BACK PAIN

INDIVIDUAL AND GENETIC FACTORS

Charlotte Leboeuf-Yde, D.C., MPH, Ph.D.
Research Director
The Medical Research Unit
Ringkøbing
Denmark
WHAT IS BACK PAIN?

Having back pain

Reporting back pain

Consequences of back pain
- reduced activities
- seek care
- sick leave
- early pension
CLASSIFICATIONS OF "INDIVIDUAL FACTORS"

Cause
Genetic  -  Acquired

Expression
-Anatomy / morphology
-Personality / psychology
-Behavior
WHAT CAUSES WHAT AND WHEN?

Infant → Child → Adolescent → Adult → Senior Citizen
MY SOURCES OF EVIDENCE

1. Systematic critical literature reviews
2. Epidemiologic studies
3. Genetic epidemiologic studies
1. SYSTEMATIC CRITICAL LITERATURE REVIEW

- high ascertainment of articles
- explicit inclusion/exclusion criteria
- objective assessment of quality and outcome
- quantification of results
2. EPIDEMIOLOGY

- large study samples
- representative of the general population

- The Danish twin registry N=30.000 (12-41 yrs)
- The Swedish military conscript database N=50.000 (18 yrs)
- The Odense school study N=500 (11 yrs)
  N=300 (15 yrs)
- The Odense MRI study N=450 (14 yrs)
  N=400 (40 yrs)
Comparison of concordance rates of a finding in MZ vs. DZ twins

MZ = MONOZYGOTIC = IDENTICAL
DZ = DIZYGOTIC = NON-IDENTICAL

The concordance rate is higher in MZ pairs than in DZ pairs, if the finding is genetically determined.
3b. GENETIC EPIDEMIOLOGY:

TWIN CONTROL METHOD

- If an external factor really causes a disease,

  then the MZ twin **with** this factor **will have** the disease

  and the co-twin **without** this factor **will not** have the disease.
MYTHS OR REALITY?

Sedentary life style
- physical inactivity
- office work
- obesity
- smoking

BUT ALSO
Hard physical work……..?

Radiologic findings irrelevant
The evidence
BACK PAIN IN CHILDREN / ADOLESCENTS

<table>
<thead>
<tr>
<th></th>
<th>LR</th>
<th>Epid</th>
<th>G Epid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frail babies</td>
<td>-</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Genetics</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>Lumbar pathology (MRI)</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>Early disc degeneration</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>Co-morbidity</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Height</td>
<td>-</td>
<td>Yes…but</td>
<td>-</td>
</tr>
<tr>
<td>Weight</td>
<td>-</td>
<td>Yes…but</td>
<td>No</td>
</tr>
<tr>
<td>Social class</td>
<td>Mixed</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td>Intellectual capacity</td>
<td>-</td>
<td>Yes…but</td>
<td>-</td>
</tr>
<tr>
<td>Type of education</td>
<td>-</td>
<td>Yes…but</td>
<td>-</td>
</tr>
<tr>
<td>Coping</td>
<td>-</td>
<td>Yes!</td>
<td>-</td>
</tr>
<tr>
<td>Alcohol</td>
<td>-</td>
<td>Yes…but</td>
<td>No</td>
</tr>
<tr>
<td>Smoking</td>
<td>-</td>
<td>Yes…but</td>
<td>No</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>Mixed</td>
<td>Yes…but</td>
<td>-</td>
</tr>
</tbody>
</table>
## The evidence
### BACK PAIN IN ADULTS

<table>
<thead>
<tr>
<th>Factor</th>
<th>Lit. review</th>
<th>Epid.</th>
<th>G. Epid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genetics</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>Lumbar pathology</td>
<td>-</td>
<td>No…but</td>
<td>-</td>
</tr>
<tr>
<td>Disc degeneration</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>Weight</td>
<td>Mixed</td>
<td>Yes…but</td>
<td>No</td>
</tr>
<tr>
<td>Smoke</td>
<td>Mixed</td>
<td>Yes…but</td>
<td>No</td>
</tr>
<tr>
<td>Hard work</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sitting work</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
METHODOLOGICAL IMPROVEMENTS

- Definition of "cause" and effect need to be uniform

- Large scale studies of general population needed in order to:
  - prevent bias
  - allow for multi variable analyses.

- Statistical associations not sufficient to establish cause:
  Remember the Bradford Hill criteria for causality!

- Analysis for confounding must be evidence-based and not just a statistical exercise.
CONCLUSIONS

MYTHS or REALITY, revisited

Sedentary lifestyle  NO

Hard work  YES

Radiologic findings  SOME
BUT ALSO.....

- genetics, co-morbidity and poor coping
- weak physiological and psychological construction
NEW POSSIBLE MODEL

Persons at risk  

rather than 

risk factors
Early identification of a *high risk population* would allow for a *selective* preventive approach.