Occupational Asthma
Management Beyond the Textbooks
Paul Cullinan MD, FRCP

Premise and plan…

- Good respiratory physicians know a lot about occupational asthma
  - But don’t often see it
  - And may not be sure about some of the intricacies
- Occupational asthma is rarely ‘severe’ asthma…
  ...but its consequences often are
- Intricacies by a single case report

Consider…

47 year old

- No relevant past medical history
- Non-smoker
- September 2008: short of breath -- Dx chest infection by GP
- Christmas 2008: short of breath + wheeze – 1/52 hospital Dx asthma
- Rx asthma since
- February 2009: returned to work
- Symptoms persist but better
- 2 week holiday in Crete: symptoms resolved
- Q1: what other information do you need?
Consider an occupational aetiology…

- In every working adult with asthma that is:
  - New
  - Recurrent, or
  - Deteriorating/Proving difficult to manage
- Especially if they are working with a recognised respiratory sensitising agent

Consider…

- 22 years work in a factory making foam insulating board
- New process January 2008
Consider…

- 22 years work in a factory making foam insulating board
- New process January 2008

- Q2: is it possible that his work is causally related to his diagnosis of asthma?
  or
- Is he working with a recognised ‘respiratory sensitising agent’?

Most occupational asthma arises from specific sensitisation

- An agent at work is:
  - Known to be a respiratory sensitiser (n=400)
  - Known not to be a respiratory sensitiser
  - Not known not to be respiratory sensitiser
- The last is tricky…
Is your patient working with a respiratory sensitising agent?

Agent on my 'familiar list'?

Yes

Consider OA

Respiratory sensitising agents: high molecular mass

- Whole allergens

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Exposure(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baking</td>
<td>Flour(s)</td>
</tr>
<tr>
<td></td>
<td>Alpha amylase (‘improver’)</td>
</tr>
<tr>
<td></td>
<td>Egg</td>
</tr>
<tr>
<td>Animal work</td>
<td>Small mammals</td>
</tr>
<tr>
<td></td>
<td>Large mammals</td>
</tr>
<tr>
<td></td>
<td>Insects</td>
</tr>
<tr>
<td>Food processing</td>
<td>Seafood</td>
</tr>
<tr>
<td></td>
<td>Tea/coffee</td>
</tr>
<tr>
<td></td>
<td>Eggs</td>
</tr>
<tr>
<td></td>
<td>Flour</td>
</tr>
<tr>
<td></td>
<td>Latex</td>
</tr>
<tr>
<td>Detergent manuf.</td>
<td>Enzymes</td>
</tr>
<tr>
<td>Health care</td>
<td>Latex</td>
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</tbody>
</table>

All induce specific IgE response

Respiratory sensitising agents: low molecular mass

- Hapten-protein conjugates

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Exposure(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spray painting</td>
<td>Hexamethylene diisocyanate</td>
</tr>
<tr>
<td>Foam manufacture</td>
<td>Toluene diisocyanate</td>
</tr>
<tr>
<td></td>
<td>Methylene diphenyldiisocyanate</td>
</tr>
<tr>
<td>Electronic engineering</td>
<td>Colophony fume</td>
</tr>
<tr>
<td></td>
<td>Cyanuric acid</td>
</tr>
<tr>
<td></td>
<td>Persulphate salts</td>
</tr>
<tr>
<td>Woodwork</td>
<td>Tropical wood dusts</td>
</tr>
<tr>
<td>Hairdressing</td>
<td>Persulphate salts</td>
</tr>
<tr>
<td>Dentistry</td>
<td>Methacrylates</td>
</tr>
<tr>
<td>Orthopodics</td>
<td>Latex</td>
</tr>
<tr>
<td>Textile printing</td>
<td>Reactive dyes</td>
</tr>
<tr>
<td>Precious metal refining</td>
<td>Platinum salts</td>
</tr>
</tbody>
</table>

Some induce specific IgE response
**Some tips...**

- All airborne proteins are (potentially) sensitising agents
- Many chemicals with powerful odours are not ...  
  — Solvents  
  — ‘Thinners’  
  — Perfumes  
  — Many (but not all) glues  
  ...and are thus improbable causes of ‘sensitisation’
- Be wary of diagnosing ‘occupational asthma’ in anyone who is not working with a recognised respiratory sensitising agent
Recall…

- 22 years work in a factory making foam insulating board
- New process January 2008

Q2: is he working with a recognised ‘respiratory sensitising agent’?
- Yes... ‘foam’ is a polymer made using ‘polyol’ and MDI
  MDI = methylene phenylisocyanate

Hence…

- Adult onset asthma
- Shortly after introduction of new process
- Works with known respiratory sensitising agent
- Symptoms improve on holiday

Q3: what is the (prior) probability that this man has occupational asthma?
Q4: how important is it to know (and how certain do you want to be)?

Occupational asthma or work-exacerbated asthma

- Occupational asthma (OA):
  - That which has arisen de novo from an exposure encountered at work
- Work-exacerbated asthma (WEA):
  - Pre-existing, recurrent or coincidental asthma that is exacerbated by exposure(s) in the workplace
Occupational asthma or work-exacerbated asthma: why does it matter?

<table>
<thead>
<tr>
<th></th>
<th>OA</th>
<th>WEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continued exposure:</td>
<td>Worsens prognosis</td>
<td>Doesn't affect prognosis</td>
</tr>
<tr>
<td>Treatment:</td>
<td>Useless</td>
<td>Effective</td>
</tr>
<tr>
<td>RPE:</td>
<td>Often useless</td>
<td>Effective</td>
</tr>
<tr>
<td>Cure?:</td>
<td>Yes (but ...)</td>
<td>No</td>
</tr>
<tr>
<td>Legal?:</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Relocation:</td>
<td>Yes</td>
<td>Generally no</td>
</tr>
<tr>
<td>Compensation:</td>
<td>Yes</td>
<td>No</td>
</tr>
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</table>

Getting it right matters…

Locating your patient: understanding the context (UK)

Family doctor → In-house provider → Occupational health

Case of OA → Referral for opinion → HSE

Avoidance of further exposure ‘relocation’
Relocation of an employee with occupational asthma

- Retention in job, adjustment to tasks
- Re-training, protected position
- Re-location within firm
- Redundancy
- Size of workforce
- Attitude of employer/OH
- Experience of OA

Self-employed...

So...

- Are you sure that you (both) want to go the whole way?
- On the one hand:
  — You have a good chance of curing their asthma
  — You will certainly stop it getting worse
  — If you miss an occupational cause then treatment is useless
- On the other:
  — They are likely to suffer major disruption at work…
  …and may become fairly unpopular there
  — They may very well need to change (lose) their job…
  …and find it difficult to get another
- Hence:
  — Getting it wrong can be disastrous
  — Beware ‘being on the safe side’

Back to the case 1

- Adult onset asthma
- Shortly after introduction of new process
- Works with known respiratory sensitising agent
- Symptoms improve on holiday
- Q5: is immunology going to be helpful?
- Negative specific IgE test for MDI
- Specific IgE in disocyanate asthma is of:
  — Low sensitivity (lots of false negatives)
  — High specificity (few false positives)
  — Hence helpful if positive
Using immunology intelligently in occupational asthma

<table>
<thead>
<tr>
<th>Is it a protein?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No, or not sure</td>
</tr>
</tbody>
</table>

IgE tests are:
- Highly sensitive
- Widely available
- Hence helpful when negative
- Ask for the right one(s)

Ask for expert help

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**Back to the case 2**

- Adult-onset asthma
- Shortly after introduction of new process
- Works with known respiratory sensitising agent
- Symptoms improve on holiday
- Specific immunology negative
- Q6: what might you do next?
- Comparison of function at and away from work
  - Serial measurement of PEF:
    - Every two hours (six times daily)
    - Four weeks
    - At and away from work
    - Plot of daily measurements:
      - Mean
      - Maximum
      - Minimum

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**Peak flow (max, mean, min) L/minute**
Now where are you?

- Adult onset asthma
- Shortly after introduction of new process
- Works with known respiratory sensitising agent
- Symptoms improve on holiday
- Immunology unhelpful
- Serial PEFs look negative
- Q7: is this enough?
  - How sure do you (both) need to be?
  - Is there anything else on offer?
- Specific inhalation challenge

Specific inhalation challenge

- Controlled exposure to workplace agent
- Inpatient procedure
- Requires experience and expertise
  - Available in few centres
- Used when:
  - Other diagnostic approaches have not proved definitive
  - A previously unrecognised agent is under consideration
  - It's important to distinguish two or more agents
  - Not for legal purposes

Results of specific inhalation challenge
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Outcome

- Back at work
- Asymptomatic
- Off treatment
- Not everything is ‘asthma’
- Probably all infective
- Note that ‘working with’ ≠ ‘exposed to’

A brief summary

- Suspect an occupational cause in all cases of new, recurrent or deteriorating asthma in working adults
- Understand ‘respiratory sensitising agent’
- Have a feeling for your patient’s ‘location’ within the workplace
- Go in with all (4) eyes open
- Get it right:
  — A positive diagnosis can be curative
  — A false positive diagnosis can be disastrous
- Be specific about the agent(s)
- Act fast
- Caution is not always the better part of anything