PRACTITIONER TECH SHEET | Ochratoxin

Ochratoxin A is one of the most prevalent mycotoxins in water-damaged buildings and food, and is classified as a class 2B, possible human carcinogen by the WHO International Agency for Research on Cancer. The toxicokinetics are not clearly understood and seem to be very complex, including inhibition of protein synthesis and energy production, induction of oxidative stress, DNA adduct formation, as well as apoptosis/necrosis and cell cycle arrest.

Ochratoxin has been implicated in numerous health conditions, especially related to the kidneys. It binds with high affinity to albumin, resulting in negligible elimination by glomerular filtration. Its very long half-life strongly affects its toxicokinetics. The bound fraction constitutes a mobile reserve. Escaping glomerular filtration means the tubular interstitium takes the brunt of the bioaccumulation. Displacement from albumin becomes a key focus of treatment.

Ochratoxin can reduce immune function, inhibit energy production, and is more neurotoxic and carcinogenic to males. This may be related to its reduction of intracellular zinc levels. Studies have correlated Ochratoxin exposure to the male prevalence of autism.

Ochratoxin crosses the placenta where it concentrates, leading to higher levels in the placenta, as well as two-fold higher levels in the fetus's blood than that of the mother.

The gut microbiome and proteolytic enzymes play a role in detoxification via hydrolysis. Even though the liver is not the sole organ to metabolize Ochratoxin, it can be biotransformed by both phase I and phase II enzymes. The phase I-type reactions are related to the action of the CYP450 enzyme family. Among phase II reactions are sulfate, glucuronide, hexose/pentose, and glutathione conjugations.

MOLD SOURCES
Aspergillus ochraseus, A. niger
Penicillium verrucosum, P. nordicum, P. chrysogenum

COLOR
Tend to be light green, but these various species of mold can take on any color, even "black mold" color, depending on substrate

FAVORITE BUILDING MATERIAL
Flooring, carpet, ceiling tiles, heating ducts especially flex ducts

SIGNS
Low albumin
Reduced GFR

SYMPTOMS
Fatigue
Brain fog
Headache, migraine
Hyporexia
Nausea
Chemical sensitivity
Pruritus
Hyperuria, or may progress to oliguria
Edema
Hypertension
Angina
Muscle weakness and/or cramps
Exercise intolerance
Frequent infections

HEALTH IMPACTS

Nephrotoxic, nephrocarcinogenic, hepatotoxic, neurotoxic, cardiotoxic, immunotoxic, genotoxic, carcinogenic, embryotoxic, teratogenic.

Kidney. Reduced glomerular function. Oxidative stress, direct genotoxic alterations, epigenetic influences. Linked to IgA nephropathy, focal segmental glomerulosclerosis, chronic interstitial nephropathy, and renal cancers. Acute renal failure has been demonstrated from severe inhalational exposure.

Liver. Transport polypeptides result in active cellular uptake. Significantly increases ROS concentration, while reducing superoxide dismutase. Secondary metabolites are not necessarily more toxic.

Heart. Myocardial injury.

Mitochondrial dysfunction. Strong negative effect on cellular glutathione and ATP production, resulting in an overall decrease in protein synthesis.

moldwise™

Dr JILL CRISTA BREAK the MOLD TAKE BACK your HEALTH

Genotoxic. Covalently binds to DNA causing mutations and subsequent formation of malignant tumors.

Immune. Activates neutrophils and kills these cells through necrosis.

Neurotoxic. Bioaccumulation in the brain via active cellular uptake by transport polypeptides.

Reproductive. Teratogenic, toxic to developing fetuses.

TREATMENT OPTIONS (select based on patient signs and symptoms, but flavonoids are a must with Ochratoxin)

*Note: the doses listed are intended for when each item is used as a standalone therapy. When multiple items are combined, they often work synergistically, meaning lower doses can typically achieve similar effectiveness due to their complementary effects.

Therapeutic Diet ~
- Eat the rainbow of colorful vegetables, 5-7 servings daily.
- Plenty of good fats every day.
- Flavor dishes with rosemary, mint, sage, and thyme. (Ochratoxin-specific mycotoxin neutralizing activity)

Flavonoids displace Ochratoxin from albumin, and prevent or attenuate its toxic consequences on albumin binding.
- First-pass metabolism of flavonoids is high, so frequent, repeated dosing is recommended.
- A mixed bioflavonoid supplement is ideal as it covers the wide range of the flavonoids studied.

Focus on astaxanthin, luteolin, quercetin, lycopene for Ochratoxin-specific albumin displacement activity.
- Astaxanthin. 6mg qid.
  - Red fat-soluble pigment protects against Ochratoxin-induced myocardial and lung injury via Nrf2 pathway.
- Luteolin. 50mg tid-qid.
  - Attenuates viability loss in kidney cells and lymphocytes, while decreasing DNA damage of blood cells.
- Quercetin. 300mg qid.
  - Suppresses cytotoxicity, oxidative stress, and alteration of antioxidant defenses via activation of Nrf2 pathway and down regulation of NF-κB and COX-2. Zinc ionophore.
- Lycopene. 10mg qid.
  - Alleviates Ochratoxin-induced DNA damage, and renal oxidative stress and apoptosis.

Binder (after bioflavonoids). 2 Tbsp ground organic seeds as insoluble fiber binder.

Zinc. 30mg bid. Take with food. (may cause nausea on empty stomach)
- Repletes intracellular zinc, reduces cytotoxicity, genoprotective. Best if co-administered with a zinc ionophore.

Resveratrol. Minimum therapeutic dose: 1 gram transresveratrol daily.
- Ameliorates Ochratoxin toxicity in kidney.

Tocotrienols. 200mg mixed tocotrienols bid.
- Improves blood pressure. Restores GFR, absoluted fluid reabsorption, and renal antioxidant enzyme activity.

Rosemary (Rosmarinus officinalis). 700mg dried leaf bid, or 1 tsp tincture bid.
- Rosmarinic acid has a significant cytoprotective effect against Ochratoxin via decreased ROS production and improvement in viability with less inhibition of protein and DNA synthesis. Also antifungal.

Glutathione. Up to 450mg liposomal daily. Start very low if still exposed or sensitive.
- Or use glutathione inducers if not tolerated - ALA, NAC, Selenium.
- NAC+Selenomethionine - combination improved immunotoxic effects on macrophages.

Milk Thistle. 500mg bid.
- Potent protective effect against apoptosis and cytotoxicity caused by Ochratoxin. Reduces immunotoxicity.

Melatonin. Nephroprotective dose: start 1mg nightly and titrate to 20mg as tolerated. Dose at dinnertime to avoid morning grogginess. Zinc ionophore.

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