

# CHILDREN'S EAR INFECTIONS

By Dr. John Heuertz, DOM

## INTRODUCTION

Recurrent infections help make Acute Otitis Media (AOM) the #1 reason for a visit to a family doctor or pediatrician in this country<sup>i</sup>. The routine treatment for AOM in the United States is oral antibiotics<sup>ii</sup>. In some instances, chronic infection is even treated prophylactically with antibiotics<sup>iii</sup>. In fact, more oral antibiotics are administered to patients under 10 years old than to any other age group<sup>iv</sup>. In spite of these facts, there is no clear evidence that antibiotics are beneficial for routine treatment of AOM in either short or long-term outcomes<sup>v</sup>. Traditional Chinese Medicine (TCM) uses pattern identification as the basis for diagnosis. Because a pattern is determined by a semi-mutable set of signs and symptoms occurring in concert, formulas are designed to address a complex of issues.

Otitis media can have multiple causes, including bacterial infection, viral infection, anatomical factors, impaired immunologic status, airborne allergy, food allergy, feeding method, and gastroesophageal reflux<sup>vi</sup>. (One study involving 456 children with AOM found that viruses caused 41% of those cases<sup>vii</sup>.) The manifestations can include bulging eardrums and ear pain, moderate to high fever, blocked sinuses, cough, ear edema, headache, irritability, insomnia and restlessness, sore throat, sweating, appetite changes, and even rash. Chinese medicine believes that its dynamic approach provides a safer, more inclusive and superior treatment strategy.

## ANTIBIOTICS

Though utilized for a broad range of clinical complaints, the action of an antibiotic is focused and narrow. Antibiotics are designed to do one (and only one) thing: kill bacteria. And though antibiotics can occasionally improve some symptoms, especially those caused by inflammation, they possess no direct action to do anything other than kill the bacteria. They cannot relieve distress or pain, promote drainage, repair damage, prevent recurrence or any of the other issues commonly encountered in a case of AOM.

Some studies suggest that when used for treating AOM, antibiotics may actually be harmful<sup>viii</sup>. One example is the statistical evidence suggesting a connection between frequent use of antibiotics in the treatment of common ear infections and children who harbor drug-resistant bacteria during frequent illnesses<sup>ix</sup>. Another example involves the interference of antibiotics with immune system signaling in the intestinal lining<sup>x</sup>.

Before nutrients or microorganisms can enter the bloodstream from the intestinal tract, they must first pass through three layers of defense. In the outer most layer, that is, the layer furthest from the bloodstream, lies about 400 species of bacteria, some beneficial, others dangerous. These bacteria are in a constant battle for dominance. In this battle, chemicals produced

by the bacteria can make the environment antagonistic for competing species or enable another to proliferate. The next layer closer to the bloodstream is made up of epithelial cells with TOLL receptors on their surface. These receptors pick up chemical signals from the battle zone to keep the immune system prepared to respond to potential transgressors. Behind the epithelial layer directly protecting the blood stream is a compact layer of immune cells (lymphocytes, microphages, monocytes, and dendritic cells), some of which bear TOLL receptors themselves. For any potential pathogen entering the body through the intestinal tract, this signaling through the TOLL receptors is the primary mechanism for immune activation.

The proximity of the compact immune cell layer to the blood stream implies a potentially global response. Oral antibiotics profoundly influence the enteric population dynamics and therefore have a comparably profound influence on the signaling system.

Some of the effects antibiotics have on the immune system are well understood. Many more remain insufficiently investigated. One effect that is fairly well understood is a form of malnutrition

resulting from an over-stimulated signaling system. Over-stimulation of signaling can cause a hypersensitivity of the intestinal tract's immune response. This hypersensitivity can result in an allergic-type response to certain foods and the nutrients they contain. Generally speaking, the more hyperactive this immune cell layer, the fewer nutrients will be properly absorbed. Suppression of this immune response is critical to avoid malnutrition.

In TCM terms, antibiotics have a very cold property, which makes them effective to clear heat and reduce inflammation. But the same cold property also damages the spleen qi and the digestive function in general. When applied to the intestines, the function of the spleen qi to "separate clear from turbid" directly translates into modern nutritional terms as the separation of nutrients from waste material. When the spleen qi is damaged, its ability to separate clear from turbid is impaired and "turbid" substances are allowed into circulation, while nutritive substances (clear) manage to pass through the stool. The spleen also plays a critical role in the production of *wei qi*, or "defensive qi", which it produces through a transformation process involving "clear" substances obtained from diet. Without sufficient "clarity" in this raw material, the strength of the *wei qi* is compromised, defense against external pathogens is diminished, and chances for recurrent infection increase.

There are a number of other mechanisms by which antibiotics may adversely impact the immune system<sup>xi</sup>. Many theories are still being researched. The important facts for the present discussion are 1) *the lack of evidence that antibiotics are an effective treatment for AOM*; and 2) *the indications that antibiotics may actually cause harm*.



## PATHOPHYSIOLOGY OF ACUTE OTITIS MEDIA (AOM)

AOM is a disease primarily affecting the eustachian tubes but originating usually in the nasopharynx. The eustachian tube is lined with mucus membrane. It begins just behind the tympanic membrane (the "eardrum") and, in adults, courses downward, forward, and medially to communicate with the nasopharynx, where it also terminates. The total length of the tube in an adult is 3-4cm. In children, the downward aspect of the angle is less pronounced and the total length of the tube is less than 3cm.

Before the 1990's the most accepted explanation for the underlying cause of AOM was under-aeration of the eustachian tube due to obstruction or blockage of the tube. More recent studies suggest that the opposite is true. Rather than an obstruction, an over-compliant eustachian tube is believed to be the underlying cause<sup>xii</sup>. For protection, a normally functioning tube remains closed except for brief moments of aeration during yawning or swallowing. Otitis media can begin when the pressure around the nasopharynx rises substantially above the pressure of the middle ear, allowing pre-infected nasopharyngeal secretions to infiltrate the mucosal lining of the eustachian tube<sup>xiii</sup>.

Several factors can contribute to the change in the pressure relationship between the nasopharynx and the eustachian tube. Most significantly, the nearly horizontal orientation of the eustachian tube in younger children makes them more vulnerable to pressure changes. But other factors come into play.

Adenoids consist of lymphatic tissue and are located in the nasopharynx. As part of the immune system, they are the first destination for many viruses entering the body. They may also serve as a reservoir of pathogenic bacteria<sup>xiv</sup>. At the early stage of infection, adenoid can become swollen. Swallowing causes the adenoid to elevate while simultaneously opening the eustachian tube, thus allowing transfer of infection from the adenoid to the eustachian tube.

TCM discusses pathogenic factors in environmental terms such as "wind," "heat," "cold," "dampness," and "dryness." Each of these has a set of pathological signs and symptoms associated with it. An acute case of otitis media (AOM) is generally associated with wind and heat. Two of the main properties of heat are that it rises and expands. This rising and expansion can explain, in TCM terms, another mechanism by which the pressure differential between the nasopharynx and eustachian tube shifts. As the adenoid becomes inflamed, it gives off heat. This heat rises and creates pressure at the termination point of the eustachian tube. When enough pressure has accumulated, the eustachian tube can no longer protect itself. A simple act of swallowing is all it takes to open the eustachian tube, thus allowing the pressure to push the wind-heat pathogen into contact with the mucosal lining of the tube.

## CHINESE HERBAL TREATMENT OF AOM

Dr. Jake Paul Fratkin designed **Children's Ear Formula**, an excellent formula for the routine treatment of pediatric AOM. It is based on three common formulas, *Yin Qiao San*, *Xiao Chai Hu Tang*, and *Bi Min Gan Wan*. The first of these, *Yin Qiao San*, has strong action to dispel wind-heat and resolve toxin. The second, *Xiao Chai Hu Tang*, is a shao yang stage formula. It can help direct the rest of the formula to the middle ear, which the shao yang channel enters. The third formula, *Bi Min Gan Wan*, opens and drains the sinuses and other orifices in the head, which can help restore the balance of pressure between the nasopharynx and the eustachian tube. Dr. Fratkin reduced this

combination to its therapeutic essentials and augmented the formula to focus its actions specifically on ear infections.

**Children's Ear Formula** not only destroys pathogens and reduces inflammation, but also resolves phlegm in the head, supports the digestive function, and preserves the *wei qi* (defensive qi) to prevent re-occurrence. It contains ingredients shown to possess not only essential antibacterial and antiviral action<sup>xv</sup>, but also which are beneficial for treating other signs and symptoms of the pattern.

*Poria (Fu Ling)*, *Chrysanthemum (Ju Hua)*, and *Peucedanum (Qian Hu)* all can reduce edema in the ear<sup>xvi</sup>. Several ingredients have strong anti-inflammatory action<sup>xvii</sup>. Pressure in the ear can cause distress and pain for children; Red Peony Root (*Chi Shao*) and *Angelica (Bai Zhi)*<sup>xviii</sup> both have an analgesic property with an affinity for the head. *Bupleurum (Chai Hu)* and *Pinellia (Ban Xia)*<sup>xix</sup> each have a mood regulating action. *Poria (Fu Ling)* and

*Fritillaria (Zhe Bei Mu)* work together to guide pathogens out of the body through the urine<sup>xx</sup>. *When using this formula, relief is usually experienced in two hours or less, complete resolution in 1- 3 days.*

**Children's Ear Formula** can be administered to prevent an infection from developing into otitis media. If the child has a recently developed mild fever, a red tympanic membrane that is not yet bulging, or sinus congestion where the heat factor is more pronounced than the congestion, **Children's Ear Formula** can be used to prevent this condition from developing into AOM.

## OTHER PATTERNS / OTHER FORMULAS

Though wind-heat is the most common TCM pattern of true AOM, it is important to distinguish between this and other conditions and patterns.

## TOXIC HEAT

Profuse suppuration and high fever indicate the presence of toxic heat. Severe headache may be part of the pattern. To treat successfully, you will need to add **Huang Lian Jie Du Tang (Coptis Relieve Toxicity)** to the **Children's Ear Formula**. This

## CHILDREN'S EAR FORMULA

Agastache <i>Huo Xiang</i> .....	10%
Poria <i>Fu Ling</i> .....	10%
Chrysanthemum <i>Ju Hua</i> .....	8%
Coptis <i>Huang Lian</i> .....	8%
Forsythia <i>Lian Qiao</i> .....	8%
Paeonia <i>Chi Shao</i> .....	8%
Peucedanum <i>Qian Hu</i> .....	8%
Angelica <i>Bai Zhi</i> .....	7%
Bupleurum <i>Chai Hu</i> .....	7%
Fritillaria <i>Zhe Bei Mu</i> .....	7%
Pinellia <i>Ban Xia</i> .....	7%
Vitex <i>Man Jing Zi</i> .....	7%
Zingiberis <i>Sheng Jian</i> .....	5%

is a serious condition and in rare cases can lead to deafness. Treat quickly and with care. [NOTE: When combining these two formulas, you should decide upon one as the lead formula and the other as its assistant. The lead formula can be given at full strength, the assistant at ½ to ¾ strength. To determine the lead formula, determine whether there is an underlying condition of toxicity that lead to the AOM, or whether the AOM developed into a toxic condition. In the case of underlying toxicity, CRT Formula should be your lead, while CE Formula guides it to the auditory canal and sinuses. If the AOM was contracted entirely from the exterior and developed into a toxic condition, then the CE Formula will be your lead and the CRT Formula will be used at ½ or ¾ strength to augment the lead formula.]

### WIND-COLD ATTACKING THE EAR

If there is ear pain causing a headache with only slight or no fever, a runny nose with clear discharge, no redness in the tympanic membrane, and slight blue or purple color changes in the cartilage of the ear, then clearing wind-heat will be of limited value. A cold pathogen has invaded from the exterior through the ear. There will probably not be any bulging to the eardrum. Using **Dang Gui Si Ni San** (*Tangkuei and Jujube Combination*) combined with **Chuan Xiong Cha Tiao San** (*Ligusticum & Tea Formula*) can warm the middle ear and head to dispel the cold, relieve ear pain and headache.

### LIVER & GALL BLADDER FIRE

Onset of pain will be rapid, as in a wind-heat condition, but pain may be mild and chronic with a sudden trigger for acute severe pain. Yellow discharge is likely. Child will probably have a ringing in the ear that accompanies the pain and have a bitter taste in his or her mouth. The recent history will not necessarily include a viral exposure. Though bacteria will show up in the exudates, the underlying cause is not viral or bacterial, but induced by stress and diet. In the days leading up to the acute attack, the child will likely appear irritable or nervous. He or she will have a thick, yellow, greasy tongue coat and/or a diet that is high in fat and/or sugar. The best formula to treat this is **Long Dan Xie Gan Tang** (*Gentiana Drain Fire Formula*).

CAUTION: **Gentiana Drain Fire Formula** is very cold, not unlike antibiotics. If given to younger children (under age 7), or to children with already weakened digestion (even with this "fire" condition) the formula can damage the spleen qi. The damage is usually not as severe as antibiotics. Yeast are killed by this formula too, so the chance of a yeast infection developing as a result of using **Gentiana Drain Fire Formula** is small. When there is a question about the child's digestive strength and this formula is otherwise appropriate for the condition, combine with a digestion-strengthening formula such as **Bu Zhong Yi Qi Wan** (*Ginseng and Astragalus Formula*), or **Liu Jun Zi Tang** (*Six Gentlemen Formula*).

### DOSAGE

#### CHILDREN'S EAR FORMULA

(available only in granules)

A dose is administered orally (NOT through the ear) at 0.4 to 0.5 grams every 2-3 hours for infants and children up to 25 pounds during the painful stage of the infection. (This period is usually only the first 1-3 doses.) The dose may be increased to

0.5 to 0.75 grams for children 26 to 50 pounds. Most parents report significant improvement within the first 2-3 hours after the initial dose. After the pain has significantly subsided and fever has dropped, you may reduce frequency to every 4 hours. If fever becomes very mild and no pain is present, you may continue with the same size dose, but administered only 3-4 times a day.

A normal course of treatment during a moderate infection looks something like this:

- Pain subsides in 1-3 hours; pain is gone 2-3 hours after 2nd dose (4-6 hours after first dose)
- One more dose is given 2-3 hours later and fever drops shortly after that. Change the administration to every 4 hours at this point. Continue every 4 hours for about 1 day or until fever is eliminated.
- As a precaution, continue administering the formula, about every 6-8 hours (3 times a day) for 1-2 days after fever has maintained below 100.5F.
- Refrigerate in between doses to keep fresh.
- Discard the formula when course is finished or after the 3rd day.

#### How to get the child to swallow the formula...

When using **Children's Ear Formula**, which comes in granules only, there are a few tricks to getting the child to swallow the formula. The taste is quite bitter and most smaller children will try and spit it out. Some older children can be "bargained" with.

- In infants and toddlers up to two years of age, mix 4-5 grams of the formula with a little boiling water. The amount of water is insignificant for the sake of the formula, but can be an important factor when it comes to swallowing. Some children will accept a diluted decoction more easily, others need it thick, like a sludge. Shake or mix thoroughly while decoction is still hot. After cooling to a safe temperature, give the child about 1/10th of the total formula every 2-3 hours, shaking or mixing vigorously prior to each administration. Remember to keep the herbs refrigerated in between administrations, but warming it slightly just before administration is a good idea.
- Older children (age 2 and up) can have the granules prepared with boiling water in the same way as infants (though the dose might be bigger depending on weight), but they have more alternatives. One way that has worked with many parents is to first give the child the herbs mixed with water so they know what it tastes like. If the child refuses later, you can offer to omit the water and mix the granules directly into honey or some other thick, sweet carrier such as caramel or chocolate sauce. Have a glass of warm water handy to chase it down. The warm water will help the herbs absorb into the system as well as clear away most of the bitter taste quickly.

#### EXTRA-CONCENTRATED TABLETS FOR NON WIND-HEAT PATTERNS (based on 600mg EC tablets)

- For infants and children up to 20 pounds, use ½ tablet per dose every 2-3 hours during the acute stage of the attack (while ear pain and fever are present) and every 4-8 hours in the sub-acute stage (immediately after the ear pain has

been eliminated.)

- For children 20-40 pounds, a whole tablet can be used. When combining formulas as suggested above you are usually safe giving an entire dose of each formula, except in the case of combining **Coptis Relieve Toxicity Formula** with **Children's Ear Formula**. (See note above.) In smaller children, the tablets will need to be crushed into a powder to avoid choking. Once in a powder, you may use any of the methods described above for the Children's Ear Formula. Older children may be able to swallow a tablet either whole or split.

## NOTES

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