

# Sulfa, Sulfite, Sulfate and Sulfur: True Allergy, Cross-Allergy or No Allergy?

John Chen, PhD, PharmD, OMD, LAc

*Sulfa*, *sulfite*, *sulfate* and *sulfur* are four terms that have similar sounds, but very different allergy profiles. As health care practitioners, it is important to understand these four terms to establish whether your patients have true allergy, cross-allergy or no allergy among drugs, herbs and foods.

## 1. Sulfa (Sulfonamide antimicrobials, Sulfonamidenon-antimicrobials)

Sulfa drugs refer to primarily to sulfonamide antimicrobials, such as sulfamethoxazole, sulfisoxazole, sulfafurazole and sulfadiazine. Sulfonamide antimicrobials contain sulfur, oxygen, nitrogen and other groups. The allergic reactions occur due to the actions of sulfonamide antimicrobials, not to the actual sulfur. Although 3-4 percent of patients claim to be allergic to sulfa drugs, only 3 percent of these patients have true allergy to sulfonamide antimicrobials.<sup>1-3</sup>

True hypersensitivity reactions, such rash and hives, will generally resolve within two weeks after discontinuation of the drug. Severe hypersensitivity reactions, such as blistering and mucosal reactions, may require hospitalization.<sup>4-6</sup>



bottled lemon juice (non-frozen), bottled lime juice (non-frozen), sauerkraut (and its juice), grape juices (white, white sparkling, pink sparkling, red sparkling), salad, pickled cocktail onions, and wine.

Sulfites are also present in many oral medications (adrenaline, isoprenaline, isoproterenol, isoetharine, phenylephrine, dexamethasone and injectable corticosteroids, dopamine, local anaesthetics, propofol, aminoglycoside antibiotics, metoclopramide and doxycycline) and topical creams and ointments (antifungal and corticosteroids). Lastly, many cosmetic products also contain sulfites (hair colors and bleaches, home permanent solutions, skin fading/lighteners, false tan lotions, anti-aging creams and moisturizers, facial cleansers, around-the-eye creams, body washes/cleansers, hair sprays, perfumes, blush, bronzers/highlighters).<sup>9</sup>

Sulfites are present in many forms, such as bisulfite, metabisulfite and sulfur dioxide. Sulfites cause allergy in approximately 1 percent of the population. Hypersensitivity reactions include hives, dyspnea and in severe cases, anaphylactic shock. Products that contain more than 10 ppm of sulfite require disclosure on the label, according to the U.S. Food and Drug Administration.<sup>10</sup>

Sulfites and sulfonamides have different chemical structures, and there is no evidence of cross-allergy between sulfites and sulfonamides.<sup>11-12</sup>

For patients with sulfite allergy, inquiry should be made to ensure the seven herbs listed below are sulfite free. Chinese herbs that may be treated with sulfite include: *Bai Guo* (Semen Ginkgo), *Bai He* (Bulbus Lillii), *Ge Gen* (Radix Puerariae Lobatae), *Gou Qi Zi* (Fructus Lycii), *Ren Shen* (Radix et Rhizoma Ginseng), *Shan Yao* (Rhizoma Dioscoreae) and *Yu Zhu* (Rhizoma Polygonati Odorati).

### 3. Sulfate

Sulfates contain one sulfur atom surrounded by four oxygen atoms. Sulfates are widely present in everyday life: sulfate-containing drugs (i.e., ferrous sulfate), dietary supplements (i.e., glucosamine sulfate) and personal care products (i.e., shampoo, toothpaste, shaving foam, body washes and facial cleansers).<sup>13</sup>

Drugs That Contains Sulfites
Adrenaline
Aminoglycoside antibiotics
Anaesthetics, local
Antifungal (creams and ointments)
Corticosteroids (creams and ointments)
Corticosteroids (injectable)
Dexamethasone
Dopamine
Doxycycline
Isoetharine
Isoprenaline
Isoproterenol
Metoclopramide
Phenylephrine
Propofol

Cosmetic Products That Contains Sulfites
Anti-aging creams and moisturizers
Around-the-eye creams
Blush
Body washes/cleansers
Bronzers/highlighters
Facial cleansers
False tan lotions
Hair colors and bleaches
Hair sprays
Home permanent solutions
Perfumes
Skin fading/lighteners

Herbs That May Contain Sulfites
<i>Bai Guo</i> (Semen Ginkgo)
<i>Bai He</i> (Bulbus Lillii)
<i>Ge Gen</i> (Radix Puerariae Lobatae)
<i>Gou Qi Zi</i> (Fructus Lycii)
<i>Ren Shen</i> (Radix et Rhizoma Ginseng)
<i>Shan Yao</i> (Rhizoma Dioscoreae)
<i>Yu Zhu</i> (Rhizoma Polygonati Odorati)

Sulfates allergies are rare. In addition, sulfates are different from sulfonamide antimicrobials and sulfites, and do not cause allergic or sensitivity reactions.

## 4. Sulfur

Sulfur is a chemical element naturally present in many amino acids and other important molecules in the body. In fact, after calcium and phosphorus, it is the third most abundant mineral in the human body. Sulfur is also found in many foods, such as garlic, onions and broccoli.<sup>14</sup>

While some individuals may be allergic to the action of sulfonamide antimicrobials and sulfites, they do not have true allergy to sulfur itself. True allergy to sulfur is virtually impossible, as sulfur is present in all living tissues and a person cannot survive without sulfur.

### Takeaway Points

Sulfa, sulfite, sulfate and sulfur are four terms that have similar sounds, but completely different clinical implications. In addition to inquiring as to patients' allergy profiles, health care practitioners must help patients understand the differences between these four terms so patients who have true allergy or cross-allergy with sulfa, sulfites and/or sulfates can avoid the relevant drugs, herbs, foods and/or products.

- Sulfa drugs, specifically sulfonamide antimicrobials, may cause allergy in approximately 3 percent of the population. There is no clinical evidence of cross-allergy between sulfonamide antimicrobials and sulfonamide non-antimicrobials. There is no documented data of cross-allergy between sulfonamide antimicrobials and Chinese herbs.
- Sulfites, including bisulfite, metabisulfite and sulfur dioxide, are widely present in foods, dietary supplements, drugs and cosmetic products. There is no evidence of cross-allergy between sulfonamide antimicrobials and sulfites. For patients with true sulfite allergy, seven herbs (listed above) should be tested to ensure they are sulfite free.
- Sulfates are widely present in everyday life as drugs, dietary supplements and personal care products. Sulfate allergies are rare. There is no evidence of cross-allergy between sulfates with sulfonamide antimicrobials and sulfites.
- Sulfur is a chemical element that is naturally present in the human body and many foods. It is virtually impossible to be allergic to sulfur.

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