Essential Oils for Lung Nebilizing

My First Experiment
First, I began inhaling *Eucalyptus radiata* oil twice a day. I would put 2 mL of hypertonic saline (essentially half of a plastic 4 mL vial) in my Pari nebulizer cup and put in two drops of eucalyptus oil (EO). I'd shake it a little to break up the big globs of oil that float on top, then start the nebulizer. It takes about 5-10 minutes to nebulize. I nebulized the EO at the end of my morning and evening treatments at the time when you would usually inhale an antibiotic like Tobi or Cayston.

At first, the EO was kinda irritating and it made me cough up a good amount of mucus. Over the next week or so I developed a tolerance to it so that the irritated coughing subsided. The irritating cough was really not so bad because it made my cough more productive, and the menthol-like feeling of the EO soothed my throat and ultimately reduced my spasms. I also believe that since I started out this experiment mixing the EO with hypersal, part of this productive cough was a reaction to the hypersal. In my later experiments I used normal saline.

The Results
After stopping my oral antibiotics and before inhaling EO, I had been having my usual spasmy morning cough (an annoying asthmatic-like hacking for 20-30 minutes), chest tightness, shortness of breath, tons of mucus, and a feeling of chronic inflammation and irritation in the lungs. I had also been getting night sweats and would often wake up at 3 am to cough with a scary feeling like I had woken up from sleep apnea. My energy throughout the day was lower than when on antibiotics. My ever-present low-grade fever required one acetaminophen every morning at 9 am.

After only two treatments of inhaled EO I immediately felt a huge effect. The EO stopped my spasmy cough that first day and it has not returned since. EO is bronchodilating, a counter-irritant, antispasmodic, and anti-inflammatory, so almost immediately made my lungs felt more open, less inflamed, and more resilient. After only a few days I was able to take in deep breaths where I could feel air moving all the way down to the lower parts of my lungs, something that I can rarely do except when on vancomycin. My shortness of breath was gone. My cough was less spasmodic but more productive, as if each cough was more efficient at getting mucus up. After a week I noticed a decrease in the amount of mucus I was coughing up, and that amount decreased still in the following weeks. The oil seemed to be getting more effective with time. My night sweats left and never came back. I could sleep through the night again without waking up from sleep apnea to then hack up mucus. My lungs felt open and clear throughout the night and even when waking up. My morning cough was minimal enough that I could eat a small breakfast before starting my morning treatments, something not usually possible when off antibiotics (I usually cough too much to get food into my mouth). I still had my daily low-grade fevers, which I control with the morning acetaminophen, but my energy had improved. My sinuses cleared up after about 2 weeks, and the only stuff that comes out is clear snot, no more green plugs. The coating on my tongue (an important diagnostic tool in Chinese Medicine) had shifted from my usual coating of thick white-yellow-brown gunk to almost nothing at all.

Needless to say, I was really excited about all this. It was pretty much revolutionary. I could feel great and not be dependent on antibiotics?! With no impact on my gut flora. No side effects at all. But the real test was the results of my FEV1. **After 3 weeks of EO treatment**

my FEV1 was up 8% from what it was 2 months before! It was now at the same level that it was after my last 10 day course on IV vancomycin in December! I had even caught a cold the week before my test (kicked it in a record-breaking 3 days!) and still my numbers were high. Pretty amazing. In addition to being antibacterial, EO is also antiviral and antifungal, so I assume inhaling it made me recover from the cold quicker and prevented it from moving into my lungs. During the cold I had also added a drop of EO to my sinus rinse bottle, which really helped reduce mucus build up and inflammation.

Tea tree (Melaleuca)

Further Experimentation

Eucalyptus worked so well that I thought I would experiment with other oils to see if all essential oils are as effective, or if not, which ones are more effective for me than others. After 4 weeks of nebulizing EO I decided to stop it and try pine oil (*Pinus sylvestris,* a.k.a Scotch Pine) alone. I decided to try it alone to be more "scientific" about it. After five days of only pine oil it became clear that it was nowhere near as effective as EO. I began to notice an increase in my mucus load and my lungs became a bit more irritated in the mornings. The spasmy cough did not return, but I felt my lung capacity begin to decline very slowly and my shortness of breath/ diaphragm tightness returned. After five days of this trend I decided the experiment was over (I planned to do a two-week trial but the results were clear enough after 5 days - not worth dropping my FEV1 for science's sake!).

For the next three days I mixed 2-3 drops of pine with 1 drop of EO in 2 mL hypersal and nebulized twice a day. Things improved somewhat. My shortness of breath went away and my diaphragm relaxed again. My morning coughs became less irritated.

For the next two days I added cinnamon leaf oil to EO (1 drop and 1 drop) and also tried cinnamon leaf by itself. It was really intense! I wanted to try cinnamon because the scientific literature has said that cinnamon oil, with its high levels of cinnamaldehyde, is essentially the strongest antibacterial essential oil out there [3]. It may be really bactericidal but it burned my throat and numbed my mouth and was so irritating that I think it actually worsened my shortness of breath. So after a few days of that I decided the pain wasn't worth it, and I needed to move on.

After these two unsuccessful experiments, I came up with a combo that I think is pretty effective, and I've been using it for the last two weeks. In the morning I am nebulizing 1 drop EO, 1 drop tea tree oil (TTO), and 1 drop lemongrass mixed in normal saline. I remembered that I had a box of normal saline syringes left over from my home-IV treatments in December, so I decided it would be less irritating to use normal saline instead of hypersal as my substrate. I nebulize the EO and TTO together in 2 mL saline, then the lemongrass (LG) by itself in 2-3 mL saline. I neb the LG by itself because it is pretty irritating (similar to

cinnamon, spicy, but a little milder, and does not cause me shortness of breath) and I have to inhale it with my mouth open, unsealed around the neb cup or else my throat will burn. I don't want to waste any TTO or EO, so I neb the LG separately this way. I recently began to use LG in combo with 1 drop of pine oil (a much more mild oil), which seems to reduce the irritating effects of LG a little bit so that I can inhale it without my throat burning as much. Then, at the end of this treatment, I add in another 1/2 mL of saline and neb that to make sure I get every last morsel of essential oil left in the neb cup. I don't want to waste any of it. I put up with the irritation of the LG because I feel that it is effective, as in the last two weeks my mucus production has declined to be even less than what it was in my first experiment with EO, and LG has been shown to be particularly effective against MRSA in the literature (which I will discuss later). In the evening I nebulize 1 drop EO, 1 drop TTO, and 1 drop pine oil together in 3 mL saline. This seems to be a soothing combo that lets me sleep better through the night, versus when I neb LG before bed it can sometimes cause me a bit of irritation that can make me wake up with a dry cough at 3 am, but not always.

The Science

There have been numerous *in vitro* studies on the bactericidal (i.e. bacteria-killing) effects of essential oils on bacteria, viruses, and fungi in the last decade or so. Interestingly, because the pharmaceutical-industrial complex dominates modern Western medicine in America and Europe to the point where almost all research is done for the development of multi-billion dollar blockbuster drugs, some of the most innovative and groundbreaking research on the use of herbs and non-patentable nutraceuticals to fight disease is coming out of Asia, the Middle East, and Eastern Europe. There are a few studies coming out of research universities in the US, Australia, and Europe as well. I find it fascinating that countries that are less obsessed with ultra-capitalism or are less financially stable are finding cheap, safe, and innovative ways to make people healthier, often times by rediscovering natural medicine.

Anyway, there is a growing body of evidence from *in vitro* studies, clinical experience, and case studies that essential oils are an incredibly useful tool as we move into a post-antibiotic era dominated by antibiotic-resistant superbug infections. Essential oils can be as effective or more effective than many of our strongest antibiotics, yet the risk of developing bacterial resistance is significantly less because essential oils are complex cocktails of many chemical constituents (sometimes over 100) working synergistically to fight infection. In fact, when scientists isolate single constituents from essential oils (like 1,8 cineole from eucalyptus oil) and apply these to bacteria, they generally have weaker activity against bacteria than the whole oil, or than multiple oils applied together in a formula. This is because whole oils contain many different constituents that can be antimicrobial, immunomodulating, antioxidant, as well as antispasmodic, bronchodilating, analgesic (pain killing), anti-inflammatory, or have several other effects that work together synergistically [1][6]. In addition to essential oils' direct inhibitory effects against microbes, they also commonly contain constituents that stimulate the immune system to mount a more efficient and effective immune response to invading pathogens. Thus, applying modern Western medicine's reductionist approach to the use of essential oils may not be as helpful as using whole oils.

Using whole oils with their varying combinations of many different constituents will also help prevent bacterial resistance to these oils. The chemical makeup of plants high in volatile oils is constantly shifting depending on weather, the season, the climate, soil composition, and many other environmental factors. Even oils from two plants of the same species planted side by side may have slightly different chemical profiles, or the oils harvested in spring may differ significantly from those harvest from the same plant in autumn [2]. This can make it

difficult to "standardize" the chemical composition of an essential oil for therapeutic use, but I like to think of this in a positive light - it further reduces the risk of bacterial resistance if we're constantly changing the rules of the game on them. The main reason why bacteria so easily develop resistance to pharmaceutical antibiotics is that they mainly consist of only one chemical constituent, and when a bacteria figures out a way around it, the antibiotic is made useless. Some antibiotics are used in combination, like the common anti-*Pseudomonas* combo of IV Tobi and ceftazidime when going in for a hospital "clean out", or oral Bactrim (a combo of sulfamethoxazole and trimethoprim) because of this emergence of resistant bacteria.

Furthermore, it's been found in preliminary research (and through several CFers personal experiences) that using formulas made of a mixture of different essential oils (like the formulas sold by Young Living) are even more effective against pathogens at smaller concentrations than single oils [6]. Studies have shown that certain plant constituents, when used together make each other more effective at killing bacteria, such as 1,8-cineole and terpenine in tea tree oil. We call this synergism. A study by Weber University and Young Living found that blended oil formulas were more effective than any of their single oils alone, and even more effective than the strongest of the single oils (i.e. lemongrass). In fact, their most bactericidal formula, R.C., was a combination of 11 oils, none of which by itself was particularly bactericidal. It's been found that essential oils and their constituents can work synergistically with antibiotics as well [6].

Choosing Oils

All plants have different chemical constituents and different energetic signatures that make their oils more or less effective against certain microorganisms and more or less helpful for certain kinds of people. All oils are at least somewhat antimicrobial because they are made of lipids (i.e. volatile oils), and many kinds of microorganisms (especially gram-positive bacteria, viruses, and fungi) have cell membranes that are made up of oils and are "lipophilic". Lipophilic means "fat loving"; that fats bind well to the cell membrane. As very small oil-like constituents, essential oils can bind to membranes of microbes and disrupt the lipid molecules in their cell membranes, essentially ripping a hole in them. In addition, their chemical constituents, being fat-soluble, can bind to the microbial cell membranes and insert themselves inside those cells, doing damage to the organelles or DNA on the inside. Gram-positive bacteria (i.e. MRSA, all *Staph*, mycobacteria) viruses, and fungi are especially vulnerable to essential oils because they are protected on the outside by a lipid-based membrane. Gram-negative bacteria (i.e. *Pseudomonas*) have lipophobic (fat-fearing)/hydrophilic cell membranes that are covered in a barrier of polysaccharide chains. This means that volatile oils and fat-soluble chemical constituents are going to have a harder time killing gram-negative bacteria [3]. So while studies have shown essential oils are very effective against gram-positive, viral, and mold/yeast infections, they are less effective against the CF's arch-nemesis, *Pseudomonas*. However, it doesn't mean they're completely ineffective. Tea tree oil has been proven to be mildly effective against multi-resistant *Pseudomonas* [4].

Although all essential oils are somewhat bactericidal, some are much more powerful than others. This has a lot to do with their chemical constituents. Certain classes of chemical constituents, such as aldehydes and phenols, are more antimicrobial than other chemicals that are more weakly bactericidal, such as alcohols, ketones, or ethers [3]. In addition, essential oils' direct antimicrobial actions are not their only actions, so we should not be myopic when it comes to choosing oils based on their bactericidal capacities only. Many oils have other

actions as well, such as anti-inflammatory, antispasmodic, mucolytic (thins mucus), nervine (calms the mind), bronchodilating, and immunomodulating, among others. For example, eucalyptus is not the most bactericidal oil on the block, but it is a powerful oil for helping respiratory function in many ways, as I will describe below, so I make sure to include eucalyptus in my formula for all of its benefits, not just because it kills bacteria.

Eucalyptus

Eucalyptus is a genus of trees that includes over 500 species native to Australia, Tasmania, and nearby islands [5]. A handful of these species have been extensively studied for their medicinal applications, especially *Eucalyptus globulus*, or the Blue Gum tree. The major constituent in most eucalyptus species' oils is 1,8-cineole, also called eucalyptol. There has been a lot of scientific study on this constituent, especially concerning its effect on the respiratory and immune systems. Eucalyptus oil has been found to increase phagocytosis by the white blood cells of the innate immune system without increasing cytokine production. In other words, EO stimulates a better immune response without increasing inflammation, especially in the airways. In fact, in-vitro studies have shown that EO actually reduces cytokine production in already-irritated cells, which would explain why it helps me so much when I feel inflamed. It is thought that 1,8-cineole is the main reason for the ability for EO to reduce inflammation. In fact, one study on asthmatics found that 1,8-cineole reduced inflammation and allergic response so much that they were able to reduce their dose of prednisone, even after treatment with 1,8-cineole had stopped. It is also thought that this constituent can control airway mucus hypersecretion, reducing respiratory exacerbations in asthma, sinusitis, and COPD [1], which also means it would be similarly effective in CF. Human and animal studies have shown that 1,8-cineole significantly reduces symptoms of chronic bronchitis, sinusitis, and COPD.

Although 1,8-cineole is great and there has been a lot of research on it, it may not be as effective against microbes as the whole oil. One study showed that although 1,8-cineole is a major component of many eucalyptus species oils, its strongest antibacterial constituent may be alpha-terpineol, which is found in smaller quantities in the oils [3]. To me, this is further proof that we should not follow the conventional reductionistic thinking patterns in the use of essential oils or herbs in general. Whole plants containing synergistic cocktails of constituents are often more powerful than their chemical isolates, even if those isolates can be delivered at higher doses.

Out of 18 essential oils tested against *Candida albicans*, *E. globulus* was the most effective followed by peppermint, ginger grass, and clove. *E. globulus* was found to be more effective than fluconazole (a commonly used anti-fungal drug for yeast infections), and peppermint oil was found to be as effective as fluconazole [1]. One study found *E. globulus* to be not as effective against *Staph* as tea tree oil, but it is the most effective thing out of anything (including pharmaceutical drugs and synthetic chemicals) against dental cavities and plaque, and that is why many toothpastes now include eucalyptus as an ingredient. EO is also effective against MRSA, depending on the species. In one study on essential oils' effect against MRSA, *E. citriodora* was found to have the largest zone of inhibition (i.e. the radius of bacteria death upon exposure to the oil) of the eucalyptus species (50 mm) with *E. radiata* second (25 mm). *E. globulus* was ineffective. *E. citriodora* was moderately effective when compared to the most effective oils in this study: lemongrass (zone of inhibition = >83 mm = complete eradication), lemon myrtle (65 mm), mountain savory (62.5 mm), cinnamon bark (*Cinnamomum verum)* and melissa (60 mm), and thyme (*Thymus vulgaris)* at 57 mm [6]. In another study, zones of inhibition for EO against 14 strains of MRSA were

comparable to that of vancomycin [10]!

There are so many amazing things about EO and so much science backing it up that I couldn't possibly go into it all here, but if you're interested I suggest you read the paper at the link in footnote 1.

The only possible drawback I could find in the use of EO is that it is mildly anti-tussive in large doses, meaning that it may suppress a cough. It does this by reducing movement of the cilia (little hairs) lining the airways of our lungs and sinuses [1]. It is not known how strongly an effect this has on humans (studies have only been done on this subject *in-vitro*) but I have noticed in myself a slight reduction in my urge to cough, even when I feel there may be mucus in my lower airways. I mentioned this to my CF doctor and she didn't seem that concerned about it. She said that what matters more is how I feel (i.e. great!), how I sound under the stethoscope (i.e. clear!), and my PFTs (i.e. improved!). This effect may vary from person to person, but it's a good thing to watch out for and keep in mind.

Tea Tree Oil

The tea tree (*Melaleuca alternifolia)* is also a native tree of Australia and has several similar chemical actions and constituents to eucalyptus. It is highly antimicrobial and is kind of a "go to" oil in the herbal first aid kit for its antiseptic properties. It is now commonly used in antiseptic hand washes and cosmetics. It is considered to be more antibacterial than many eucalyptus species, but does not have EO's immunomodulating effects. Although it has a small amount of 1,8-cineole, its main constituent is terpinen-4-ol, which is credited as giving TTO most of its antimicrobial effects [7]. Research has proven it to be effective against 27 bacterial and 24 fungal strains, as well as some viruses and protozoa [1]. In one study it was shown to have powerful antibacterial effects on biofilm-grown MRSA [12]. There have been several case reports of prolonged tuberculosis infections (a type of mycobacterium) being cured by inhaling several days of TTO by steam inhalation. As was previously mentioned, TTO is one of the few oils effective against multi-resistant *Pseudomonas* [4] and other gram-negative bacteria. In one study, tea tree oil was moderately effective against MRSA with a zone of inhibition of 45 mm (compared to *E. citriodora* at 50 mm, or lemongrass at >83 mm) [6].

Tea tree oil does have anti-inflammatory properties as well. Studies have shown that it downregulates the production of pro-inflammatory cytokines (chemicals produced by a certain part of the immune system) and reduces inflammatory oxidation in animal studies when inhaled [7]. Furthermore, TTO is highly antifungal and very effective against *Candida* yeast infections, inhibiting its ability to mutate from yeast to hyphae form. TTO has also been shown to be bactericidal against MRSA biofilms [7].

Lemongrass

Lemongrass is actually a genus (*Cymbopogon)* of 45 species of grasses native to southern Asia. It has been used as a medicinal and culinary herb for centuries, and can also be used to repel insects (citronella grass is a species within this genus). In folk medicine, lemongrass is used not just as an antiseptic but also to calm the mind, reduce anxiety, and improve mental clarity. *Cymbopogon citratus* is the most commonly used species for its oil. The species are differentiated by their chemotypes, meaning that they are categorized by their dominant chemical constituents, which can vary significantly between lemongrass species. Its most prevalent chemical constituents are citral and geraniol [9]. Lemongrass oil (LG) is strongly antimicrobial, especially against bacteria but also against fungi, viruses, and even parasitic

worms (i.e. helminths). One study found that out of 14 different essential oils tested including some of the strongest like cinnamon and thyme, lemongrass oil was the most effective against the *H. influenzae* (flu) virus [3]. LG has been shown to have anti-cancer and anti-inflammatory effects as well. It is also effective against *Aspergillus* and *Candida* fungal (mold and yeast) infections. LG has extraordinarily high antioxidant powers [9].

In a study comparing the antibacterial power of essential oils against drug-resistant bacteria, LG had the strongest bactericidal effect against MRSA compared to eucalyptus and TTO. Interestingly, all three essential oils were more bactericidal against these drug-resistant bacteria than both 70% ethanol (alcohol) and chlorhexidine (a commonly-used chemical antiseptic) [4]. Furthermore, lemongrass oil proved to be more antibacterial against all bacteria tested (including two strains of *Staphyloccocus aureus*) than any of its isolated constituents (citral, geraniol, and myrcene), proving once again that whole oils are more powerful than chemical isolates. This study also showed that LG is effective against *Staph* biofilms [8], which is an incredibly important distinction to make, since the chronic infections that we CFers get in our lungs become intractable precisely because of the development of bacterial biofilms. Many *in-vitro* studies only test effectiveness of antibacterial substances against planktonic bacteria, but biofilm-inhabiting bacteria is a whole different beast, and biofilms are what make chronic infections so resistant to antibiotics. All this said, lemongrass seems to me one of the most powerful oils against the bug that most bugs me (MRSA), and while it is pretty irritating it is less so than several of the other oils that have similarly powerful antibacterial effects (i.e. cinnamon and thyme).

Other Oils

As I mentioned, I tried cinnamon leaf oil but it was too irritating for me to continue. I gave it to my sister to use when she gets cuts on her hands (she's a dirty farmer and gets infected cuts a lot). I was interested in cinnamon because several studies have shown that cinnamon (*Cinnamomum verum* and several other species within *Cinnamomum* genus*)* and its major constituent, cinnamaldehyde, are extraordinarily antimicrobial. While I do not think inhaling cinnamon is a good idea because it's so irritating, I do think it has a place in the treatment of skin and external tissue infections, when properly diluted in other oils (like coconut or olive oil) to prevent skin irritation. For infected wounds (especially with antibiotic-resitant bacteria) or MRSA infections of the skin, this may be just the ticket. It may also be safe to diffuse it into the air of a room using an aromatherapy diffuser or oil burner, especially if there is any risk of passing pathogens back and forth in a particularly well-populated room (like at a party or something).

One study showed that cinnamon bark oil was the most effective oil at the lowest concentrations against *Staph* and several other bacteria compared to clove, cardamom, and cumin oils [11]. Another *in-vitro* study that created a model of essential oil inhalation showed that out of 14 oils tested, cinnamon and thyme oils were the strongest antimicrobial oils, especially against *Staph* and the flu virus [3]. Cinnamaldehyde in cinnamon and thymol in thyme are considered to be some of the strongest bactericidal constituents in essential oils.

Thyme oil is another very promising essential oil, and it is probably the next one I will experiment with. There are about 350 species within the *Thymus* genus native to Europe, North Africa, and Asia. In the scientific literature, there has been significant study on a handful of these species and their major constituents. There have been several studies on *Thymus vulgaris, Thymus zygis, and Thymus serpylum*, but most research has been done on specific chemotypes of *T. vulgaris*. The major constituents of thyme that are the most

well-studied are thymol, geraniol, eugenol, carvacrol, and linalool. Thymol, carvacrol, and eugenol have very strong effects against MRSA [6]. Thymol chemotypes of thyme are the strongest antimicrobial oils that I have read about in the scientific literature [3], and are stronger than vancomycin against MRSA [10].

I have been hesitant to try inhaling thyme because I have been warned by multiple herbalists that although thymol is a very effective antibacterial constituent, it is toxic to the kidneys in high doses. Nebulizing very small daily doses of EOs used for a short period of time is safer than ingesting them, and will likely not cause harm to the kidneys. But EO's potential toxicity to the kidneys is something important to keep in mind (especially since I've had kidney troubles caused by IV antibiotics in the past). A solution to this problem is to choose chemotypes of thyme that do not have much thymol in them, and instead have more linalool, geraniol, or alpha-terpineol. There is some research being conducted currently by a well-known aromatherapist, Maggie Tisserand, on the use of a specially formulated thyme blend called "benchmark thyme" for therapeutic use against MRSA infections. Benchmark thyme oil is unique because it harvests certain chemotypes of thyme at certain times of the year to ensure a specific balance of chemical constituents that are effective against MRSA [2]. Thyme may be irritating to inhale, or so I have heard, but benchmark thyme is formulated to be as gentle as possible while still maintaining its bactericidal powers, so it has obviously attracted my attention in the last few weeks. In the near future I will give it a try and report back my findings.

Conclusion

In conclusion, the inhalation of essential oils has been a revolutionary discovery for me and it has greatly helped me control my lung infections. They work better for me than oral antibiotics and almost as well as IV antibiotics with no side-effects at all. They helped me clear a head cold in only 3 days and prevented it from traveling down into my lungs. They are safe and easy to use. There is a lot of *in-vitro* research on the antimicrobial effects of essential oils, but more human trials need to be done to determine how whole oils benefit those with lung infections, like CFers with *Pseudo, Staph*, or mycobacterium infections. If enough of us find positive results from inhaling essential oils on our own and we inform our doctors of our progress, maybe researchers will conduct more human trials, leading to the use of this as a commonplace therapy in our toolbox against chronic CF lung infections.

At the present moment I am taking a break from inhaling essential oils to work on another experiment, and I want to be scientific about it by reducing the number of variables. I also want to give my body a rest from the oils for a few weeks, just to make sure my liver and kidneys can process their metabolites and clear them out completely. In addition, although the risk of bacterial resistance is probably thousands of times less than that associated with conventional antibiotic usage, it's good to take a break once in a while to ensure my bacteria maintain maximum sensitivity to the oils.

Update: May 2018

A lot of people ask me where they should source their essential oils from. This is a very controversial subject because there are two companies that have been doing very deceptive and dishonest marketing for years, spreading misinformation about the quality of their oils and how they can be properly used: Young Living and doTerra. I encourage people to avoid both of these companies. Instead, choose companies that source only from organic or unsprayed sustainably wildcrafted plants. The company should also be testing every batch with GC/MS testing and should be able to provide you with that information upon request.

You should also be able to acquire any information about the oil, such as where the plants were harvested, where the oil was distilled, what processes they used, and when it was distilled. I have a local aromatherapist who runs an excellent aromatherapy shop near me, so I source all of my oils from there because I trust her expertise and the quality of her oils. But if you are not as lucky as I am, I recommend you buy oils from a reputable company such as Aromatics International. In addition, if any company recommends taking essential oils internally, that means they are a disreputable source. Certified aromatherapists will tell you that taking essential oils internally is unsafe and can cause serious side effects if done without supervision.

Update: October 2018
I wanted to give an extra precaution to the use of nebulized essential oils in people with a history of pleurisy, pleural pain, or pneumothoraxes (lung collapses). I am now a person with a sensitive pleura (and a history of multiple collapses) and I have tried several of times in the last two years to do a course of nebulized essential oils like I have done in the past. I have found that each time I have pleural pain in my lungs after nebulizing EOs for more than about 5 days, even though it certainly helps clear up my infection and reduces my mucus burden. Though correlation does not prove causation (because the pain could be coming from other things, like the infection itself), I have reason to believe that nebbing EOs is no longer a good idea for me, since my pleura are now so sensitive. I can, however, use an aromatherapy diffusor without issue, and use EOs in other ways, like on the skin (in a carrier oil). I have not tried rectal suppositories since my first rounds of experimentation, but I assume this would also be fine for me to do. Therefore, I want to encourage people to take extra precaution if they have a history of pleural complications, and I also recommend to stop nebbing oils immediately if you think they could be causing pleural pain. Discuss this with a certified aromatherapist or herbalist (like me) if you want to explore this issue further.