



## Mold Neurotoxicity: Validity, Reliability and Baloney

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"Mold neurotoxicity" is an increasingly common allegation in personal injury litigation, although it is conspicuously absent from day-to-day medical practice. The current controversy on this subject is driven more by lawyers than by scientific disagreements. The alleged injuries are variously referred to as brain damage, toxic encephalopathy, cognitive deficits, neurobehavioral deficits, neuropsychological impairment, and as facets of sick building syndrome or environmental illness. The alleged symptoms include memory deficits, difficulty concentrating, problems with language and reasoning, mental fatigue, depression, and anxiety. Last year, a Time Magazine article warned: "Like some sort of biblical plague, toxic mold has been creeping through homes, schools and other buildings across the U.S. . . . The biggest winners are the industries feeding off mold mania." (Hamilton 2001)

Despite all this, there is no consistent pattern of symptoms or test results through which a diagnosis of "mold neurotoxicity" can be defined. Nor is there any scientific basis for the allegation that breathing mold spores or mycotoxins in household and commercial office settings causes neuropsychological impairment. The neuropsychological effects of these exposures are unknown. But supposed experts are using naïve and empty arguments, such as saying they cannot think of any other reason why a person suing for millions of dollars might make subjective complaints and that the scientific literature does not **disprove** their speculative opinions. These are "junk science" arguments.

The so-called "study" most often cited as evidence of neuropsychological impairment due to mold neurotoxicity is not actually a scientific study and was not peer reviewed in any conventional sense. The methodology was so weak that it will never be accepted for publication in a high-quality scientific journal and—as of this writing—has not been published in any scientific journal, regardless of quality. The study purports to have evaluated persons exposed to the mold *stachybotrys atra*, but it included no control group or standardized test battery administered to all the participants. Alternative toxic exposures were not investigated—not even other mold exposures. The participants did not all take the same tests, and the author has testified that he only reported data from a few tests he selected as more likely to produce what he was looking for. The neuropsychological test scores of the people studied were notable for being **normal**, not impaired, but lawyers and a few of their experts refer to these findings as evidence of mold neurotoxicity. Furthermore, an examination of the data employed in preparing the manuscript shows that the paper did not accurately reflect what was actually done. In the only other relevant study involving objective testing, as distinct from subjective reports (a study that **was** published in a peer-reviewed journal), the briefly mentioned finding was that the mold cases performed **better** on cognitive testing than the controls (Hodgson et al., 1998). Sudakin (1998) found an increase in self-reported neurobehavioral symptoms in a case report but cautioned readers that these individuals had been exposed to reports of adverse health effects of toxigenic fungi exposure prior to making their subjective complaints in hindsight after a delay. These symptoms improved substantially after leaving the building. Many of the people Sudakin studied were making claims for compensation.

### Establishing Proof without Evidence

Because their methodology is devoid of objective evidence that mold or mycotoxin inhalation has caused brain injury, so-called "toxic mold" experts are relying heavily on subjective symptom reporting and on tests that are affected by response biases associated with litigation. Their approach is problematic at least three reasons:

- As noted above, there is no known pattern of complaints that constitutes a neuropsychological or psychological syndrome or diagnosable mental disorder associated with mycotoxin inhalation or inhalation of mold spores.
- Experts in litigated cases are ignoring the growing abundance of research showing that patients in litigation behave differently than other persons in important ways that directly affect expert examinations of the patient's condition. Plaintiffs often report their pre-injury history in unusually benign terms, and discount alternative explanations for their complaints, such as important stressors in their lives, to an implausible degree. They respond to neuropsychological tests more frequently in an impaired range even when no one is claiming they have brain damage—not their lawyers, their doctors, or the plaintiffs themselves. In other words, artifacts associated with litigation are affecting neuropsychological test results. Plaintiffs making mild brain injury claims often respond to psychological tests in a more impaired way than persons with documented severe brain injury .
- The test results are contaminated by the biases arising from litigation rather than being a true reflection of the extent of injury. There is growing evidence that attorneys and other advocates associated with litigated claims influence the psychological and neuropsychological evidence in ways that cause misleading and erroneous results.
- The amount of effort the patient makes during neuropsychological testing has a greater impact on the test results than the degree of injury, even when including severe brain injuries among the persons studied (e.g., see Green et al., 2001).

Genuinely troubled people become involved in these matters, at times to their detriment. For example, individuals with somatoform characteristics and histrionic personalities tend to be suggestible and therefore vulnerable to zealots and advocates who tell them they are brain-damaged and doomed to suffer permanent deficits caused by their toxic environment. Most of us more or less ignore, or notice and discount common "symptoms of life" such as transient aches and pains, fluctuating ability to concentrate, temporary fatigue, feeling stressed, or inability to recall all sorts of information such as a word or name or where we left something. However, when a health professional claims these are symptoms of mold neurotoxicity, a gullible person may focus more attention on these experiences, become alarmed, and become involved in a vicious cycle of over interpreting mild symptoms, becoming anxious, developing more symptoms caused by the anxiety, and becoming even more alarmed, sometimes to the point of virtually obsessing over the symptoms. It is an easy next step to conclude that because these feelings are more noticeable and more frequent lately, they must have been caused by mold exposure.

Although most of us think of ourselves as not presently suffering the effects of mild brain injury due to mold or anything else, empirical investigations have repeatedly shown that surprisingly high rates of mild brain injury symptoms and psychological symptoms are normal in the general adult population and among student and medical patient populations (e.g., see Dunn, Lees-Haley, Brown, Williams, & English, 1995; Gouvier, Cubic, Jones, Brantley, & Cutlip, 1992; Gouvier, Uddo-Crane, & Brown, 1988; Fox, Lees-Haley, Earnest, & Dolezal-Wood, 1995a, 1995b; Lees-Haley, 1992; Lees-Haley & Brown, 1993). Likewise, prevalence studies show that rates of psychiatric illness are "greater than previously thought to be the case" (Kessler, McGonagle, Zhao, Nelson, Hughes, Eshleman, Wittchen, & Kendler, 1994, p. 8; see also Regier, Boyd, Burke, Rae, Myers, Kramer, Robins, George, Karno, & Locke, 1988; and Robins, Helzer, Weissman, Orvaschel, Gruenberg, Burke, & Regier, 1984). Thus when someone directs attention to a search for psychopathology, it is not hard to find and it is more common than many people imagine. Administration of diagnostic procedures to a random or non-complaining population leads to the detection of false positives and actual pathology that was silent prior to the testing, so it is no surprise that testing a group of plaintiffs leads to discovery of apparent injury whether there is any or not. The *average* person with no history of

brain injury produces scores in the impaired range on several tests in a detailed neuropsychological test battery but some experts ignore these base rates ("normal levels of abnormality") and over interpret these findings as indicative of toxic brain injury.

### **Teaching Eyewitnesses to See Invisible Phenomena**

In ambiguous settings such as controversial legal arguments over what is known about mold neurotoxicity, psychological influences assume an increasing importance in determining what is perceived as real. The information disseminated by media, politicians, activists, litigating parties, experts, and attorneys may cause important emotional reactions in the affected people. A claim may be false but it can cause true alarm and genuine emotional distress to innocent people if misleading allegations are taken seriously.

It is critically important to weave good science into the mold neurotoxicity arguments as an antidote to unfounded advocacy. Interested parties are promoting speculation and making arbitrary allegations in such an emphatic way that we are tempted to believe them for illusory reasons. Lawyers and clinicians who cannot wait for facts are relying largely on propaganda and social influence techniques such as:

- Social proof: If an advocate creates the impression that several credible people have concluded that mold caused them brain damage, there is a natural human tendency to agree, and a subtle implication that you are somehow lacking in credibility if you disagree. Identifying a few people who believe a proposition, and encouraging them to go public (especially repeatedly) creates the impression that there are a lot of people out there discovering something real.
- Repeated affirmations: Just saying your claim over and over creates the impression that the assertion is true. After all, as everyone knows, where there is smoke, there must be fire.
- Appeals to authority: If one or more of the people affirming a belief is authoritative, e.g., a civic leader or expert, more people will be persuaded. Sometimes politicians are persuaded to join in unfounded but politically advantageous rhetoric. If we like the source of an opinion, we are more likely to believe what is said, so if a popular actor, media figure, politician or local hero joins the process, more of us will endorse the perceived reality.
- Vivid examples: Dramatic case histories often influence judgments more than dull but more accurate quantitative examples. Presenting a dramatic, close up picture of black mold in a scary manner may cause the observer to conclude that anything that looks this bad must cause whatever harm is alleged.

In response to recent criticisms of junk science, anti-science arguments are on the rise. Advocates tell us, "We can't wait on science. We have to act now!" and "The scientists want us to do nothing! How many people have to die before the defendants do what is right?" One such critic ironically declared, "We can't wait on science, we have to act on the evidence!" Certainly, we make most of our decisions in life without conducting a scientific study first. However, the allegation that the mold spores that surround us all every day are causing brain damage is a factual question that can only be answered by looking at the data, not by emotional reactions to speculation, sensationalism, and innuendo.

### **Plaintiffs Differ from Patients without Claims**

Patients pursuing litigation report more intense, frequent, and persistent symptoms than non-litigating patients do. For example, a number of prospective studies have found that non-litigating individuals with mild brain injury typically recover from their symptoms within a few months. (Barth, Alves, Ryan, Macciocchi, Rimel, Jane, & Nelson, 1989; Dikmen, Ross, Machammer, & Temkin, 1995; Dikmen, McLean, & Temkin, 1986; Gronwall & Wrightson, 1974; Hugenholtz, Stuss, Stethem, & Richard, 1988; Levin, Mattis, Ruff, Eisenberg, Marshall, Tabaddor, High, & Frankowski, 1987). However, recovery of patients in litigation commonly does not conform to expectations, as

complaints including memory loss, headache, dizziness, concentration difficulty, blurred vision, photophobia, ringing in the ears, irritability, fatigue, anxiety, and depression (World Health Organization, 1978) continue long after such symptoms normally resolve (Binder, Rohling, & Larrabee, 1997). Many empirical investigations have documented discrepancies between patients in litigation and patients not seeking compensation (see e.g., Berry, Wetter, & Youngjohn, 1995; Levin et al., 1987; Youngjohn, Davis, & Wolf, 1997). Fee and Rutherford (1988) compared the frequency of reported symptoms among mild brain injury patients in litigation with those not in litigation. After equating for severity of initial injury, reporting rates were assessed for various symptoms including headache, anxiety, irritability, dizziness, depression, and insomnia. On follow-up, litigating patients reported nearly twice as many symptoms as non-litigating patients.

The differences between self-reported symptoms of litigants and non-litigants have been established with respect to psychological as well as neuropsychological injuries, where compensation-seeking patients have been found to report more persistent psychological symptoms than patients with similar injuries not seeking compensation. Frueh, Smith, and Barker (1996), for example, found that combat veterans seeking service-connected disability for posttraumatic stress disorder (PTSD) obtained significantly more pathological scores on a wide range of psychological inventories and on MMPI-2 validity indices than did combat veterans with equivalent PTSD diagnoses not seeking compensation. Pope, Butcher and Seelen (1993) noted that MMPI profiles of patients with pending disability evaluations exhibit more exaggeration and pathology. Their research also indicated that persons who are genuinely disabled but not awaiting a disability determination tend to produce MMPI profiles with normal scale scores. Patient compensation seeking has been cited as one of the most serious obstacles to successful treatment of PTSD within the VA system (Richman, Frueh, & Libert, 1994). Campbell and Tueth (1997) reported that the system of compensation payments creates a disincentive for recovery and noted that, "Rewarding individuals for pain and disability, particularly on a long-term basis, can have numerous negative consequences, and ultimately may be a disservice to the patient" (p. 42).

Health-care providers have noted fundamental differences between litigating and non-litigating patients, and "have become increasingly suspicious of the genuineness of symptoms exhibited by plaintiffs because of the large disparity often found between subjective complaints and objective findings" (Weissman, 1990, p.71). Patients seeking financial compensation may find treatment withheld because they are perceived as resistant and noncompliant with psychotherapeutic and rehabilitative services. In the context of litigation or similar applications for compensation where incentives such as settlement may outweigh incentives such as getting better, treatment may be postponed or even sought for legal purposes.

Recent research suggests not only that litigating patients report current symptoms at higher rates and duration than do non-litigating patients, but also that litigating patients tend to recall pre-injury psychological and neuropsychological functioning as superior to that of non-litigators (Lees-Haley, Williams, & English, 1996; Lees-Haley, Williams, Zasler, Margulies, English, & Stevens, 1997). For example, Lees-Haley et al. (1997) asked both to recall how problematic specific symptoms, behaviors, and aspects of life were in the past. Patients seeking compensation recalled fewer problems with concentration, memory, fatigue, depression, anxiety, ability to attend school or work, irritability, headache, confusion, self-esteem, marriage, and relationships with children. Because the apparent severity of injury or loss in functioning is essentially a comparison of pre- and post-injury functioning, a greater apparent difference in functioning from pre- to post-injury can create the impression that more compensation is warranted. Therefore, not taking into account the tendency of plaintiffs to overestimate their pre-injury functioning misleads forensic examiners and triers of fact regarding the severity of the injury.

### **Exaggeration or Malingering**

Malingering is defined as the intentional production of false or grossly exaggerated physical or psychological symptoms motivated by external incentives such as financial gain, obtaining drugs, avoiding work, evading criminal

prosecution, etc. (American Psychiatric Association, 1987, 1994). Contrary to what many of us used to believe based on our clinical experience, empirical studies have found that malingering is common in forensic evaluations. However, the courts have been wiser than clinicians and have long recognized this challenge. References to fraudulent claims and false testimony recur in published cases and legal commentary throughout the history of law. In the oldest known code of laws, the Code of Hammurabi, participants in the legal system were already addressing the problem (Hammurabi's policy was to slay witnesses who testified falsely) (Johns, 2000). Indeed, the problem of false testimony is the first issue addressed with every witness who is asked, "Do you swear to tell the truth, the whole truth, and nothing but the truth. . . ?"

Patients seeking compensation have more incentives to produce false or exaggerated symptom reports than do patients seeking treatment. Published estimates of the proportion of plaintiffs feigning psychological deficits range from a low of 1% (Keiser, 1968) to over 50% (Miller & Cartlidge, 1972). In personal injury cases, feigned cognitive deficits have been estimated at 64% (Heaton, Smith, Lehman, & Vogt, 1978) with 47% of workers' compensation possibly involving malingering (Youngjohn, 1991). Another study estimated the percentage of manufactured memory deficits in patients claiming persistent postconcussive syndrome as being between 33 to 60% (Greiffenstein, Baker, & Gola, 1994). Such studies are relevant because the complaints made by persistent postconcussive plaintiffs are remarkably similar to those of many "toxic mold" plaintiffs, and both often appear to be exhibiting litigation-related response biases. Research by Binder (1993) indicates that 33% of mild brain-injured subjects seeking compensation malingered deficits on psychometric testing. Forensic examiners should consider and rule out the possibility that symptom reports and test results are the product of false presentation by plaintiffs during interviews and exaggeration of symptoms through self-report inventories or tests. It has become the standard in forensic cases to consider the possibility of malingering in the differential diagnosis.

Some psychologists and psychiatrists claim that plaintiffs are unable to malingering mental disorders or neuropsychological deficits without detection by psychological experts. However, there is substantial support for the idea that naïve individuals can fake psychological and neuropsychological symptoms successfully when provided minimal information about disorders (e.g., Albert, Fox, & Kahn, 1980; Faust, Hart, & Guilmette, 1988; Lamb, Berry, Wetter, & Baer, 1994; Rogers, Bagby, & Chakraborty, 1993; Rogers, Ornduff, & Sewell, 1993; Wetter, Baer, Berry, Robison, & Sumpter, 1993). An early study demonstrated the ability of university students to successfully fake schizophrenia on the Rorschach test (Albert et al., 1980). After watching a 25-minute film on schizophrenia, 72% of university students were successful in feigning the disorder compared to 46% who were naïve. In another analog investigation, participants asked to fake brain injury were provided detailed information on the type of validity scales on the MMPI-2 and were given information on how to avoid getting caught. Results showed that this information enabled subjects to produce clinically elevated profiles without significantly elevated validity scales (Lamb et al., 1994).

Individuals not provided with information were able to identify symptoms similar to those of genuine patients on certain kinds of inventories, such as symptom checklists (Lees-Haley, 1989a, 1989b). Research indicates that untrained individuals are able to endorse accurately symptoms and experiences of post-concussion syndrome (Mittenberg, DiGiulio, Perrin, & Bass, 1992) as well as major depression, generalized anxiety disorder, and PTSD (Lees-Haley & Dunn, 1994). The research showing that naïve individuals can simulate psychopathology without raising suspicion of malingering is problematic for evaluators. Information about some psychological and neuropsychological disorders is readily accessible to plaintiffs motivated to deceive. Berry (1995) points out that "Fabricators may become familiar with psychiatric symptoms through personal acquaintances, perusal of volumes such as the DSM-IV (APA, 1994), textbooks in psychiatry, or even through exposure to lay sources such as magazine articles and movies about individuals with mental disorders" (p. 88).

## **Attorney Influence**

The influence of lawyers provides another confound to the evaluation of patients involved in litigation. Although psychological experts have been slow to realize the extent of the problem, concern about attorneys affecting examinations is not a novel concept in legal circles. In California, the problem is salient enough that the [California Code of Civil Procedure does not permit lawyers to sit in on psychological evaluations](#) (See CCCP 2032(g)). In *Ragge v MCA/Universal Studios* 165 F. 605 (Cal. 1995), the federal judge decided that a third-party observer should not be present during the evaluation and that the psychologist should not be required to disclose in advance what tests would be used. Such disclosures are an invitation to fraud as well as to innocent causes of invalid results.

Lawyers are supposed to learn facts from their clients, not engage in invention. But, as University of Pennsylvania law professor Geoffrey Hazard, who is a member of the American Bar Association Ethics 2000 Commission, has noted, "Lawyers do tell their clients what to do, indirectly . . . . How artificial they are, how artful, varies." (cited in Dolan, 1994, p. A17). Resnick noted that, "Once an individual becomes a litigant in a personal injury suit . . . the efforts of attorneys for both the plaintiff and defendant may alter the patient's attitudes and the course of the illness" (1988, p. 88).

Attorneys influence psychological data by several means. They advise clients how to respond to psychological tests, make suggestions of what to tell examining psychologists and what to emphasize, and lead patients not to disclose certain information important to psychologists. Attorneys can prompt their clients to take actions that affect the clinical history and create misleading data concerning the impact of an injury, e.g., telling them that it "would look better" if they not return to work, and that "it might be worth their while to see a doctor every week" (Rosen, 1995, p. 84).

Some attorneys supply claimants with information not only about symptom inventories but also about psychological tests for detecting malingering (see, e.g., Baer, Wetter, & Berry, 1995; Dolan, 1994; Legate, 1996; Lees-Haley, 1997; Platt & Husband, 1986; Rosen, 1995; Taylor, Harp, & Elliott, 1992; Wetter & Corrigan, 1995; Youngjohn, 1995). As Youngjohn (1995) observed, "Psychologists and neuropsychologists performing forensic examinations typically assume that their patients have not been prepared or 'educated' prior to examination" (p. 282). Baer, Wetter, & Berry (1995) note that "given the increasing likelihood that coaching of test-takers may be occurring in a variety of settings, it is important for clinicians to understand its impact" (p. 198).

Further evidence of the willingness of attorneys to interfere with psychological assessment was offered by Wetter and Corrigan (1995). These researchers conducted a survey in which 63% of attorneys surveyed felt they should provide plaintiffs with information about psychological test validity measures (47% of attorneys surveyed said they should "always or usually" provide such information to their client (the plaintiff) before the testing, and another 16% said they should "sometimes" do so). Of the 63% of attorneys who believed they should provide such information, 42% said they should provide "as much [information] as possible" and another 42% said they believed they should provide a "moderate amount of information," for a total of 84%. Youngjohn (1995) reported an attorney who argued that not counseling a plaintiff prior to psychological testing is legal malpractice. Other research with plaintiffs in personal injury litigation confirms the existence of coaching, specifically in cases related to the psychological sequelae of traumatic events (Rosen, 1995).

When plaintiffs undergoing neuropsychological evaluations are asked whether anyone has talked to them about their evaluation, they almost always say no, but commonly add that their attorney told them to tell the truth. However, later in the evaluation, it is common for a question to be answered with variations of "My attorney said I don't have to answer that." In some evaluations this reply is made several times, despite the denial of having talked with anyone prior to the evaluation. Since attorney-client communications are privileged unless the attorney and client are conspiring to commit fraud, e.g., if the attorney is helping a plaintiff malingering, psychologists usually do not explore attorney coaching directly in the interview. However, spontaneous comments like these indicate that many plaintiffs are counseled about how to conduct themselves in a psychological evaluation. University of Michigan Law School

attorney Larry Cohen (personal communication, March, 1997) reported that some attorneys consider it part of attorney-client privilege to instruct the client to deny that the coaching ever took place.

Although attorneys are reluctant to discuss privileged communications with specific clients, they publicly share relevant information in continuing legal education courses. Consider for example the advice offered in one national meeting of attorneys, in which attendees were advised to talk to the psychologists they retain "about what kind of history they will want to take." (Bureau of National Affairs, 1994, p. 52). An attorney on the panel of this conference said she talks to psychologists before their evaluations and "I tell them what areas I don't want them to probe" (p. 52). In another continuing legal education program attorneys were taught to prepare clients for their independent evaluations (IMEs) (Legate, 1996). In this course they were discouraged from sending clients to independent examinations without advance preparation by counsel. They were advised to review and "clarify" the client's symptoms before the IME, and cautioned not to assume the unprepared client would be consistent. One suggestion was to "Consider the creation of a symptoms list that you will review with your client on a regular basis" (Legate, 1996, p 5). Do plaintiffs really need lawyers to tell them where it hurts? A two-year-old can tell you that. Do lawyers think people in serious pain do not notice it and forget that they are hurting in the absence of protection and assistance from legal counsel?

In a widely circulated legal journal, Taylor, Harp and Elliott (1992) published an article on "preparing" the mild-brain-injury plaintiff. These attorneys suggest taking "steps to enhance the client's ability to remember key facts" (p. 67). They recommend that "counsel should begin to prepare the plaintiff to testify from the outset of the case" and provide a list of steps to follow prior to depositions and prior to trial (p. 68). Noting that brain-injured clients "tend to be somewhat uncomfortable with the process [of testifying (Does anyone find it comfortable?)]" they suggest that "attorneys must take great care in getting them ready to testify" (p. 68). They recommend providing "instructions regarding presentation, demeanor, and dress" when testifying. It is difficult to imagine there being no effects at all on a plaintiff's perception after prolonged exposure to a persuasive advocate repeatedly reframing the data from a litigator's special perspective, in a litigator's convincing language.

If attorneys go to these lengths to prepare a client for a deposition or trial, it is reasonable to assume that they give similar advice before medical and psychological examinations that could have a major impact on the value of the case. Guidance such as instructions on demeanor, presentation, dress, and memory all may affect the mental status examination by the psychological expert. A histrionic, hypochondriacal, or deceitful plaintiff provided with the coaching proposed in this article could learn to behave in a misleading fashion. The effects of such instructions on a borderline or delusional patient are unpredictable but a matter of concern.

### **Influence of Health-Care Professionals**

Psychological experts can also contaminate the data in personal injury litigation. For example, in the unpublished case of Lailhengue v Mobil (Civil Action No. 90-4425, United States District Court for the Eastern District of Louisiana), a psychiatrist interviewed the plaintiffs with an attorney present and then gave them copies of the diagnostic criteria from the Diagnostic and Statistical Manual to review before a second interview to investigate whether they were suffering Posttraumatic Stress Disorder. In another unpublished case sealed by the court, a fairly prominent psychologist and an attorney stood before an audience of plaintiffs while the psychologist described symptoms of Posttraumatic Stress Disorder, immediately after which plaintiffs were administered a Posttraumatic Stress Disorder scale of the MMPI with no accompanying validity scales.

Even honest litigants can be induced to unintentionally magnify existing complaints or discover new ones. Repeated physical and psychological examinations by health-care professionals can have these unintended effects. As Lishman noted, "The repeated rehearsal of symptoms before a variety of audiences, some encouraging, some skeptical, does



not help the patient to be clear about what he is truly experiencing" (1986, p. 463). Platt and Husband (1986) observed :

By the time the patient/litigant arrives at the clinician's office, he or she often has consulted not only an attorney but a host of medical and allied health professionals as well. Patients may well pick up cues from their attorneys or treating professionals as to the symptoms they might be expected to have. The questions asked and the messages communicated by these professionals regarding the patient's physical and mental condition can have the effect of covertly or even overtly alerting the patient to additional symptoms he or she had not reported or had not emphasized in previous evaluations, as well as potentially serving to reinforce existing symptoms (p. 35).

Experts' expectations in assessment are important to consider because they can have important unintended effects. There is a substantial and growing literature on the nature and consequences of clinician expectations on psychological assessment (see e.g., Arkes, 1981; Blank, 1993; Chapman & Chapman, 1967; 1969; Dawes, 1994; Golding & Rorer, 1972; Salovey & Turk, 1991; Smith, 1988; Snyder, 1981; Snyder & Thomsen, 1988; Starr & Katkin, 1969; Turk & Salovey, 1988). For example, Temerlin (1968) showed how expectations can influence behavior in a clinical setting. Before listening to a recording of a benign interview with a normal man, psychiatrists overheard a prestigious colleague characterize the stimulus person as mentally ill. Even though the interview revealed no signs of psychopathology, 60% of the psychiatrists judged the man psychotic, with the remaining 40% diagnosing him with a neurotic or character disorder. None of the control judges (not given a diagnostic category) characterized the target as psychotic. In a related study, clinicians expecting to observe a "patient" judged the person as more disturbed than did clinicians expecting to observe a "job applicant" (Langer & Abelson, 1974), based upon otherwise identical data.

These studies have important implications for evaluators. Preconceived beliefs and prior expectations can shape behavior in ways that support what evaluators expect (see e.g., Snyder & Thomsen, 1988). Both the gathering and interpretation of data can be affected by these preconceptions. For example, clinicians convinced that mold exposure causes cognitive deficits may inadvertently or intentionally communicate their expectancies to patients and thereby reinforce self-reports. Plaintiffs, in turn, often minimize data related to alternative explanations for deficits (e.g., reported consumption of drugs and alcohol and important stressors), thereby increasing the salience of causative factors deemed relevant by evaluators and attorneys. Assumptions that patients' injuries were caused by factors identified in the legal claims can become a self-fulfilling prophecy in which relationships between the supposed cause and the deficits are perceived where none actually exist. (For a discussion of self-fulfilling prophecy see Rosenthal & Jacobson, 1968).

Finally, the intellectually bankrupt tactics of some experts in mold cases deserve to be exposed for what they are. Instead of arguing from facts and reason, they use junk science arguments. In one case, an expert characterized the opinions of skeptics of mold neurotoxicity claims as "tobacco industry" tactics when he could not refute criticism with evidence and logic. He thus asserted that defendant's experts actually knew that mold is injurious but would not tell anyone. Some experts involved in these cases are using alarmist language that is more likely than not to cause emotional distress to a patient who takes the expert seriously, while the true effects of molds remain unknown.

## **Internet Promotion**

Many plaintiffs perform Internet searches that expose them to claims and opinions of wildly varying reliability and validity. At this writing (December 2002), searching Google.com with the phrase "toxic mold" yields about 36,000 links. Last March, the list was topped by a link sponsored by the [Personal Injury LawyerShop](#) and headlined, "Learn about the side effects of toxic mold!" which led me to the [Toxic Mold InfoCenter](#), a site offering "Toxic Mold info



and access to attorneys who specialize in Mold litigation." During the same month, the [Doctor Fungus Web site](#) contained news about someone suing for \$65 million.

The [Toxic Mold and Tort News Online Safety, Prevention, and Information](#) site states, "The Toxic Mold Website is a comprehensive guide to information regarding mold, toxic mold, safety, and prevention. Our site also provides important legal rights and information for those who have been adversely affected by Toxic Mold in their home, workplace, and elsewhere." Its introductory paragraphs about "potentially fatal dangers" and legal rights are followed by summaries of four mold cases in which plaintiff won more than \$1 million.

[The Mold Source](#) contained a list of medical and legal experts introduced with the following statement:

The following professionals have established themselves, through their dedication, commitment and their overwhelming concern for mankind, as the experts. They are the best the world has to offer "us", the fungi contaminated. Collectively, they retain the majority of all known knowledge on fungi and fungal poisoning related illnesses. If knowledge is power, then my prayer in providing this list is to give you the "power" to make a difference in your life or the life of your "exposed" loved ones.

The list includes William Rae, M.D., and several leading promoters of the bogus "[multiple chemical sensitivity](#)" diagnosis.

The [Toxic Mold Survivors Information and Support Group](#) home page states:

Poisoned by Toxic Molds?  
Stachybotrys, Aspergillus & Penicillium.

Potential adverse health effects include: Allergies & allergic asthma, allergic rhinitis/sinusitis, allergic conjunctivitis, cancer, mycotoxicosis, aspergillosis, hypersensitivity pneumonitis, neurotoxic:-toxic encephalopathy: headache, memory and verbal problems, fatigue, malaise, vertigo, dizziness, depression, burning-sore throat (laryngitis), irritant cough, nose bleeds, tremors, tachycardia (fast heart beat), exertional shortness of breath, chest tightness, wheezing, (bronchitis and pneumonitis) respiratory tract ciliary damage, (clearing of air ways impaired), bleeding from the lungs (hemoptysis) immunotoxic (higher incidence of infection), dermatotoxic (dermatitis, rash), hair loss, enterotoxic (nausea, vomiting, diarrhea, gallbladder-like-colic pain). Toxic to the liver, brain, kidneys and heart, and with chronic exposure, are potent carcinogens of the liver.

The list of adverse health effects goes on . . . as those poisoned, try to survive after toxic mold exposure.

Although ostensibly a website for a support group, litigation appears to be a major interest of these "survivors." For example, the home page provides links to "Litigation," an article entitled "Toxic mold: The Next Asbestos?" by Sylvia Hsieh of Lawyers Weekly USA), and the websites of lawyers and expert witnesses who testify in toxic tort litigation.

## Conclusion

Toxic tort attorneys and a handful of experts they favor would like you to believe that "toxic mold" is disabling people in epidemic proportions by damaging their brains. In order for this to be correct, the overwhelming majority of physicians, toxicologists, and mental health professionals who have studied this issue would have to be completely wrong, and doctors in day-to-day practice would have to be overlooking the diagnosis. If a problem exists, I doubt that it is common. One expert estimated that there are close to 100,000 recognized species of fungi (Terr, 2001).

Given the number of possible exposures under different environmental circumstances to persons in dramatically different mental and physical condition, one can speculate about anything. But speculation is not evidence.

The mold neurotoxicity debate is not simply about health care and science—a focus on money and litigation is pervasive in the communications of the toxic mold promoters. As noted by Paul Scroggins, an environmental engineer with the U.S. Environmental Protection Agency "toxic mold" is a term that "sells." (Scroggins, 2002) The campaign being waged to convince people of the dangers of "toxic mold" is not merely an amusing example of folly in modern society. The people who are bypassing scientific evidence and engaging in wholesale dissemination of "toxic mold" rhetoric are not neutral forces. If it turns out that these exposures are neuropsychologically harmless, the hysterical claims and unfounded alarms sounded by lawyers, doctors and others will nonetheless have harmed many victims. Who will be responsible for their pain and suffering or emotional distress at being told they are going to die or be permanently brain damaged? On the other hand if we discover evidence of causation of neuropsychological deficits in this area, the findings should be presented widely in a style most helpful to affected patients, not in sensationalized hyperbole. Further exploration of the effects of inhaling mycotoxins and mold spores should be through high-quality, well controlled, scientific studies, not speculation in adversarial settings.

### Additional Reading

- Brandt M and others. [Mold prevention strategies and possible health effects in the aftermath of hurricanes and major floods](#). MMWR 55(RR08):1-27, 2006.

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Dr. Lees-Haley is a psychologist with offices in Huntsville, Alabama. This article was adapted from Lees-Haley, P.R. (2002). Mold neurotoxicity: validity, reliability and baloney, presented at the conference "Mold Medicine and Mold Science: Its Practical Applications for Patient Care, Remediation and Claims," hosted by the International Center for Toxicology and Medicine and the Georgetown University Department of Pharmacology. May 13-14, 2002. The expression "validity, reliability and baloney" was coined by the late Professor Edward E. Cureton, Ph.D. Researchers conducting studies on related issues can contact Dr. Lees-Haley at 2915 Bob Wallace Avenue, Huntsville, AL 35805; telephone: (256) 551-1024; or by email [paullh@lees-haley.com](mailto:paullh@lees-haley.com).

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