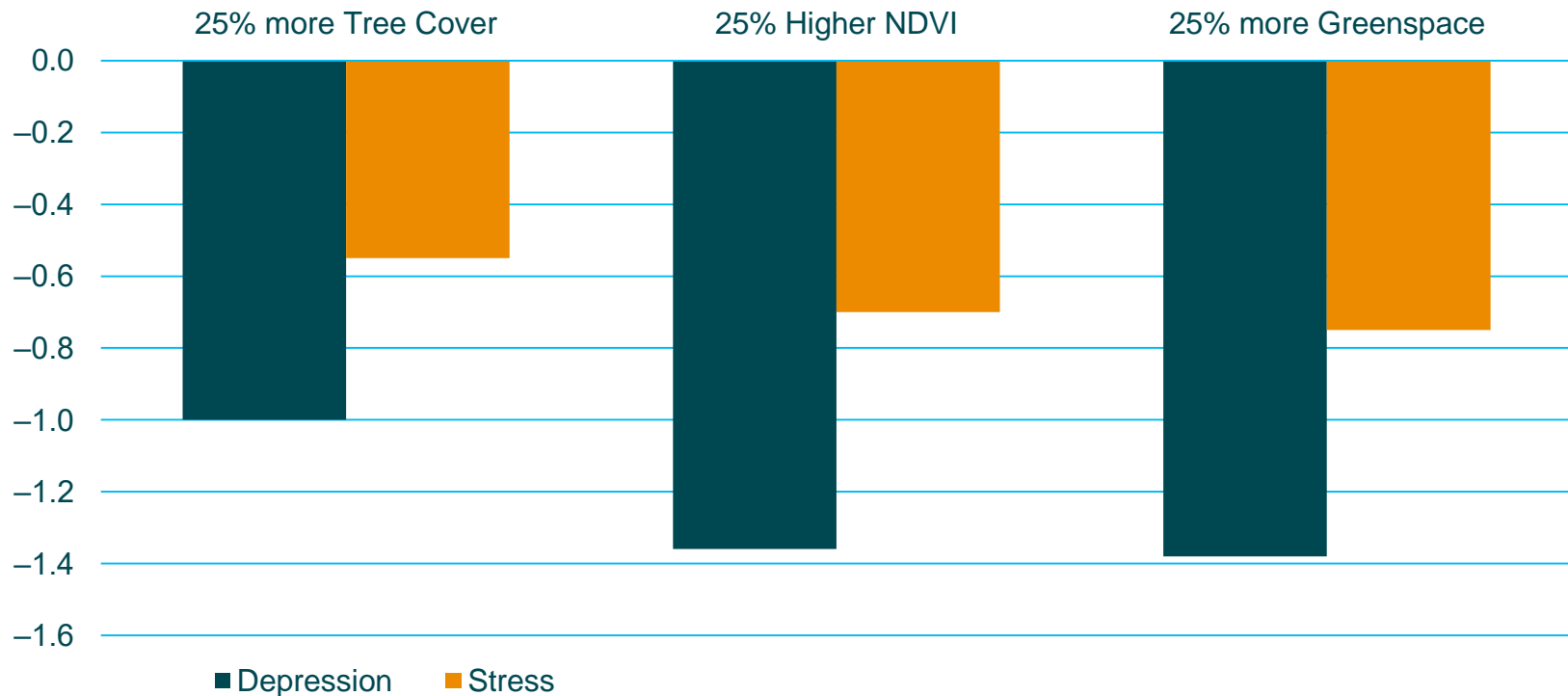
© 2015 Intelligent Health





# Association Between Trees, Vegetation, Depression and Stress

Normalized Difference Vegetation Index (NDVI)

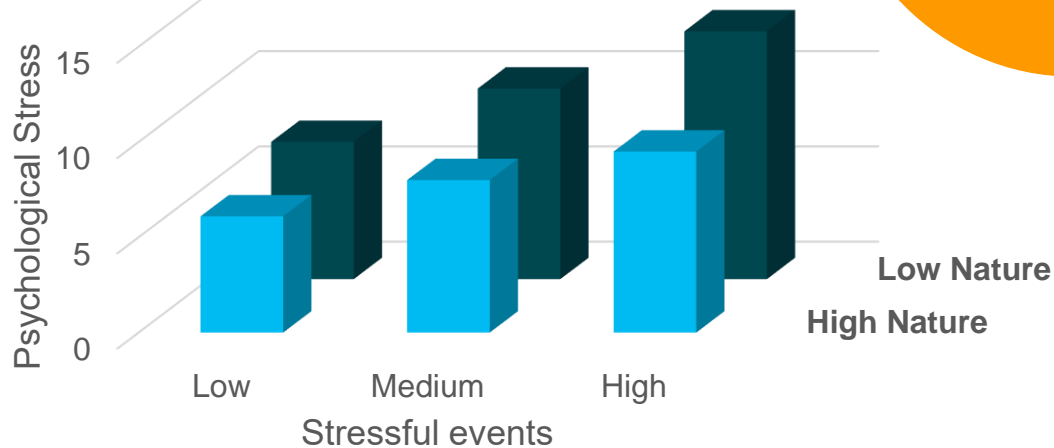


Mitchell, R. and Popham, F. (2008) Effect of exposure to natural environment on health inequalities: an observational population study. *The Lancet* 372(9650):pp. 1655-1660.



# Place: Green space moderates the effect of stressful events in children

Nearby Nature  
A Buffer of Life  
Stress among Rural  
Children NM Wells,  
GW Evans  
Environment and  
Behavior May  
2003vol. 35 no.  
3 311-33



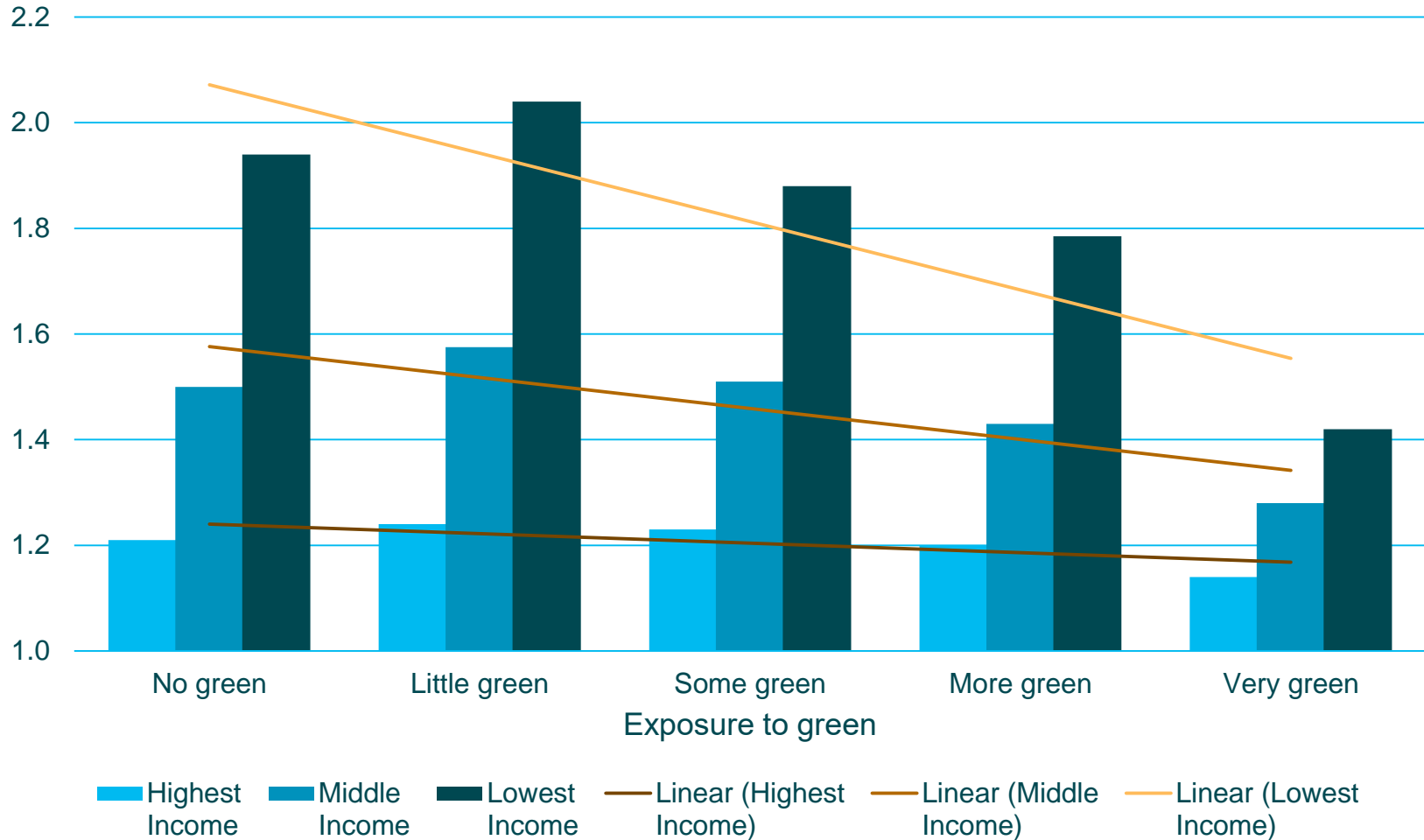
© 2015 Intelligent Health

■ High Nature ■ Low Nature



# Green Space reduces Health Inequalities

Incidence Rate Ratio



Mitchell, R. and Popham, F. (2008) Effect of exposure to natural environment on health inequalities: an observational population study. *The Lancet* 372(9650):pp. 1655-1660.



# Nature and the Unborn Child

High  
Blood Pressure  
in pregnant  
women increased  
by 14% for every  
300 meters away  
from green  
space

Birth  
weight and  
baby's head  
size were larger  
within the 500  
metres of  
green space



1. Grazuleviciene R et al Int J Environ Res Public Health 2014 11 2958-2972
2. Davvand P Env Health Perspectives 120 10





# Chronic Stress

Stress  
Hormones

Physical  
Inactivity

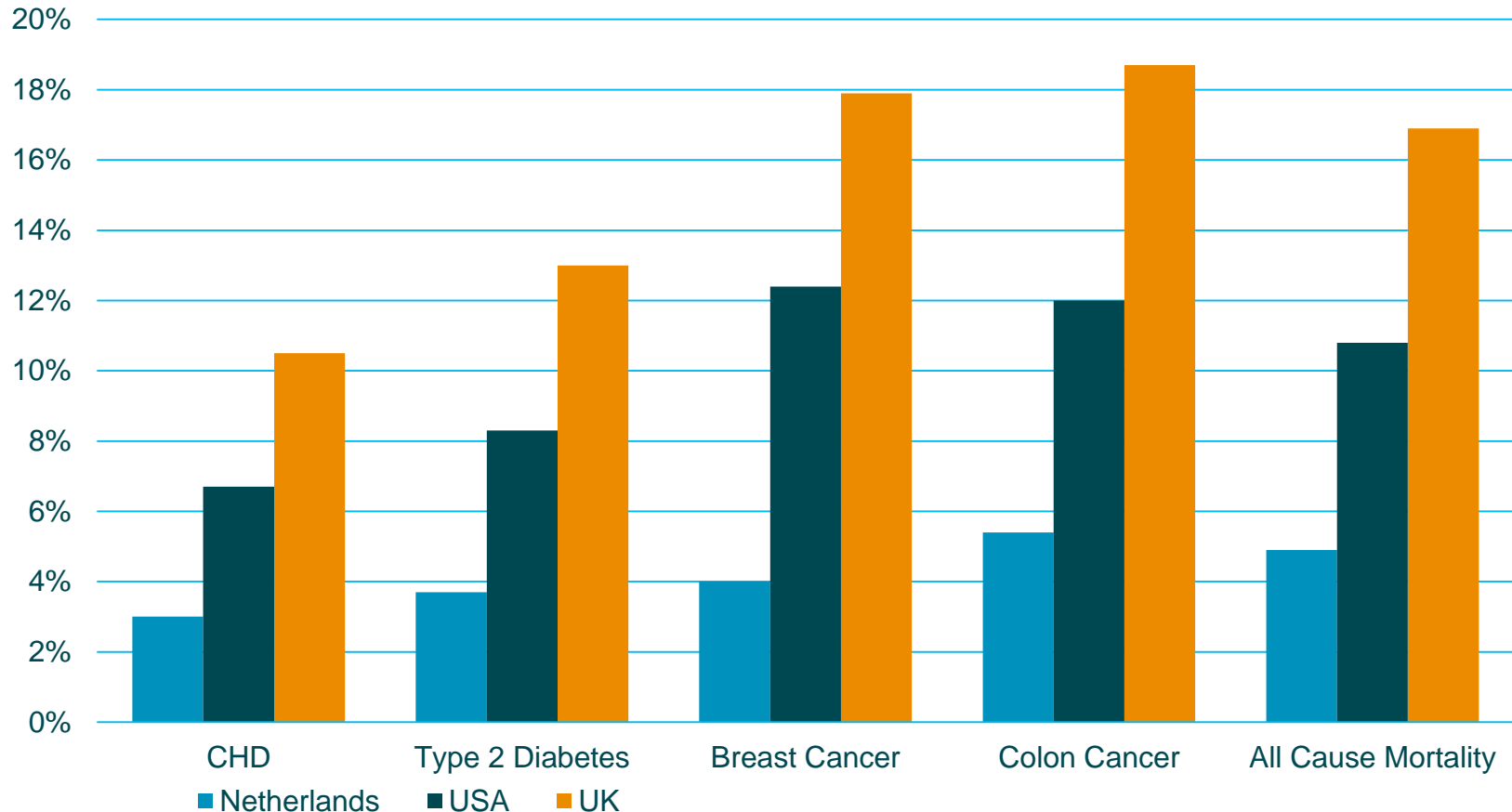
And other  
poor health  
behaviours

# Chronic Inflammation



# Mortality due to Inactivity

Population Attributable Fraction of mortality due to Inactivity (%)



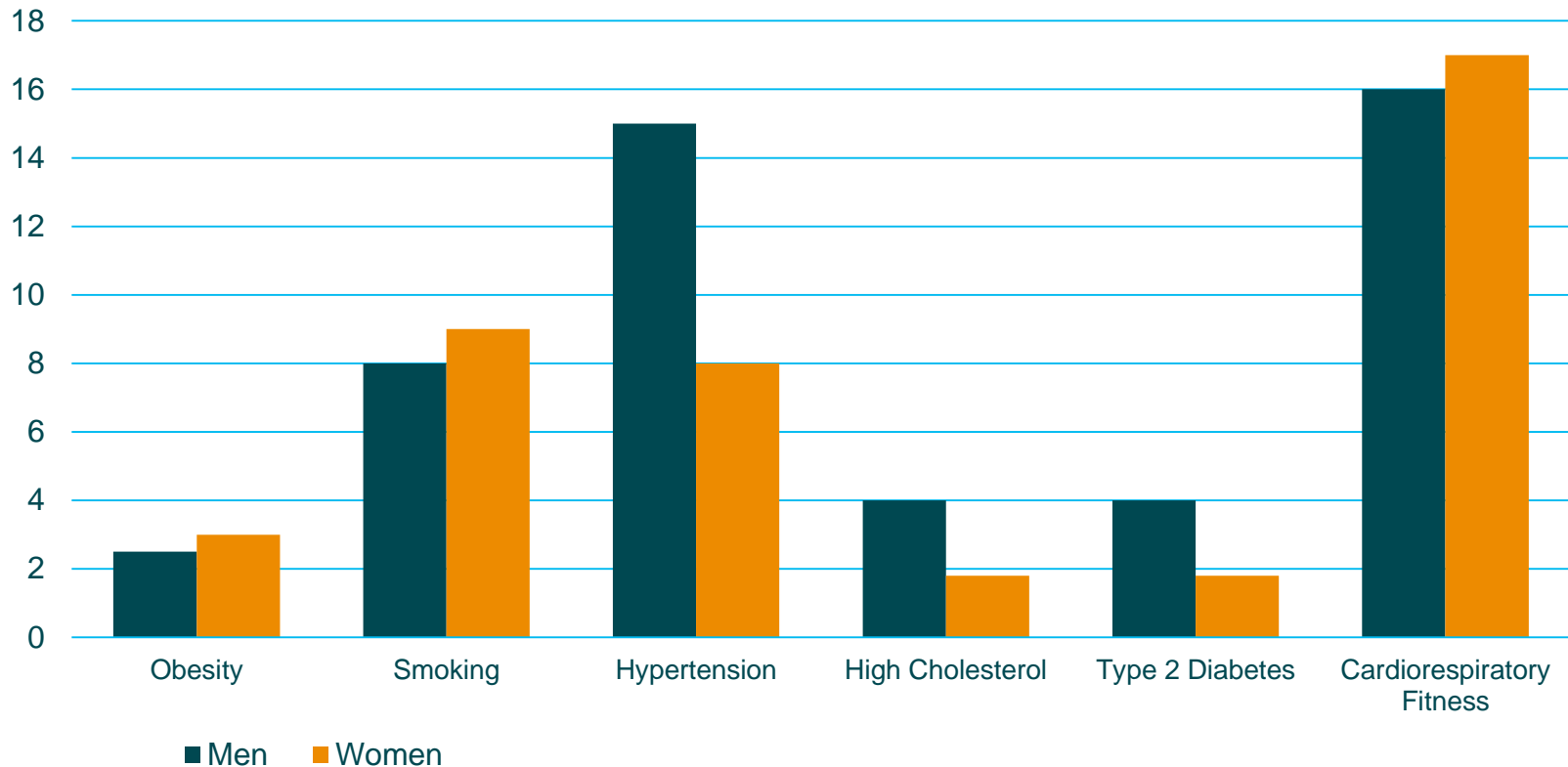
Lee I-M et al. Effects of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. The Lancet 2012 Published online July 18.



# Attributable fractions for all-cause deaths

Attributable fractions (%) for all-cause deaths in 40,842 (3,333 deaths) men and 12,943 (491 deaths) women in the Aerobics Center Longitudinal Study

Attributable Fraction %





# Inactivity causes inflammation

1.  
Increases  
visceral fat

2.  
Reduces anti-  
inflammatories

3.  
Damages  
healthy cells



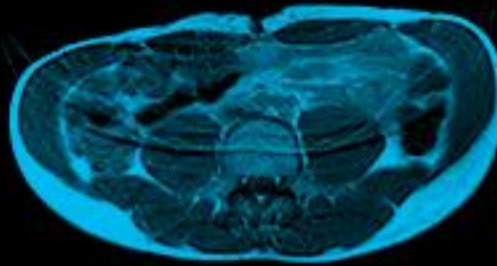
# Inactivity: trilogy of inflammation

1.  
Increases  
visceral fat



# Reducing inflammation – fat

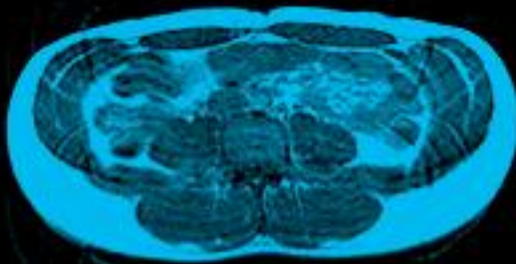
Variation in visceral fat content in men with the same waist circumference



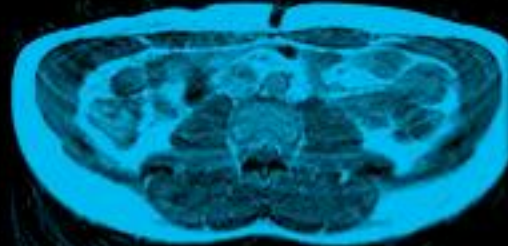
Visceral fat = 0.5 L



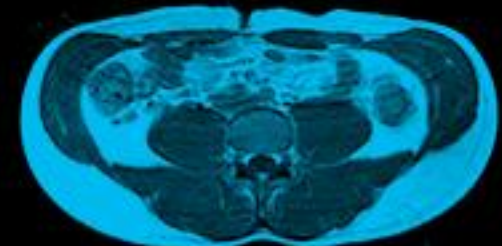
Visceral fat = 1.1 L



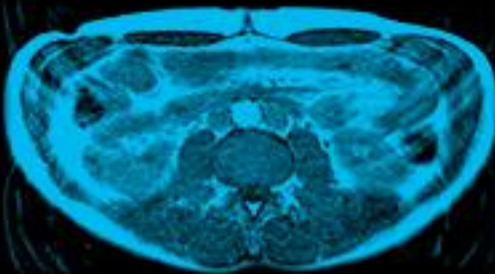
Visceral fat = 1.2 L



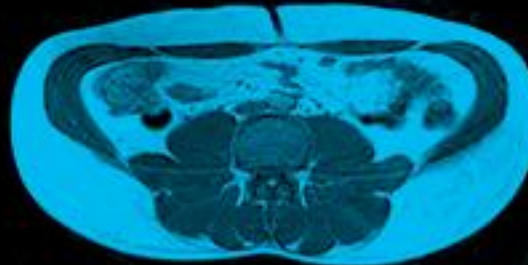
Visceral fat = 1.3 L



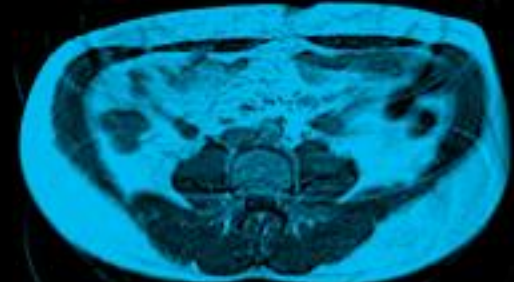
Visceral fat = 1.7 L



Visceral fat = 1.8 L



Visceral fat = 4.2 L

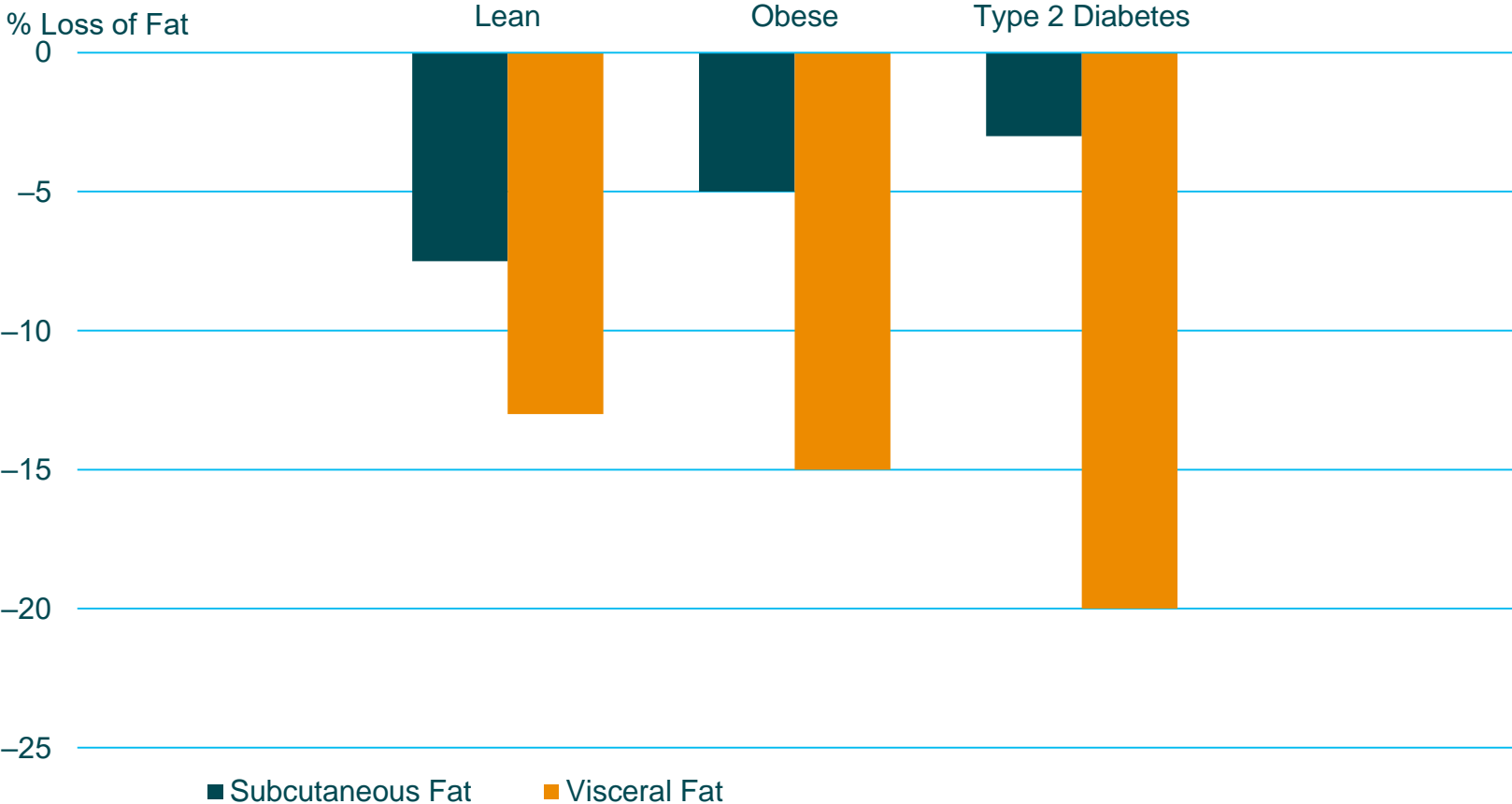


Visceral fat = 4.3 L



# Visceral fat reduction with exercise

Fat loss after 13 weeks of walking 60 mins a day and no weight loss



Lee S et al. J Appl Physiol 2005;99:1220-1225



# Inactivity: trilogy of inflammation

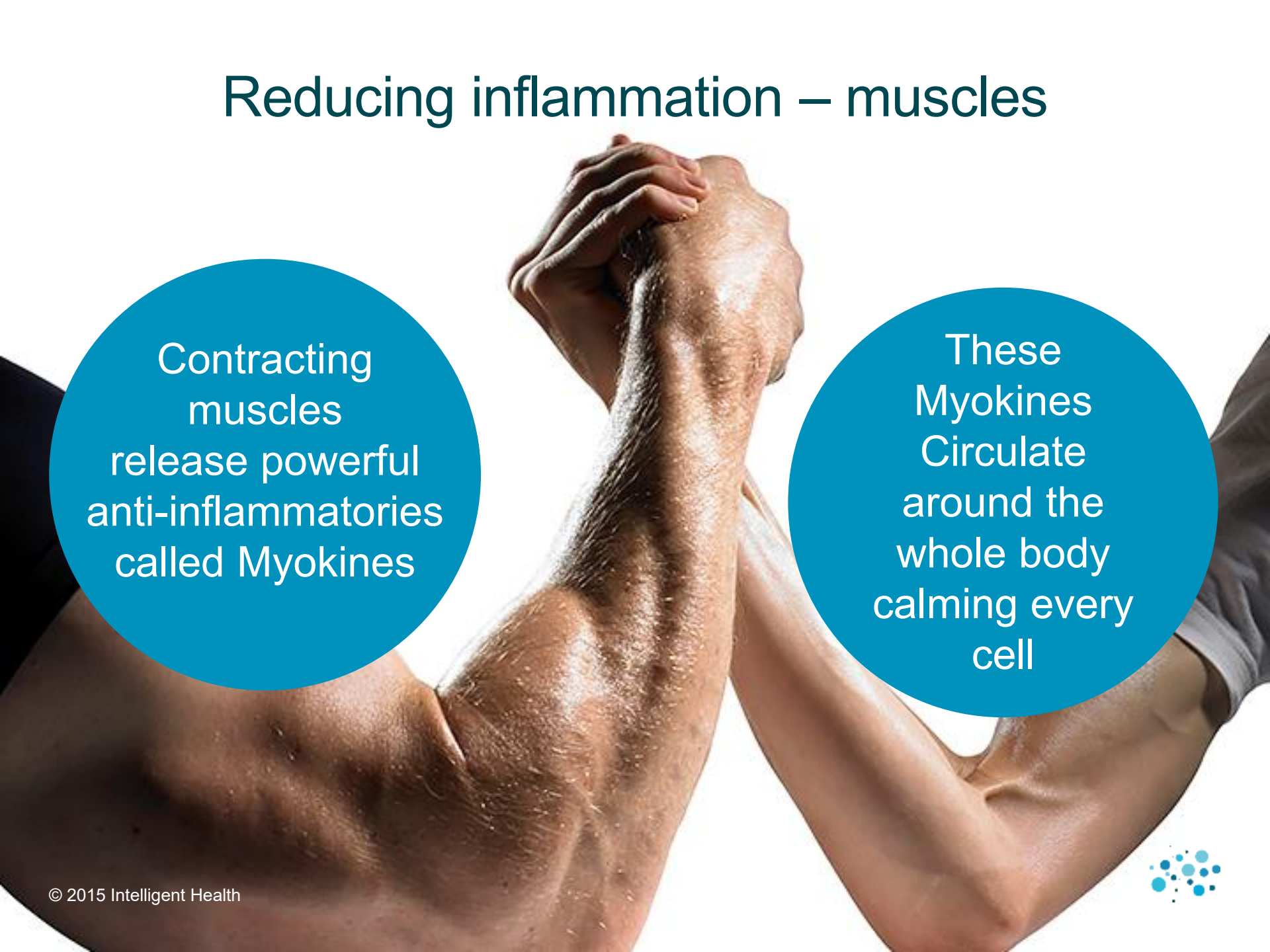
1.  
Increases  
visceral fat

2.  
Reduces anti-  
inflammatories

3.  
Damages  
healthy cells



# Reducing inflammation – muscles



Contracting muscles release powerful anti-inflammatories called Myokines

These Myokines Circulate around the whole body calming every cell



# Inactivity: trilogy of inflammation

1.  
Increases  
visceral fat

2.  
Reduces anti-  
inflammatories

3.  
Damages  
healthy cells

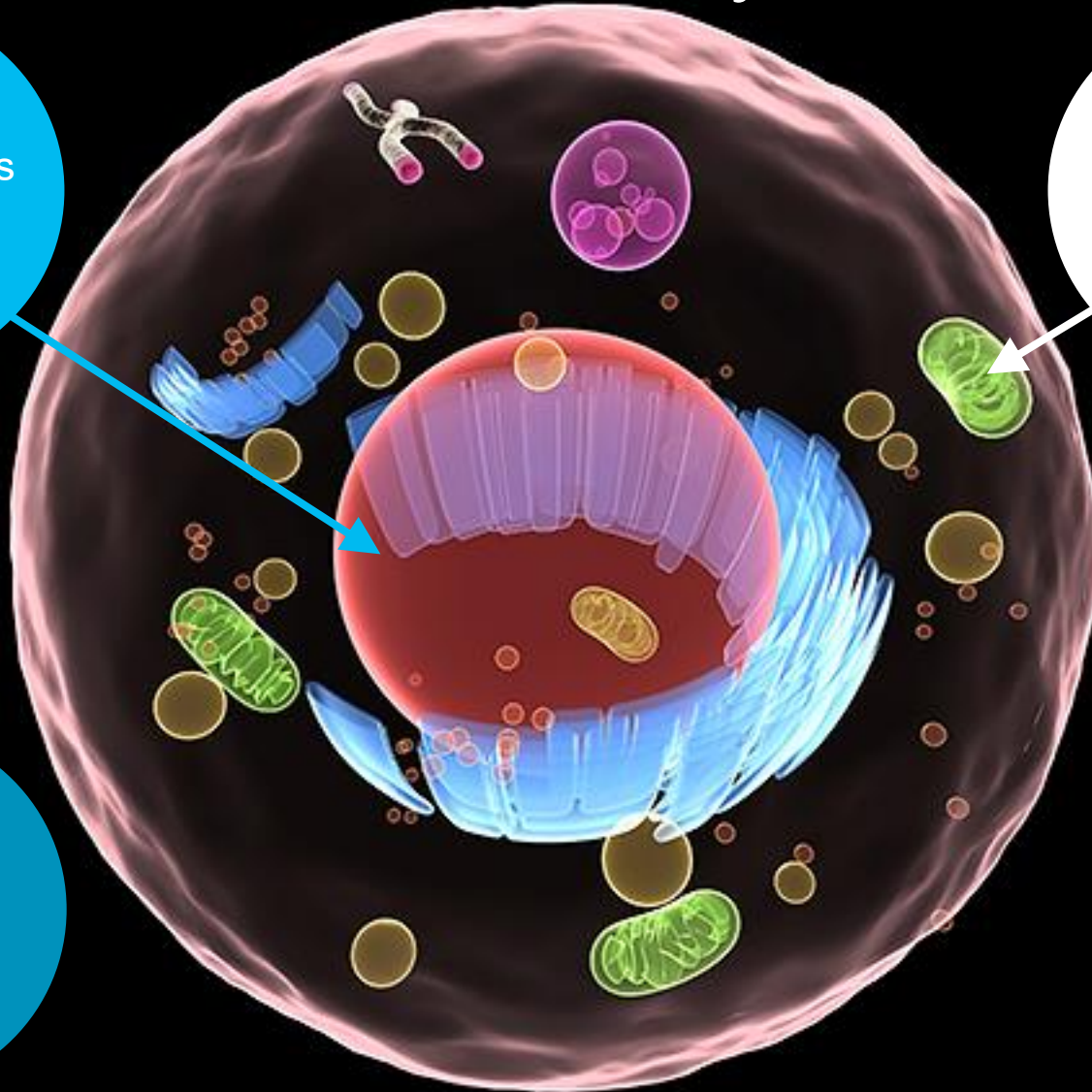


# Inside a healthy cell

Chromosomes  
keep dividing

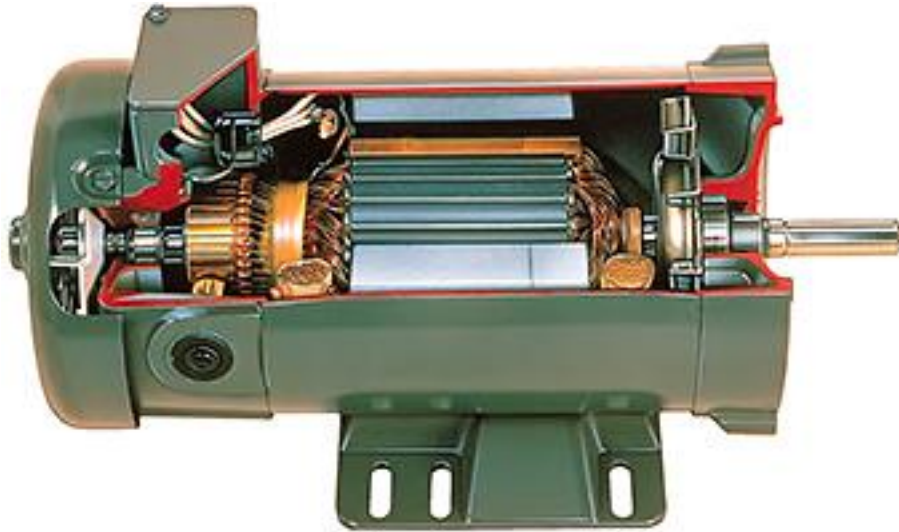
Mitochondria,  
healthy  
and active.  
Providing lots  
of energy

Immune  
system is  
switched off  
until needed





‘The mitochondria is like a dynamo,  
it has to keep moving ...

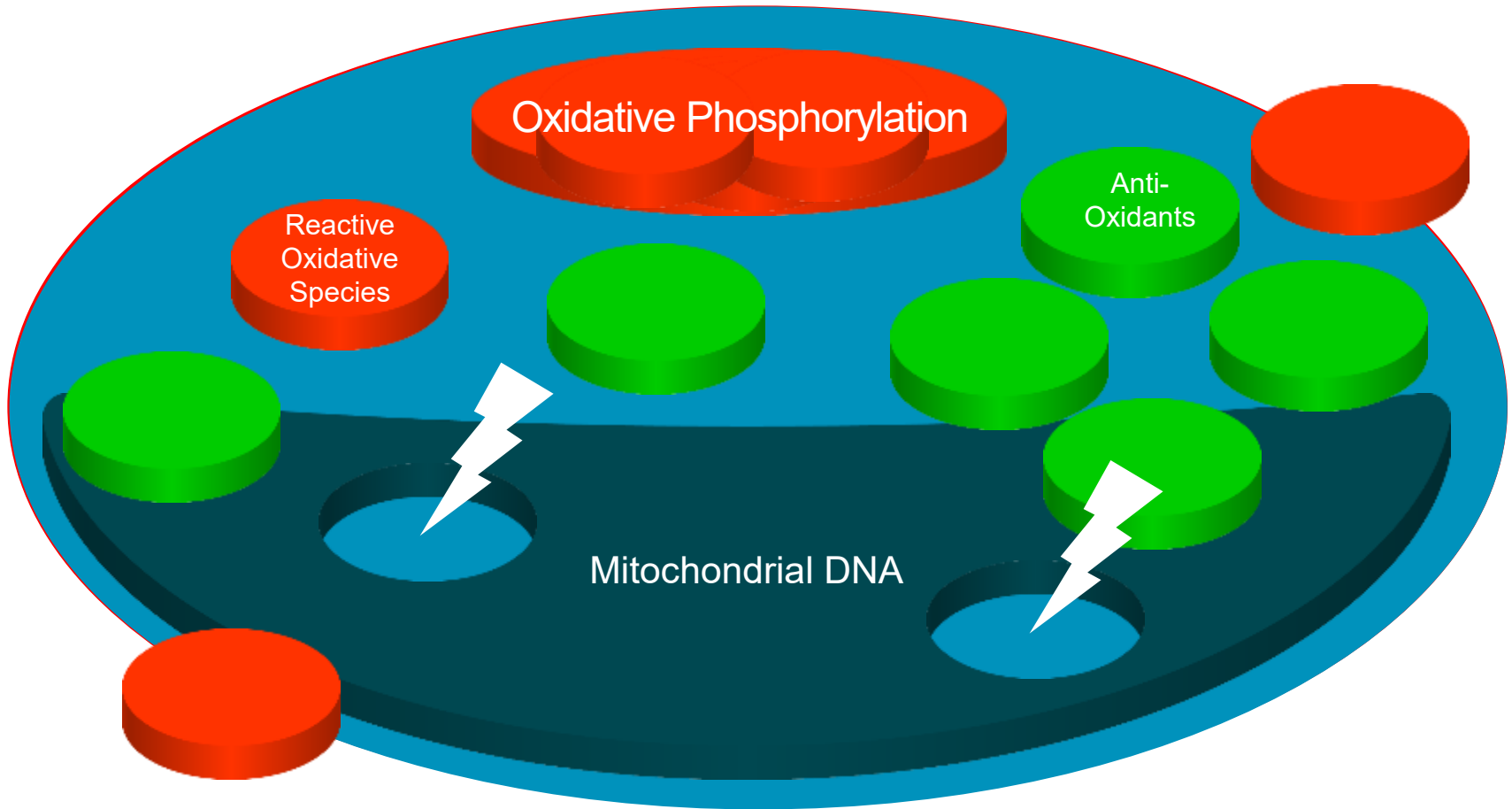


... and in the body they  
weigh as much as a car battery’

Prof Mike Murphy,  
MRC Mitochondrial Biology Unit Cambridge University



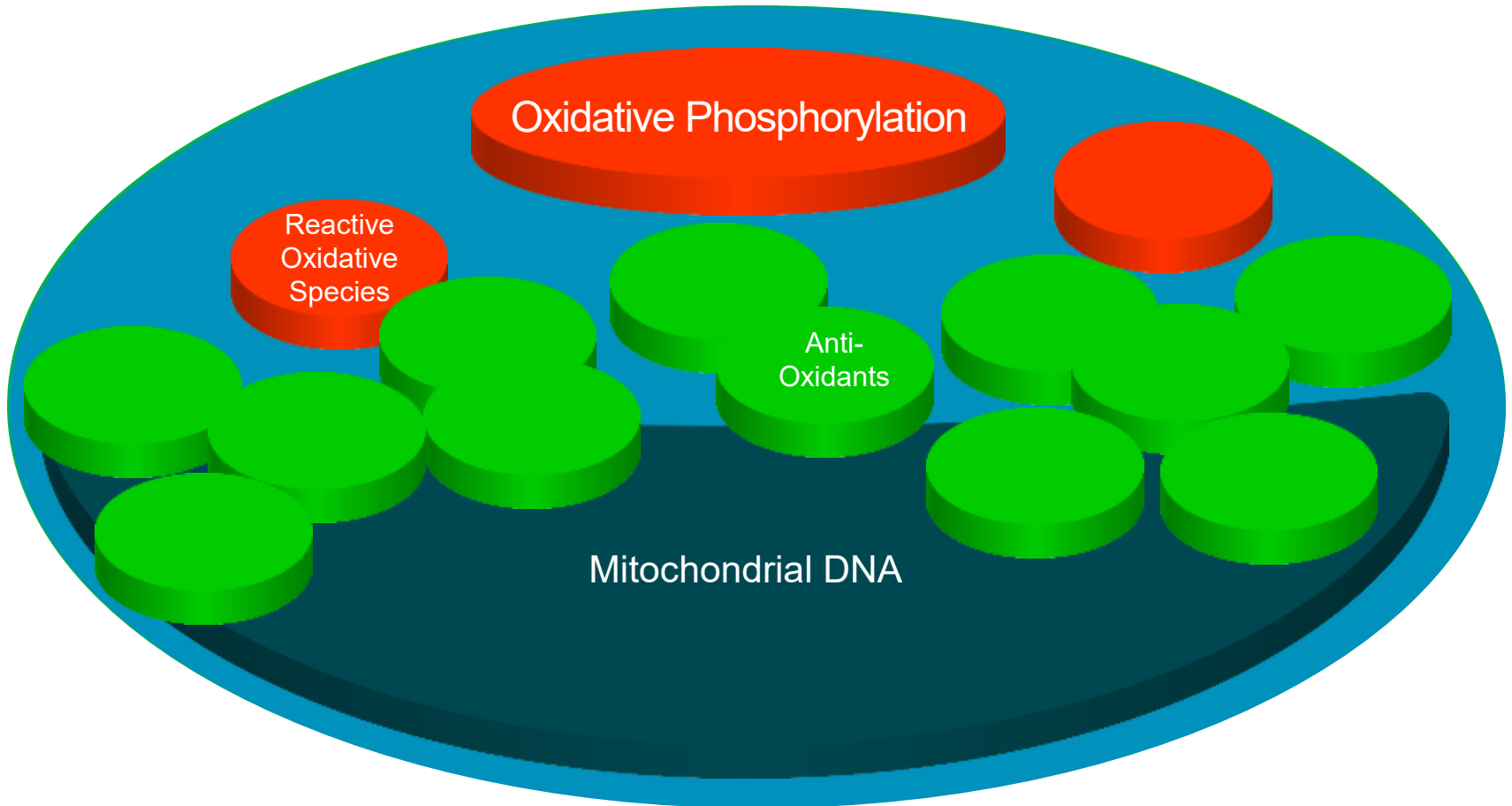
# Sedentary, high fat diet and stress



## Mitochondria



# Physically active, low fat and not stressed



## Mitochondria



# How does physical activity work?



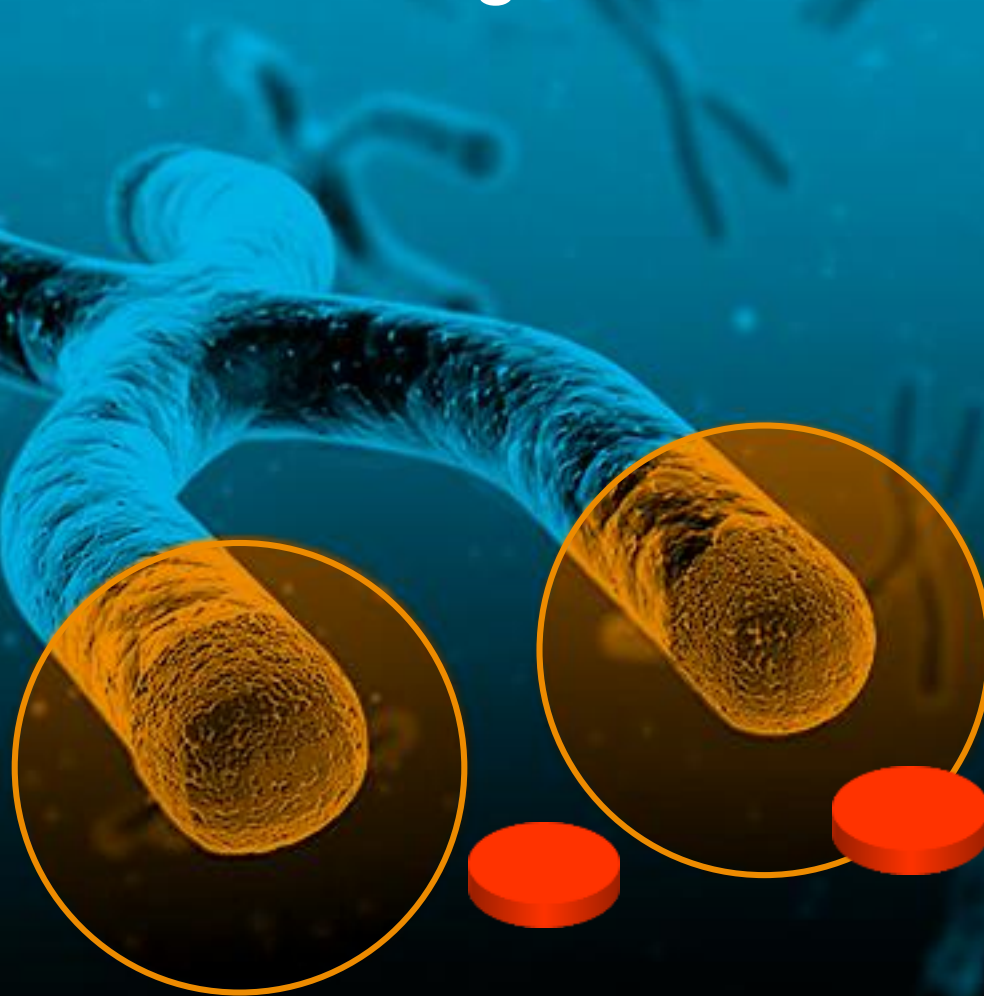
Anti-inflammatory



Anti-aging



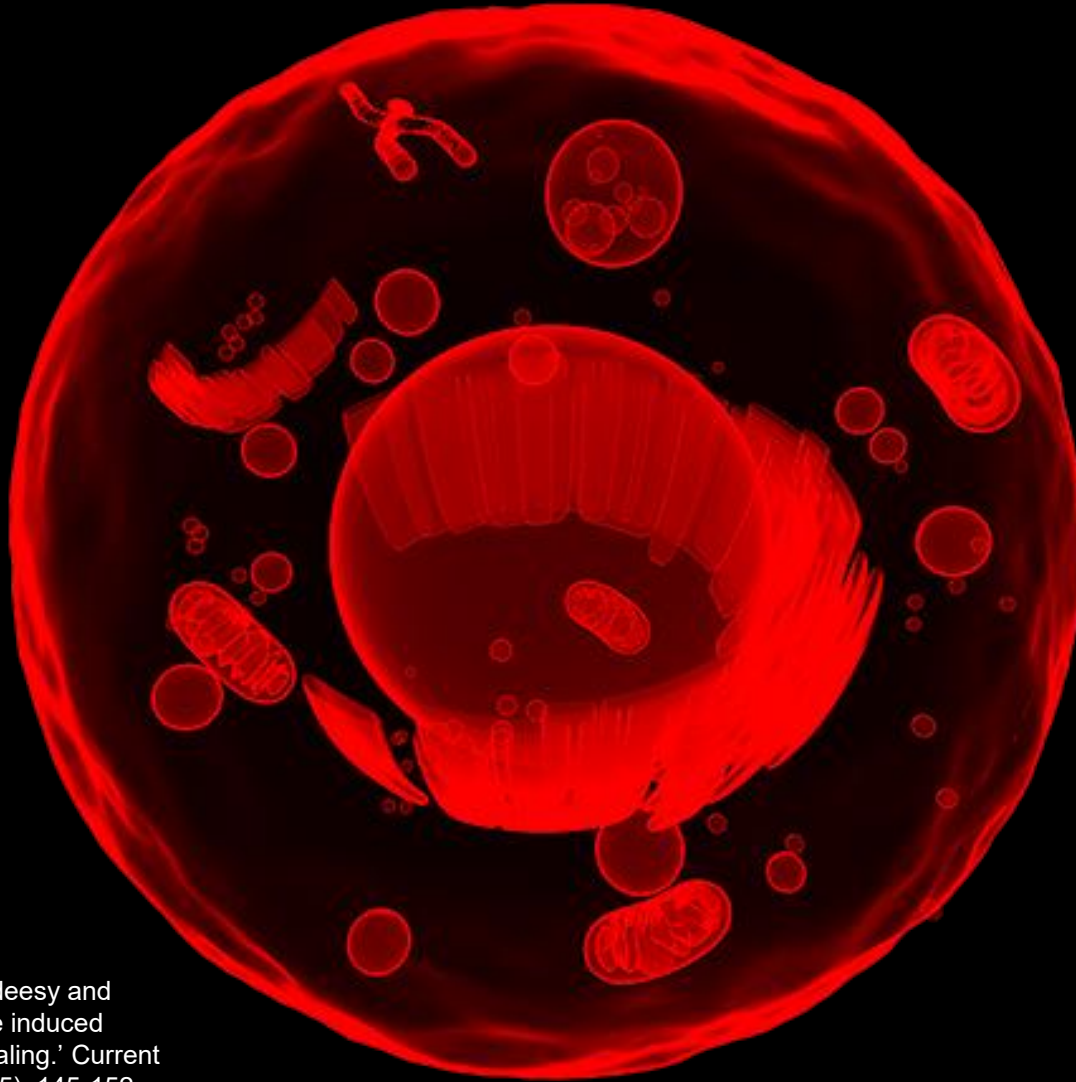
# Telomeres get shorter



Epel, Elissa, et al. Can meditation slow rate of cellular aging? Cognitive stress, mindfulness, and telomeres. *Annals of the New York Academy of Sciences* 1172.1 (2009): 34-53



# Senescence: the end of the cell



Hezel, Aram F., Nabeel Bardeesy and Richard S. Maser. 'Telomere induced senescence: end game signaling.' *Current molecular medicine* 5.2 (2005): 145-152.



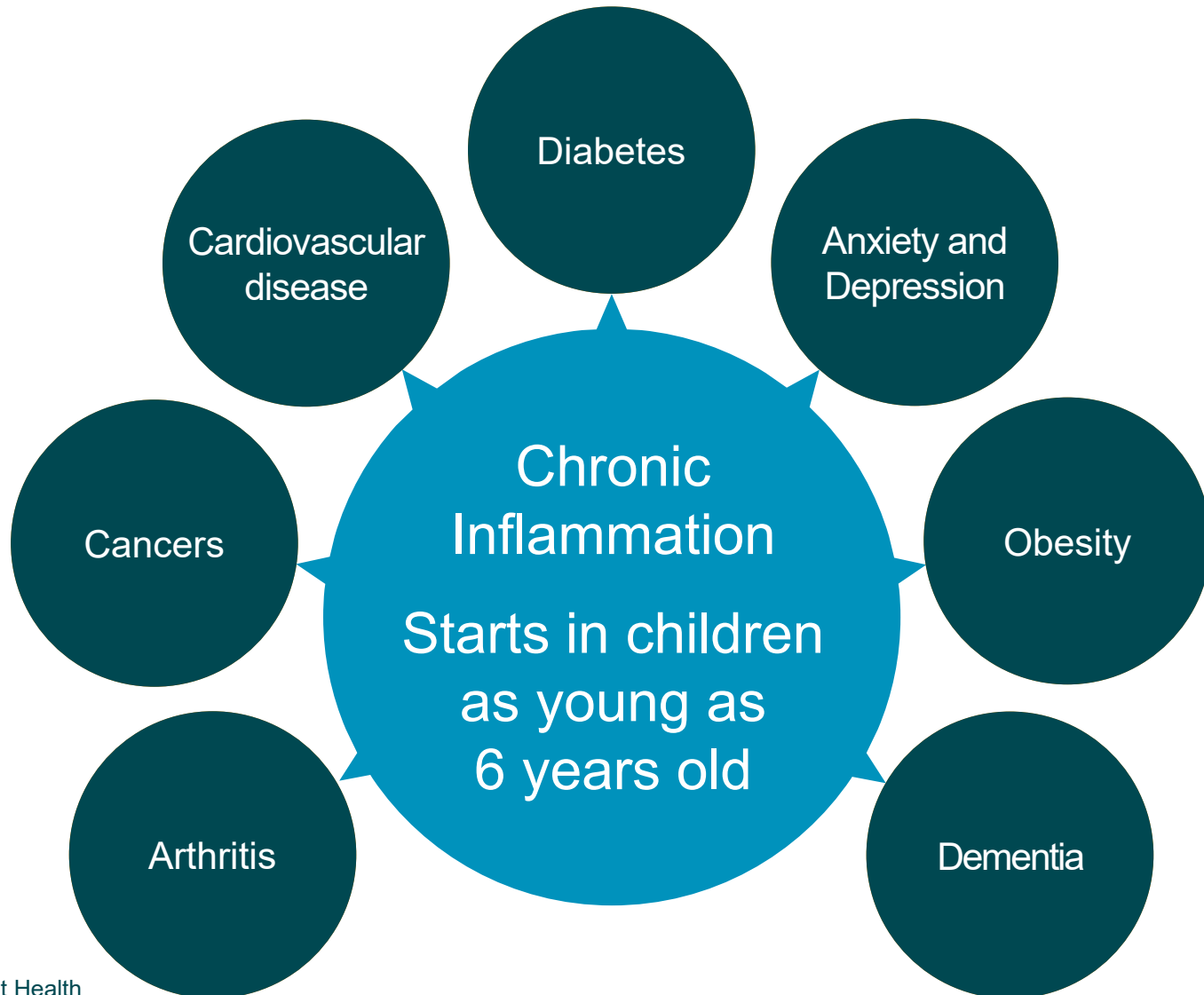


# This causes inflammation

Immune system  
is constantly  
switched on



# Inflammation: 'the cause of causes'





# The Burden of Long Term Conditions

- People with one or more long-term conditions account for £7 out of every £10 spent on health and care in England.
- Patients with a single long-term condition cost about £3,000 per year whilst those with three or more conditions cost nearly £8,000 per year. These multimorbid, high-cost patients are projected to grow from 1.9 million in 2008 to 2.9 million in 2018.
- That's £15.2 Billion now and £23.2 billion in 2018



# CCG and Public Health Budget

	Central Manchester £000's	North Manchester £1000's	South Manchester £000's	Public Health (Covering all three CCGs) £000's
Population	211,000	163,000	160,000	503,000
GP Practices	40	36	25	
<b>Total Allocation</b>	<b>282,062</b>	<b>294,377</b>	<b>242,675</b>	<b>41,738</b>
Secondary care	134,625	139,317	117,984	
Greater Manchester Collaboratively Commissioned Services	18,715	19,174	15,332	
Mental Health	36,335	37,091	24,017	
Community Services	27,533	27,307	26,209	
Prescribing	27,432	33,513	27,996	
Other				



# Cost of Physical Inactivity from 6 conditions in Liverpool (excluding mental health, frail elderly, musculoskeletal and obesity)

	Number	Number reduced if 100% population becomes active	Cost due to inactivity
Deaths (39-79)	2315	424	
Diabetes (Prevalence)	17767	2452	£2,485,000
CHD (Emergency admissions)	1287	146	£5,721,000
Breast Cancer (New Cases)	261	55	£425,700
Bowel Cancer	211	43	£502,000
Stroke			£1,685,000
Cost (total for Liverpool UA for 1 year)			£10,820,000
Cost (per 100,000)			£2,423,000



# Health Benefits of Physical Activity

Those patients who are inactive have:

- 38% more days in hospital
- 5.5% more GP visits
- 12% more nurse visits

REF: Department of Health 2009 Let's Get Moving



People



Loneliness

Place



Hostile

Purpose



Rejection

## Fear and Chronic Stress



# Chronic Stress

Stress  
Hormones

Physical  
Inactivity

And other  
poor health  
behaviours

leads to inflammation  
Mitochondrial damage and telomere shortening

Depression

Cancers

Cardiovascular

Diabetes

Dementia





Increases articular  
thickness in joints





Increases Hippocampus  
by 20%







Reduces Breast Cancer  
recurrence by 24%



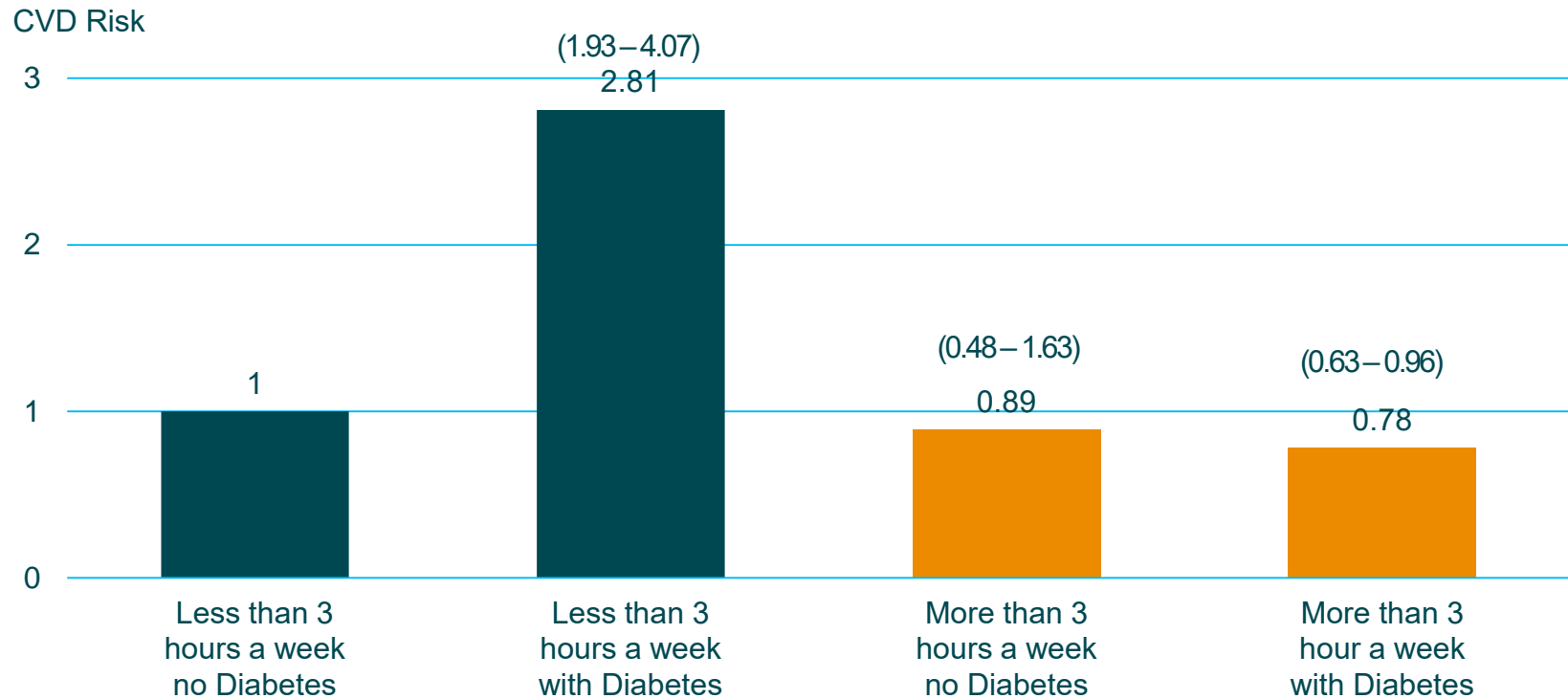


# Boosts Natural Killer Cells



# Physical Activity clears all CVD risk from patients with Diabetes

Follow up of 53,973 Norwegian Men (recruited 1995). Adjusted for weight, 1,750 deaths from CVD in 2008. Less than 3 hours vs more than 3 hours a week of Physical Activity



Moe B et al Diabetes Care March 2013 vol. 36 no. 3 690-695



To make a step change in activity levels we need to be bold

Let's  
remove  
boundaries  
and turn a whole  
town into a  
playground!



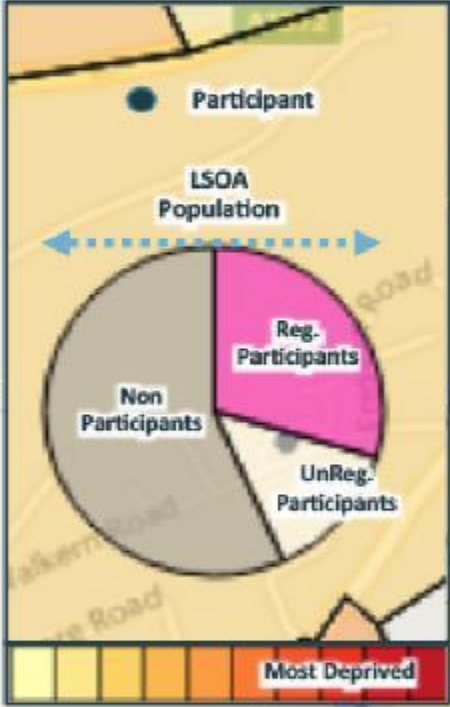
# Step change across a community



# Beat the Street 2015

10,506  
people (23%)  
had a long-term  
medical condition  
such as diabetes,  
asthma or heart  
disease

# Getting inactive people engaged

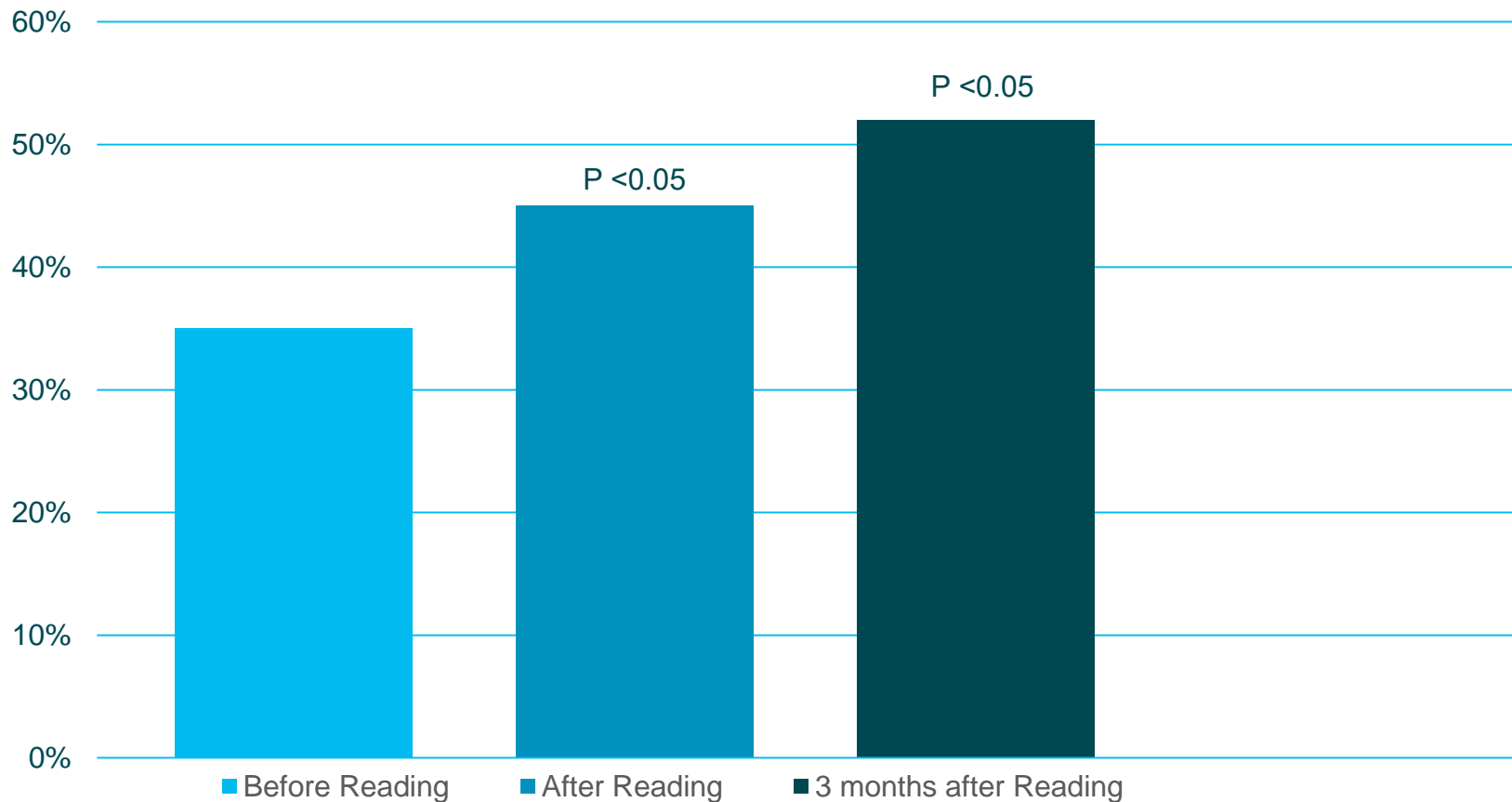


Beat the Street well represents deprived communities



# Changes in Physical Activity Beat the Street Reading 2014

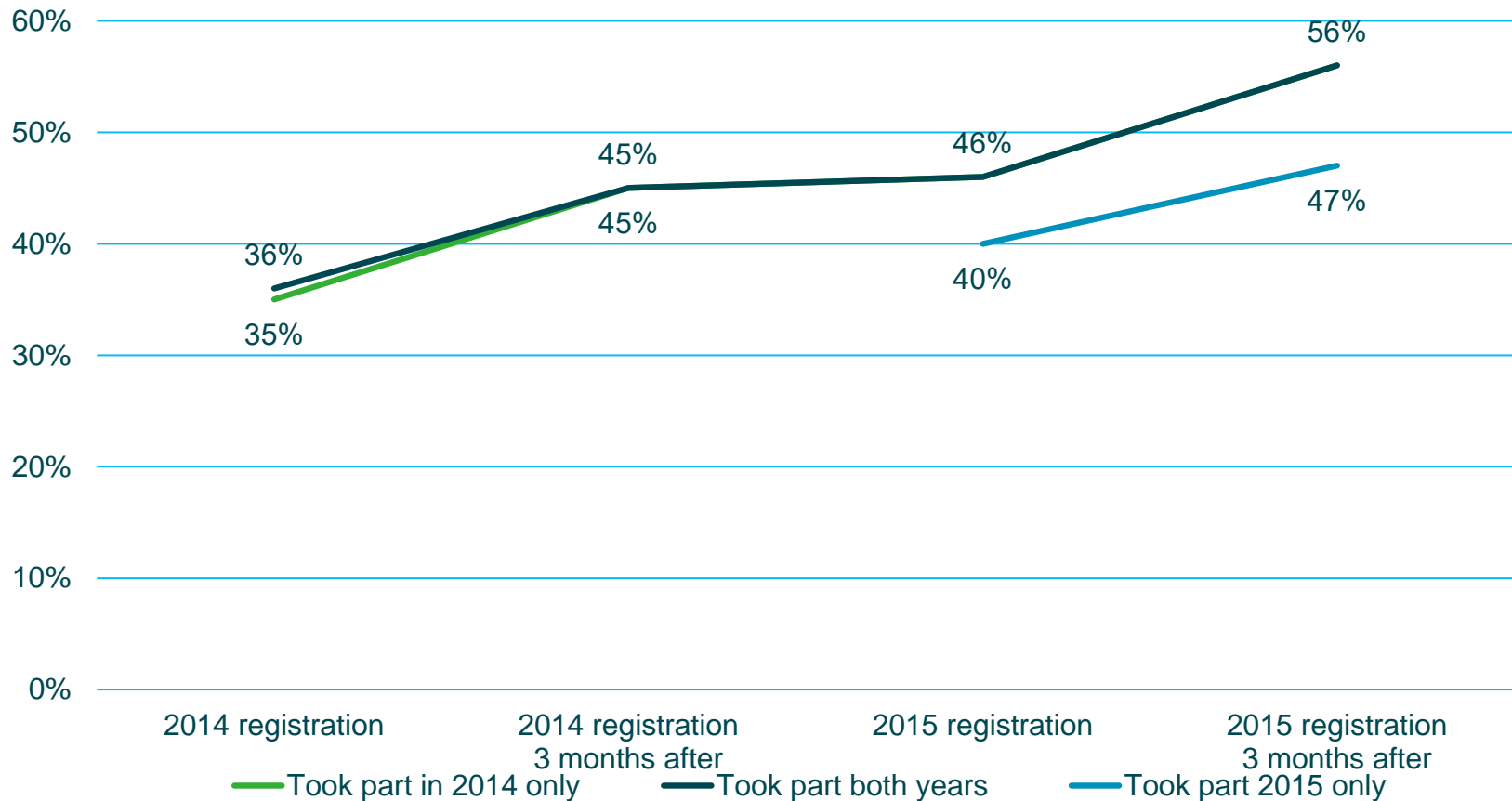
Achieving 30 minutes of activity 5 days a week





# Beat the Street Reading

Over two years in Reading there has been a 20% increase in the number of people reaching the Government recommended activity levels of 150 minutes a week



# For every £1 spent on Beat the Street after 2 years

NICE ROI tool:

- Transport £3.53
- Healthcare £14.58
- Productivity £16.39





# Building Active Communities

