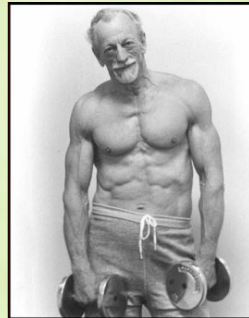


Effects of environment and lifestyle on aging



A&S300-002 Jim Lund

Healthy aging

Interaction between:

- Genes
- The environment
- Lifestyle factors
 - Diet
 - Physical activity.

Genetic Heritability of Human Lifespan

Cournil & Kirkwood 2001

Twin Studies

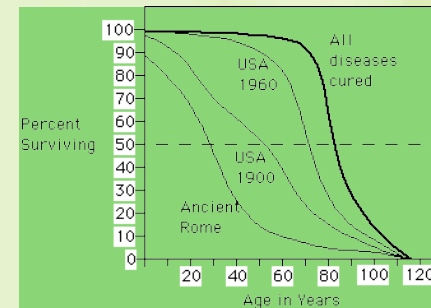
- | | |
|---------------------------|-------|
| • McGue et al (1993) | 0.22 |
| • Herskind et al (1996) | 0.25 |
| • Ljungquist et al (1998) | <0.33 |

Traditional Family Studies

- | | |
|---------------------------------|-----------|
| • Philippe (1978) | 0-0.24 |
| • Bocquet-Appel & Jakobi (1990) | 0.10-0.30 |
| • Mayer (1990) | 0.10-0.33 |
| • Gavrilova et al (1998) | 0.18-0.58 |
| • Cournil et al (2000) | 0.27 |

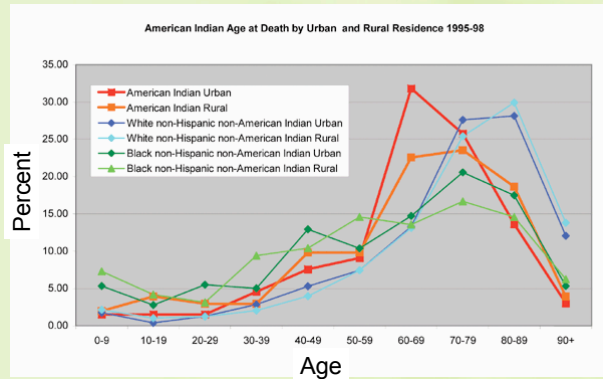
Genes account for 25% of what determines longevity

Mean vs. maximum lifespan.

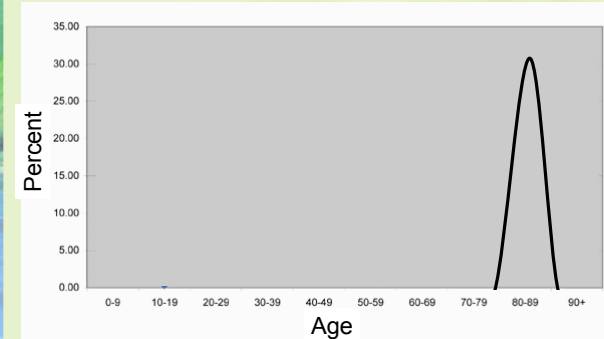


Most environmental and lifestyle factors affect the **mean**, not the **maximum** lifespan.

Age at death, current



Age at death, ideal



"Successful Ageing is defined as the ability to maintain low risk of disease or disability, high mental & physical function, and active engagement with life."

MacArthur Foundation Study

Environmental effects

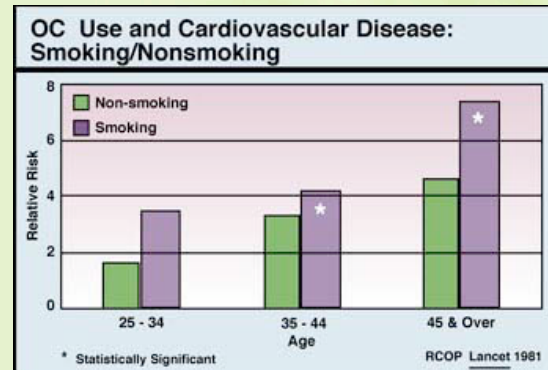
Sun damage causes premature aging of the skin:



Smoking!

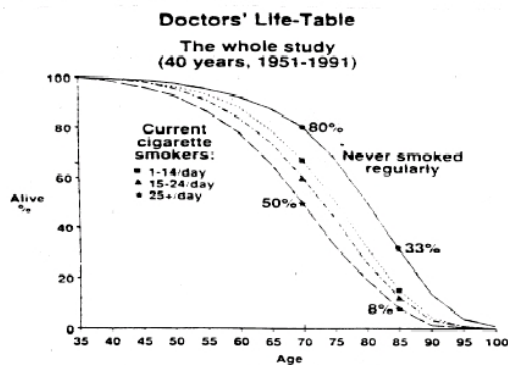


Smoking->premature aging



Smoking->premature aging

Source: Doll et al. BMJ 1994;309:901-911



Negative Tobacco Outcomes

- Smoking harms nearly every organ of the body.
- Smoking low tar and nicotine cigarettes has not been shown to be any less damaging.
- Smokeless tobacco also causes cancer.
- Smoking also causes gum disease, bone loss, ulcers and many other diseases.

Benefits of Quitting Tobacco

- Quitting has immediate as well as long term health benefits.
 - Health and survival of smokers who quit begins to trend toward that of non-smokers.
- Quitting improves the health of those around you.

Other environmental factors

- Work environment toxins:
 - Particulates, asbestos (lungs).
 - Chemical toxins (liver, kidney).
- Environmental toxins
 - Heavy metals
 - Lead, mercury (brain)
 - Smog, particulates (lungs).

What wrong with Kentucky?

ADULT SMOKING RATES BY STATES, 2006
National Average 20.1

Rank	State	2006 Adult Smoking Rate	Rank	State	2006 Adult Smoking Rate	Rank	State	2006 Adult Smoking Rate
1	Kentucky	28.5	18	Wyoming	21.6	35	Oregon	18.5
2	West Virginia	25.7	19	Pennsylvania	21.5	36	Minnesota	18.3
3	Mississippi	25.1	20	Iowa	21.4	37	Arizona	18.2
3	Oklahoma	25.1	21	Florida	21	37	New York	18.2
5	Indiana	24.1	22	Maine	20.9	39	New Jersey	18
6	Alaska	24	23	Wisconsin	20.8	39	Vermont	18
7	Arkansas	23.7	24	Illinois	20.5	41	Colorado	17.9
8	Louisiana	23.4	25	South Dakota	20.3	41	District of Columbia	17.9
9	Alabama	23.2	26	New Mexico	20.1	41	Texas	17.9
9	Missouri	23.2	27	Kansas	20	44	Massachusetts	17.8
11	Tennessee	22.6	28	Georgia	19.9	45	Maryland	17.7
12	Michigan	22.4	29	North Dakota	19.5	46	Hawaii	17.5
12	Ohio	22.4	30	Virginia	19.3	47	Washington	17.1
14	South Carolina	22.3	31	Rhode Island	19.2	48	Connecticut	17
15	Nevada	22.2	32	Montana	18.9	49	Idaho	16.8
16	North Carolina	22.1	33	Nebraska	18.7	50	California	14.9
17	Delaware	21.7	33	New Hampshire	18.7	51	Utah	9.8

Centers for Disease Control and Prevention, Behavior Risk Factor Surveillance Survey, 2006.

Successful Ageing concerns itself with:

- How you can maximise function as you age
- Minimising the 'period of morbidity'
- A risk-management strategy for one's own well-being
- Healthspan in relation to lifespan
- Successful Aging is not a denial of the ageing process

Emerging research data concludes:

- As we grow older, the influence of environmental factors on our health become more important, and the influence of genetic factors becomes less important.
- Our course in older age is not predetermined.
- The frailty of old age is essentially avoidable and largely reversible.

Harvard Medical School Report 2001

These signs of ageing are often accepted as 'usual' in the mature individual, however, research has now established these 'usual' conditions are caused in large part by our pathology – how we live – and not only by our biology – our genes.

The 1% Rule

- Old consensus view: after age 25, we lose 1% per year in aerobic capacity, strength, speed and other physical attributes.
- This is not necessarily the case, activity, exercise, and diet have strong effects on function, the decline in many physical parameters can be halted or slowed.

Poor Lifestyle Choices

Sedentary lifestyle.
Poor food choices.
Use of alcohol.
Use of tobacco products.
Lack of understanding of consequences.
Lack of motivation to change.



Cycle of De-conditioning

- Higher level of fatigue and pain with aging.
- May lead to decrease in physical activity.
- Result is downward spiral in fitness and increase in health problems.

Negative Outcomes: Hypokinetic Diseases

- Heart Disease
- Stroke
- Diabetes
- Osteoporosis



Benefits of Physical Activity

- Can make a substantial difference in a person's life, *regardless of age or disability*
- Add life to one's years rather than adding years to one's life

Benefits of Physical Activity

Can make a substantial difference in a person's life, *regardless of age or disability*

- Decrease blood pressure
- Increase strength, CV endurance
- Increase balance
- Increase lung and breathing function
- Improve immune function
- Reduce depression and anxiety
- Control obesity

Components of Physical Fitness

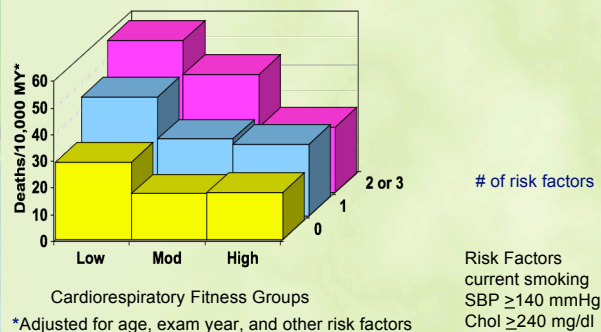
- Muscle strength and endurance
- Flexibility
- Body composition
- Cardiovascular endurance

Fatigue And Rest

- Fatigue is a side effect of many chronic conditions.
- Fatigue can also be caused by depression, stress, medications or weakness.
- A common response to fatigue is rest.
- When fatigue is caused by depression, stress, or weakness, exercise will alleviate the fatigue and *rest will only increase it*.
- Once a person starts exercising, s/he will gain confidence in their ability to control their symptoms.

Cardio respiratory Fitness, Risk Factors and All-Cause Mortality, Men, ACLS


The Aerobics Center Longitudinal Study
(Steven N. Blair, Cooper Institute, Dallas, Texas)



Blair SN et al. JAMA 1996; 276:205-10

Obesity

- An obese 20-year-old man may have his life expectancy cut by as many as 13 years compared with normal-weight people
- For an obese 20-year-old woman, the reduction is 8 years, concludes the study based on three decades of data from US mortality studies.
- Women obese at the age of 40 lost 7.1 years of life, while obese men lost 5.8 years, study of the medical records of 3500 US adults.
- Being overweight at 40, rather than obese, shortens life expectancy by around three years.
- Worse for smokers, with overweight adults dying seven years before their non-smoking counterparts, and obese smokers dying 13 to 14 years earlier (Annals of Internal Medicine).




The dominant effect of fitness over other risk factors, and its apparent effect as an antidote for other risk factors, makes physical fitness perhaps the single most important thing an older person can do to remain healthy.

(MacArthur Foundation Study)

Cognitive ability


- Cognitive ability is not one function.
- Research indicates 2 areas of change in cognitive performance as we age:
 - Speed of processing information
 - Certain types of memory.

Cognitive Function



More than 50% of decline of cognitive function in older age is determined by genetic factors (more than other functions).

However, this still leaves considerable influence for lifestyle factors.



Research has established the following as direct contributors to maintaining cognitive function:

- Learning
- Physical Activity
- Self-Efficacy
- Complex Environments
- Mild Stress
- Nutrition

Cancer

Arises from a variety of factors:

- Family history/genetics (1-5%)
- Environmental causes
 - i.e. Smoking-30% of all cancer deaths in USA
- Dietary factors (poor nutrition-1/3 of all cancer deaths in US)
- Lifestyle choices
 - Lack of exercise, diet, exposure to toxins-cigarettes

Lifestyle and cancer

- Diet:
 - Poor diet is an equivalent risk compared to tobacco.
 - High fiber & vegetables reduces risk for ten cancers
 - Red meat increases risk of certain cancers.
 - Salt increases risk of stomach cancer
 - Total fat intake linked to hormone related cancers lung/colorectal and breast (Note: risk is with animal not vegetable fats and most studies now show that breast cancer risk not increased with increased fat intake-olive oil reduces breast cancer risk: *(Martin-Moreno et al 1994; Trichopoulos et al 1995)*)
- Alcohol
 - Synergistic with alcohol in cancer of upper digestive tract
 - Implicated in risk for breast, liver and colon cancers

Lifestyle and cancer

- Exercise
 - Exercise decreases risk for colon, breast and prostate CA's
 - 30 minutes brisk exercise/daily decreases incidence of certain CA's by 15% (colon in specific)
(Cancer causes and control 1996;1997)
- Poverty
 - Considered a significant carcinogen
 - Confounded by increased use of tobacco, alcohol, poor diets. *(Bal 1992)*

"No one is terrified about growing old in itself, but the terror is in becoming clinically dependant."

Prof. Suresh Rattan, DSc, PhD. Research Professor, University of Aarhus, Denmark

Successful aging: middle age, 1st 1/2

- Maintain desirable weight
- Optimal nutrition.
- Regular exercise.
- Regular health checkups, treat conditions as appropriate.
- Avoid toxic exposures.

Successful aging: middle age, 2nd 1/2

- Optimal nutrition.
 - Women: Ca and vit D supplements.
 - Men: a diet that prevents cardiovascular disease
- Regular exercise.
- Regular health checkups to catch serious problems early.
 - Men: prostate screening.
 - Women: mamograms.
- Manage chronic disease conditions.
- Avoid toxic exposures.
- Remain socially engaged.

Successful aging: old age

- Optimal nutrition including supplements.
- Continue exercise as possible.
- Regular health surveillance and problem management.
 - Emphasis on maintenance of function (social, physical, psychological).
 - More near term interventions: diabetes, CV disease, immunizations.
- Continue education.
- Remain socially engaged.