

Correction of central nervous system metabolic abnormalities, deficits in executive cognitive functioning and elevated C4a: a clinical trial using low dose erythropoietin in patients sickened by exposure to water-damaged buildings (WDB)

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Recent literature has demonstrated that erythropoietin (epo) is a neuroprotective agent for peripheral and central nervous system (CNS) that specifically prevents apoptosis of glial cells, improves capillary hypoperfusion in CNS and lowers elevated lactate in CNS. Previous treatment studies of patients made ill solely by exposure to WDB ("mold illness") with refractory executive cognitive symptoms and persistently elevated levels of C4a, a product of activation of complement, using epo safely lowers C4a and reduces neurocognitive symptoms. A prospective open label clinical trial was performed to assess (1) safety of epo in mold illness patients who have elevated C4a; (2) efficacy of epo to improve

symptoms, reduce C4a and correct abnormalities in CNS metabolites measured by magnetic resonance spectroscopy (MRS); (3) provide data that supports a testable hypothesis of the inflammatory origin of systemic and CNS symptoms in these patients.

32 patients with mold illness provided informed consent for an IRB-approved study. Symptoms of executive cognitive function, C4a and MRS of 1 cubic cm areas of left and right frontal lobes and left and right hippocampus before and after treatment with 5 doses of 8000 units of epo given by the study physician over 2 weeks were compared to known controls. Symptoms, C4a and safety parameters were recorded at each visit.

After 5 doses of epo, repeat MRS was performed.

Epo use did not cause adverse effects: No adverse effects of clotting, elevation of blood pressure, polycythemia or development of iron deficiency anemia occurred. Symptoms of executive cognitive function were reduced in cases after treatment, though still exceeding controls. C4a was reduced beginning after the second dose of epo, achieving values equal to controls in 91% of cases. MRS-determined values of n-acetyl acetate; creatine; choline and myoinositol did not change in cases and equaled controls. Lactate was elevated in all patients, with reduction after epo to controls in 88%. Ratios of gluta-

mate to glutamine were abnormal in all cases, with reduction to controls achieved in 75%.

Use of low dose epo in mold illness patients is safe and effective to improve symptoms, C4a and CNS markers of abnormal capillary hypoperfusion (lactate); and excitatory neurotransmission (glutamate/glutamine). These results suggest that the systemic inflammation in mold illness caused by elevated C4a may be treated using epo and that the CNS correlates of cognitive dysfunction has an inflammatory basis. A double blinded, placebo controlled trial is planned.

Defining mold illness in children: a chronic inflammatory illness with distinctive biomarkers

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Study of illness acquired following exposure of children to water-damaged buildings (WDB) has been hampered by absence of a case definition. Adults are defined by a two-tier model that includes (1) potential for exposure, presence of multiple symptoms from multiple organ systems and absence of confounders; and (2) presence of three of six objective parameters including reduced level of alpha melanocyte stimulating hormone (MSH); presence of a particular HLA DR haplotype; elevated MMP9; presence of a particular deficit in visual contrast testing (VCS); and dysregulation of ACTH/cortisol or ADH/osmolality. Tier 1 also applies to children. Tier 2 criteria required modification, as chil-

dren may be unable to perform VCS testing and hypothalamic/pituitary axis immaturity may be present. We surveyed symptoms and lab results from known cases and controls from one practice to identify factors to correctly classify all cases and controls.

144 known pediatric cases with illness and 47 control patients were analyzed by chart review. Significant differences in symptoms, MSH, HLA DR by PCR and MMP9 were identified. Significant differences in incidence of antibodies (IgA and IgG) to gliadin as well as autoantibodies to cardiolipin (IgA, IgM and IgG) were identified. Cases were stratified by abil-

ity to perform VCS testing, as before age 8 most children couldn't perform VCS consistently. By age 8, nearly all children could perform VCS. Levels of C4a, a split product of complement activation were significantly different. Higher than 2830 ng/ml also were significantly different in cases compared to controls.

Symptoms were analyzed by logistic regression, correctly classifying 189 of 191 patients. VCS deficits (N=110) correctly classified 102 of 110 patients. MSH levels < 35 pg/ml were found in 127 of 133 cases and 2 of 23 controls. MMP9 levels > 332 ng/ml were present in 100 of 105 cases and in 5 of 20 controls. Gliadin antibodies

were found in 58% of cases and in no controls; autoantibodies to cardiolipin were found in 27% of cases and in no controls. C4a > 2830 was found in 33/33 cases and in 1/8 controls.

Using HLA, MSH, antibodies to gliadin or cardiolipin, MMP9, VCS, all cases were identified and all controls were identified correctly (N=110). For those unable to perform VCS, presence of 2 or 5 criteria identified all cases and controls correctly (N=71). These Tier 2 requirements will possibly be enhanced by adding C4a values in those unable to perform VCS testing.

Sequential upregulation of innate immune responses during acute acquisition of illness in patients exposed prospectively to water-damaged buildings (WDB) Ritchie C. Shoemaker, MD¹, Margaret S. Maizel¹

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Previous data demonstrated a pattern of innate immune inflammatory responses following re-exposure of patients made ill previously by exposure to a given WDB with evidence of amplified growth or toxigenic organisms, including fungi. This report expands those observations, using a prospective model that confirms causation of illness by exposure marked by upregulation of innate response elements measured daily following re-exposure including complement activation product C4a, leptin, MMP9, vascular endothelial growth factor (VEGF) and coagulation factors.

Following consent, 60 patients known to have a chronic biotoxin illness caused by exposure to a WDB followed a five step process: assessments of (i) symptoms (ii) VCS (iii) C4a (iv) leptin (v)

MMP9 (vi) VEGF (vii) Factor VIII (viii) vWF (ix) vWF Ag were carried out at (1) baseline; (2) after first therapy with cholestyramine (CSM) (3) off CSM, without re-exposure for three days (4) after each of three days following re-exposure to suspected WDB (5) after second CSM treatment. Results were compared to known controls.

In patients (N=38) with illness recrudescence, upregulation of innate immune elements was observed: C4a increased after 24 hours; leptin increased after 24 hours; MMP9 increased after 48 hours; VEGF initially increased after 24 hours, falling after 72 hours. Factor VIII fell concomitantly with the rise in C4a; vWF fell after 72 hours. Episodes of epistaxis or hemoptysis were observed in 6 patients, coinciding with fall of vWF. Symptoms and VCS

decline increased daily during re-exposure, reaching baseline levels after three days. Patients (N=22) without recrudescence showed no changes and equaled controls. Buildings with repeat illness patients continued to have evidence of ongoing water intrusion; sites without reacquisition had no evidence of ongoing water intrusion.

Re-exposure to WDB causes illness that can be identified by sequential changes in symptoms, VCS and innate immune responses. Use of sequential observation of symptoms, visual contrast sensitivity (VCS) and inflammatory responses following re-exposure to WDB can not only supports a model of disease mechanisms but can rapidly determine safety for re-occupancy.

Mold Remediation is tax deductible

Did you know that if you are a landlord or a homeowner and you have to have mold removed from your home, it is tax deductible? It qualifies as a repair that has to be done to protect the investment of your home.

The costs that you will incur from removing mold from your home or your business can be quite great, depending on the size of the infection. Sometimes a quarter, half, or even a whole wall or more has to be removed, not to mention the cost of the chemicals and personal protection equipment necessary to do the job safely.

The Internal Revenue Service—IRS has concluded that the cost of mold removal and remediation are tax deductible as an ordinary

and necessary business expense. This is a requirement that must be met before something can be deducted as a business expense: it must be both ordinary and necessary.

Renovations that increase the value of a home or other building cannot be counted as business expenses, but the removal of mold is necessary because the health of the workers and anyone else in the building will be affected, thus affecting the flow of cash into the business. Mold remediation does not add value to the property, so it is fine to count it as tax deductible at the end of the year, even if it is not a business that is being treated. Unfortunately, if the mold

remediation is the part of a renovation plan that includes the entire property, then the cost is required to be capitalized instead of deducted from your taxes at the end of the year.

So, just what is deductible? If you hire a professional service to do it for you, then the total of whatever they billed you after the project was completed is what you would write down as your deduction at the end of the year. Also, any building materials that you have to purchase after the mold removal are tax deductible, as well. These are necessary to complete the repairs.

It is also possible any relocation expenses that you or your



family might incur while the mold remediation is taking place may be deductible, as well. Contact whoever prepares your taxes for you and ask them if it may be deductible.

If you play your cards right, you should be able to deduct most of the cost of your mold remediation, as long as it is not part of a larger renovation of the property.

Jim Corkern is a writer and respected contributor to the Water damage restoration and mold remediation Industry.

Bankers' Group Revisits Effects of Mold on Real Estate

by Al Heavens

Concerns about mold and its potential effects on indoor air quality and property values appear to have taken a back seat to other real estate issues, but that doesn't mean that someone isn't thinking about.

For example, the Mortgage Bankers Association last week published an update of a white paper on the effects of mold in the commercial and multifamily realm, "to reflect the most current information on mold mitigation, standards for conducting mold assessments, legal issues and insurance issues."

Don Glitz, corporate insurance risk manager of Capmark Financial Group, explained that the update was "an attempt to eliminate the 'misinformation' that exists with regard to the mold issue."

The update, the bankers' group cautioned, is only a "snapshot," since, as with many environmental issues, changes in the way mold is viewed and handled can occur frequently with research.

The reason for the continued interest in mold by lenders is obvious. Mold and dampness can directly damage buildings and their contents, but there are other repercussions, including a reduction in cash flow through lost rents or rental value and expenditures for remediation costs.

When mold issues are uncovered in a building, whether residential or commercial, there is a perception that the structure has become unfit or unusable, and that can result in a loss of market value.

After Hurricane Katrina, for example, some real estate agents in areas of Louisiana and Mississippi were reporting that many buyers were pulling out of deals if they even minor exterior damage to homes that could result in mold issues.

In addition, as the MBA white paper, points out, there are costs of litigation with tenants, purchasers of property or persons who claim to have been injured.

The chief concern has been with black mold. While less common than other molds, this one is more dangerous to humans because, given the proper environmental conditions, it can create multiple toxic chemicals called mycotoxins. These toxic byproducts exist in the spores of the mold, as well as in the tiny fragments that can become airborne. Of particular concern is the threat that humans will inhale and ingest these toxic spores.

According to the Centers for Disease Control and Prevention, there are few case reports that toxic molds inside homes can cause unique or rare health conditions such as pulmonary hemorrhage or memory loss. A causal link between the presence of a toxic mold and these conditions has not been proved, the agency says.

For the last few years, insurance companies have become unwilling to write new policies and have been excluding coverage of mold from existing ones. Such coverage as is available is underwritten as part of a "stand-alone" environmental insurance policy. There has not been any

significant increase in the availability of coverage for mold as more information on it has become available, according to the mortgage bankers team.

Air quality issues "also may act as a negative constraint on a lender's or servicer's decision to foreclose and resell, continue operations or abandon property," the mortgage bankers' group observed.

Even before Hurricanes Katrina and Rita, New Orleans' mold problems were out of control, owing to the region's humid climate. With so much standing water for so many weeks and months, and no way to dry things out quickly, "you're able to find just about every variety of it," said Frank Panico, who is an expert on flood and fire cleanup issues.

That's why the best course of action when mold or moisture is found is to take care of the problem quickly, the MBA said.

Avoidance or reduction of mold risks begins at the moment the first sketch for a new structure is put on paper and involves proper selection and use of professionals, contract terms, contractors, subcontractors, design and engineering professionals, materials and construction techniques, as well as ongoing inspection, documentation and a complete moisture-management assessment plan.

For existing buildings, mold cleanup first requires elimination of moisture that is fueling the mold growth. The next step is to conduct a detailed visual inspection of the affected area to en-



Mortgage lending on poorly repaired homes is a house of cards. If insurers deny proper repairs, the loans are not worth the paper they're written on.

sure that the full extent of an outbreak is determined and additionally to demonstrate that an outbreak is in fact limited in scope or severity.

Mold and materials technology continue to become more effective. There are continuing developments in technology to detect hidden moisture as well as new or improved building materials that are immune to or resist mold attack.

This may lower remediation costs and increase confidence in the effectiveness of the cleanup work that has been done.

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UF to lead research on life-threatening fungus

Tuesday, July 31, 2007. GAINESVILLE, Fla. — Hear the word fungus, and mushrooms and mold might leap to mind. But the University of Florida is about to house the nation's first research repository for one species that has nothing to do with pizza toppings or marbling blue cheese: *Aspergillus*, which increasingly poses a major health threat to cancer patients and transplant recipients.

The National Institutes of Health has awarded \$9 million over the next seven years to the effort. UF researchers are collaborating with colleagues at Duke University, Brigham and Women's Hospital in Boston and the Dana-Farber Cancer Institute, who will funnel patients' respiratory, urine and blood samples to UF. The repository will support research aimed at learning more about the fungus and efforts to develop more accurate tests to detect it in patients.

"*Aspergillus* is everywhere, particularly in the air we breathe; all of us breathe it in all the time," said principal investigator John Wingard, M.D., director of UF's blood and marrow transplant program and deputy director of the UF Shands Cancer Center. "On a windy day, especially in a dusty environment or every time some dirt gets moved around, lots of these organisms get aerosolized."

The number of people contracting *Aspergillus* infections jumped enormously in the 1990s, Wingard said, and those with weakened immune systems are particularly susceptible. *Aspergillus* is the leading cause of death from infection in bone marrow transplant and leukemia patients, as well as among those who receive certain other solid organ transplants,

he said. About 15 percent of all bone marrow transplant patients, for example, will develop an infection from *Aspergillus*; of those, about two-thirds die.

"We haven't had good treatments, we haven't had good prevention methods and, most importantly, we haven't had good diagnostic methods to identify which patients have these infections," Wingard said. "Since we often don't recognize that patients have aspergillosis until very late in the course of the infection, by the time we try to treat the infection it is often so advanced we have very poor prospects of bringing it under control."

A number of hospitals undergoing renovations have experienced outbreaks, in many cases after the organism contaminated ventilation systems or fireproofing materials. Despite hospitals' infection control measures aimed at minimizing risks, including special air filtration systems designed to filter out *Aspergillus* and other infectious agents, facilities can still have problems and sometimes have even had to temporarily close their patient-care units.

"You and I have a good healthy defense, so while we may be colonized by the organisms, we rarely get serious infections," Wingard said. "But if we become immunocompromised, those organisms can be deposited on the mucosal surface of nasal passages, the sinuses and the bronchi, and they can start invading and can cause very serious, deadly infections."

Complicating the picture is that aspergillosis is frequently mistaken for bacterial pneumonia, and tests for the infection often are initially negative.

"Historically, our only means

of diagnosing these infections has been by growing the organism from patient's specimens in the laboratory and then having it identified by an experienced mycologist," said Barbara D. Alexander, M.D., the project's co-principal investigator and director of transplant infectious diseases services and the clinical mycology laboratory at Duke University Medical Center. "These conventional methods for diagnosing fungal disease are slow and lack sensitivity. Furthermore, many times the patients are too sick to tolerate the invasive procedures, such as lung biopsy, in order to obtain the samples for laboratory testing."

Wingard said two-thirds of the time tests are negative even though patients have the infection.

"That's the biggest challenge — we may suspect patients have the infection but we can't really know with certainty from currently available tests whether they truly are infected or not," he said. "We end up making clinical decisions about using drugs that may be toxic or using the wrong drugs in patients when we are not sure whether they have this deadly infection."

Officials are hoping to collect samples from about 200 patients a year for the next seven years to better characterize the fungus and improve the diagnostic accuracy and speed of tests used to detect aspergillosis. The repository will include samples from patients with confirmed infections that will be compared with samples from patients whose diagnosis is less clear and with samples from patients who are at high-risk but not infected.

Researchers also will work with Emory University, Indianapolis-based MiraVista Diagnostics, and the University

of Manchester in England to evaluate existing tests and develop new, more accurate and less invasive ones.

While more potent treatment regimens are improving prospects for patients, so-called emerging pathogens — viruses, bacteria and fungi — are a growing medical problem, Wingard said.

"With advancing medical technology and more powerful antibiotics, patients are living longer," he said. "We have a growing population of patients who are susceptible to very serious infections by viruses, bacteria and fungi that in years past were not medical problems."

The number of people contracting *Aspergillus* infections jumped enormously in the 1990s .

Diagnosis is very difficult and is often mistaken for something else.

The wrong drugs are often prescribed.