

Forensic approach to medical causation when allergic disease is in the differential diagnosis

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ABSTRACT

As physicians, we are advocates for our patients. As allergists, we probe patient exposures. Occasionally, our good intentions find us entwined with forensic matters. Unfortunately, we have little formal training in toxicological, epidemiological, or evidence-based medicine methodology when determining exposure-related medical causation. This article provides such an approach and suggests helpful hints of conduct.

(Allergy Asthma Proc 31:1–4, 2010; doi: 10.2500/aap.2010.31.3303)

Key words: Advocates, epidemiological, evidence-based medicine, forensic, methodology, patients, toxicological

Allergists attract patients with a myriad of health complaints which are accurately or erroneously ascribed to “an allergic reaction.” We pride ourselves in thorough history taking with particular concern for allergic and irritant environmental exposures. The proper approach to concluding medical causation from some of these agents becomes essential when the legal system is in play. Here is the approach I have refined over the past 15 years as a medical expert for environmental exposure issues, focusing on the proper questions to be asked and the appropriate methodology for causation to be used.

A typical scenario goes something like this. A patient comes into your office with symptoms suggestive of chronic rhinitis and/or chronic rhinosinusitis and/or asthma. This is familiar ground. She feels that her symptoms are related to her work environment or to something in her home. This is still familiar territory, but could get a little complicated. She wants you to write a letter excusing her from work (Workers’ Compensation issues) or a letter to her homeowners’ insurance company (civil action issues). This is now a less familiar and more complex situation. Her attorney would like a report and wants to know if you would testify as a medical expert in court. Are you now feeling a little uneasy?

As we all appreciate, the 1980s and 1990s were beset with numerous syndromes/illnesses including multiple chemical sensitivities syndrome, *Candida* hypersensitivity syndrome, attention deficit disorder, chronic

fatigue syndrome, fibromyalgia syndrome, sick building syndrome, building-related illness, latex allergy, and, most recently, “toxic mold syndrome.” Throughout your practice, you have also experienced patients claiming “allergies” to formaldehyde from insulation/plywood off-gassing, pesticides, perfumes, household chemicals, and the like. Some of these conditions have no evidence-based medicine to support them, some are bonafide illnesses with health claims going beyond the case definition, and others are fraught with popular misconceptions. Without formal training in toxicology or industrial hygiene, you may have experienced frustration and a feeling of inadequacy. You certainly want to do everything that you can for your patient and, as such, may end up in an extensive record review, deposition, and court appearance.

Using a more specific example, a patient comes into your office with her notion of health complaints due to an exposure. Symptoms include nasal congestion, nose bleeds, tearing of eyes, sinus problems, headaches, postnasal drip, frequent sore throats, cough and shortness of breath. The patient has been an office administrator in an accounting firm for the past 20 years. Since Hurricane Andrew in 1992, her office feels damp, has a musty smell and visible mold. With time, additional symptoms develop, including chronic fatigue, aches all over, irritability, sleep disturbance, dizziness, decreased memory, and decreased concentration.

The differential diagnosis is extensive, including mixed (allergic and nonallergic) perennial rhinitis, mixed conjunctivitis, chronic rhinosinusitis, allergic fungal rhinosinusitis, chronic headache syndrome, eustachian tube dysfunction (with or without vertigo), chronic pharyngitis with possible immune dysfunction, chronic cough (extrapulmonic and/or intrapulmonic), bronchospasm/bronchial asthma, and hypersensitivity pneumonitis. Other diagnoses include chronic fatigue syndrome, fibromyalgia syndrome, ob-

From Medical Assessment Institute, Inc., Boca Raton, Florida
Presented at the Eastern Allergy Conference, Palm Beach, Florida, May 1, 2009
This project was not funded and there are no disclosures
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structive sleep apnea, endocrinopathies, and neurocognitive/neuropsychological disorders.¹⁻⁵ Immediate pitfalls include accepting the patient's history as reliable, failing to realize that your medical records can and will be discovered in the legal process, and getting "hooked" as your patient's legal advocate more so than medical advocate.

THE PROPER QUESTIONS

My approach addresses four questions:

- What was the exposure event?
- From which health complaints/illnesses does the patient suffer?
- What can the agent(s) in question cause?
- Has/have the agent(s) in question caused this patient's health complaints/illnesses?

What Was the Exposure Event?

The answer to this seemingly simple question may be quite elusive. A thorough history is essential, focusing on the nature of the exposure as well as the toxicological principles of concentration, route, and duration. All available indoor air quality reports, maintenance records, company health records, and other relevant records should be reviewed. A Material Safety Data Sheet for any given chemical exposure summarizes pertinent chemical, industrial hygiene, toxicological, and medical information. Look for medical records immediately following an acute event (*e.g.*, emergency room and paramedic records). Remote records that have elicited the history months or years later typically provide less accurate information. All available medical records should be reviewed to identify selective history giving, preexisting conditions, and lack of objective documentation by physical examination, *etc.* Psychosocial issues (*e.g.*, discontent with the employer/service provider) must be considered.

From Which Health Complaints/Illnesses Does the Patient Suffer?

Symptoms (subjective complaints) should be accepted at face value rather than discounted or refuted. On the other hand, medical conditions/illnesses should never be accepted historically from the patient or even from the medical records. Be alert to "Interne-topathy" and iatrogenic disease. Signs are objective findings on physical examination that assist in clarifying the origin of the symptoms. Patient misconceptions abound regarding common complaints such as nasal allergies, sinus headaches, frequent colds/sore throats, shortness of breath, and chronic fatigue. Laboratory tests support diagnostic considerations. A differential diagnosis ultimately leads to a final diagnosis. (Attorneys may reference the differential diagnosis process to validate conclusions and procedures not otherwise

peer accepted within the context of the case.) Do not diagnose malingering. Rather, clearly report observations that may indicate discrepancies. Leave malingering and the like to attorneys and psychiatrists/psychologists.

What Can the Agent(s) in Question Cause?

The challenge is to identify which agent(s) is/are involved.

Consider the following:

- "The dose makes the poison."
- Identify concentration, route, and duration of exposure.
- Appreciate the absorption, biodistribution, metabolism, and excretion of the agent(s) involved.
- Understand the types of airborne contaminants, gases, vapors, aerosols (dusts, fumes, smoke, mists, fog, and smog), liquids, and solids.
- Define the size of the airborne particulate matter.
- Determine the degree of water solubility of the inhaled substance.
- Recognize the agent as being an irritant and/or allergen.

In the case cited previously, a damp, musty smelling, visibly moldy environment has been described. Mold is well appreciated to cause and/or aggravate and/or exacerbate allergic rhinitis, allergic conjunctivitis, allergy fungal sinusitis, allergic asthma, allergic bronchopulmonary aspergillosis, and hypersensitivity pneumonitis. Moldy environments can be irritants to the respiratory tract (*e.g.*, volatile organic compound vapors and glucans). However, odor detection must be distinguished from pungency (a mucosal inflammatory response). A learned behavior/conditioned response from the odor must be kept in mind. Damp environments are associated with numerous symptoms and can produce endotoxins, possibly resulting in humidifier fever and a modified organic dust toxic syndrome. Mycotoxicosis may occur with excessive

Table 1 Toxicological methodology

Evidence of exposure
Evidence the exposure results in a dose
Evidence the dose is sufficient to cause the specific disease/ailment
Evidence the chemical causes disease/ailment in humans
Evidence the disease/ailment is temporally concordant with the exposure
Evidence the alleged effect is biologically plausible
Evidence the confounding variables have been eliminated as the possible cause of the disease/ailment

Table 2 Epidemiological methodology

SPECIFICITY of the association is the degree to which one particular exposure produces one particular disease; a single observational study can not provide definitive evidence of a causal link between exposure and disease

STRENGTH of the association is measured by relative risk, odds ratios, standardized mortality ratios, proportionate mortality rates, and the like; these values are derived from appropriately performed epidemiological studies; strength of the association alone is inconclusive for causation

CONSISTENCY of association is of the utmost importance; varying populations fulfilling the same case definition, in different places at different times performed in separate studies by varying groups must yield the same results; the conclusions may then be considered universally accepted tenets

TEMPORAL relationship of the association is a prerequisite for causation; the exposure must precede the disease; although this is a prerequisite, it is by no means validation for causation

COHERENCY of the association is essential; conclusions should be consistent and compatible with that which is known in the scientific community; it must be biologically plausible

DOSE-RESPONSE relationship provides strong support for causation

ABSENCE OF BIAS is mandatory; bias is determined by judgment based on experience and intuitiveness by the reviewer; no statistical formula exists for measuring bias

CONFOUNDING FACTORS must be considered

ingestion but not predictably by the inhalation route in a residential or commercial building setting. The International Agency for Research on Cancer has listed Aflatoxin as a human carcinogen (group 1) and Fumonisin B1 as possibly carcinogenic to humans (group 2B) *via* ingestion.

The same venue and similar scenario may present with a different agent, such as “the China Drywall Syndrome.” Due to a shortage of drywall in the southeastern United States in the early 2000s, drywall was imported from China (used in over 100,000 homes in at least 35 states). This product appears to have been produced in a manner that off-gasses sulfur products, resulting in discoloration and/or corrosion of air-conditioning coils, copper wiring, metal faucets, drains, showerheads, and the like. Health complaints include “allergy-like symptoms,” headaches, dry eyes, chest tightness, and bloody noses. Residents intuitively feel that their noses, eyes, and lungs have got to be at

Table 3 Evidence-based medicine methodology

Evidence-based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients ... integrating individual clinical expertise with the best available external clinical evidence from systematic research

To incorporate rigorous research into clinical expertise, evidence transfer must occur; this process requires framing the right question, finding the evidence, evaluating the evidence, and applying the evidence; many factors considered in toxicological methodology and epidemiological methodology are incorporated into evidence-based medicine methodology

significant risk if this off-gassing can destroy their air-handling units. You may well see a case like this. What will be your approach and methodology?⁶

Has the Agent in Question Caused This Patient’s Health Complaints/Illnesses?

It is imperative to use toxicological methodology, epidemiological methodology, and evidence-based medicine methodology in concluding medical causation or lack thereof (Tables 1–3).^{7–13} Obtain, appreciate, and acknowledge the patient’s impressions of causation in this matter. A physician’s impressions are requested to be stated within a reasonable degree of medical certainty (50.1%), not the scientific standard of 95%. Be aware of this distinction.^{14,15} Your impressions are subject to change based on a review of additional information.

ESSENTIALS

Appreciate your bias as the treating physician and patient advocate. Recognize iatrogenic disease as a confounder. Know your limitations in determining medical causation. Do not accept a historical account of a temporal relationship between the exposure and health complaints/illness as conclusive for causation. Acknowledge your level of expertise in the given matter before becoming an expert witness for your patient.

What should one do in a deposition or court testimony? Be prepared! Review all of your records and have them organized for easy reference. Know the scientific material in question. Leave your ego outside the proceeding. If opposing counsel is ineffective in cross-examination of the medical/scientific facts of the case, the attorney may resort to emotionally charged issues such as your fees, your bill for this particular case, percentage of practice designated for legal work, percentage of legal cases for the defense versus plaintiff, and other irrelevant/inflammatory diversions.

Table 4 Pearls

Assume your patient is telling the truth but recognize the possibility of misconceptions
Do not assume other physician/health care provider impressions are correct; you are ultimately responsible for your diagnostic conclusions and recommendations made
Your medical records may be accessed by subpoena; assume that nothing is “off the record”
Know your limitations in concluding medical causation
Recognize your role in a legal proceeding; be thoroughly prepared; educate the judge and jurors without bias . . . you are not an advocate; tell the truth and keep your composure; be humble; appreciate the privilege; you can make a difference

STAY COMPOSED! Remember, you are humbled to be in this privileged role and recognize your professional responsibility to educate the court without bias. It is not your case to win or lose. You don't own it. You are not an advocate.

ALWAYS TELL THE TRUTH! This simplifies your job substantially. Remember, attorneys have access to all of your prior depositions and court testimonies. Efforts will be made to impeach your integrity. Any inconsistencies you may state should solely be a function of a change in the science. When opposing counsel makes a good scientific point, readily acknowledge it. This demonstrates your unbiased nature and enhances your credibility.

In court testimony, know your material so well that you need not look at it. Maintain good eye contact with the jury. Keep them interested and engaged. Notice how the judge is responding to your testimony. How is the jury feeling about the attorneys? The courtroom is a legal stage with lots of subtle nuances. Experience is helpful. Remember, you're an outsider. The science is

straightforward: *Res ipsa loquitur*—the thing speaks for itself. If effective, you can place good science into case law and keep “junk science” out of the courtroom (Table 4).

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