

# Exploring the Complexities and Caveats of Safe Internal Use of Essential Oils for Pain: Highlighting Intestinal Discomfort, Part 1

By Sarah A. LoBisco, ND, IFMCP

## References

1. LoBisco S. Sniffing Out Pain. Part 1: Olfaction's Complex Connections of Emotions, Memory, and Pain Perception. *Townsend Letter*[online]. November 2016.
2. LoBisco S. Sniffing Out Pain: Part 2: The Multimodal Actions of Essential Oils on Pain Perception and Pain Relief. *Townsend Letter* [online]. December 2016.
3. Krusemark EA, Novak LR, Gitelman DR, Li W. When the Sense of Smell Meets Emotion: Anxiety-State-Dependent Olfactory Processing and Neural Circuitry Adaptation. *Journal of Neuroscience*. September 25, 2013; 33(39):15324-15332.
4. Matsunaga M, et al. Psychological and physiological responses to odor-evoked autobiographic memory. *Neuro Endocrinol Lett*. 2011;32(6):774-80.
5. National Cancer Institute – PDQ Cancer Information Summaries. Aromatherapy and Essential Oils (PDQ®) Health Professional Version. Last Update: October 16, 2012.
6. National Association for Holistic Aromatherapy. Exploring Aromatherapy: Regulations and Licensing. Available at: <http://naha.org/explore-aromatherapy/regulations/>. Accessed April 5, 2018.
7. National Association for Holistic Aromatherapy. Exploring Aromatherapy: Methods of Application. Available at: <http://naha.org/explore-aromatherapy/about-aromatherapy/methods-of-application/>. Accessed April 5, 2018.
8. Alliance of International Aromatherapists. Aromatherapy. Alliance of International Aromatherapists. Available at: <http://www.alliance-aromatherapists.org/history-basics>. Accessed April 7, 2018.
9. Robert Tisserand interviewed on ingestion, dilution and other safety issues. Robert Tisserand Web site. Available at: <http://roberttisserand.com/2015/08/robert-tisserand-interviewed-on-ingestion-dilution-and-other-safety-issues/>. Accessed July 2, 2018.
10. Miller K. Lavender and Tea Tree Essential Oils May Cause Male Breast Growth: Yes, you should be worried. Women's Health Web site. Available at: <https://www.womenshealthmag.com/health/a19480687/lavender-tea-tree-essential-oils-male-breast-growth/>. Accessed March 28, 2018.
11. Lee B. Will Essential Oils Like Lavender and Tea Tree Make Your Breasts Larger. Forbes Web site. Available at: <https://www.forbes.com/sites/brucelee/2018/03/18/will-essential-oils-like-lavender-and-tea-tree-make-your-breasts-larger/#3e238f323fc2>. Accessed March 28, 2018.
12. Endocrine Society. Chemicals in lavender and tea tree oil appear to be hormone disruptors: Current Press Releases March 17, 2018. Endocrine Society Web site. Available at: <https://www.endocrine.org/news-room/2018/chemicals-in-lavender-and-tea-tree-oil-appear-to-be-hormone-disruptors>. Accessed March 28, 2018.
13. Endocrine Society. Chemicals in lavender and tea tree oil appear to be hormone disruptors. ScienceDaily. Available at: [www.sciencedaily.com/releases/2018/03/180318144856.htm](http://www.sciencedaily.com/releases/2018/03/180318144856.htm). Accessed March 28, 2018.
14. Henley DV, et al. Prepubertal gynecomastia linked to lavender and tea tree oils. *New England Journal of Medicine*. 2007; 365(5): 479-485.
15. Tisserand R. Lavender oil is not estrogenic. Robert Tisserand Web site. Available at: <http://roberttisserand.com/2013/02/lavender-oil-is-not-estrogenic/>. Accessed March 28, 2018.
16. LoBisco S. Why Lavender Essential Oil Won't Cause Your Boys' Breasts to Develop [Web page]. Living Well at Saratoga.com Web site. Available at: <https://www.saratoga.com/living-well/2016/01/why-lavender-essential-oil-wont-cause-your-boys-breasts-to-develop/>. Accessed March 23, 2018.
17. LoBisco, S. The Safety of Sage Essential Oil Part I: Camphor, Thujone, "Toxicity" Oh My! Healing, Health, and Wellness for the Body, Mind, and Spirit with Dr. Sarah. May 1, 2018. Available at: <https://www.saratoga.com/healing-health-wellness/2018/05/the-safety-of-sage-essential-oil-part-i-camphor-thujone-toxicity-oh-my/>. Accessed July 1, 2018.
18. LoBisco, S. Sage Oil Safety Vindicated. BreakFree Medicine Website. May 4, 2018. Available at: <http://dr-lobisco.com/sage-oil-safety-vindicated/>. Accessed August 1, 2018.
19. Gori L, et al. Can Estragole in Fennel Seed Decoctions Really Be Considered a Danger for Human Health? A Fennel Safety Update. *Evidence-based Complementary and Alternative Medicine : eCAM*. 2012;2012:860542. doi:10.1155/2012/860542.
20. Timm M, et al. Considerations regarding use of solvents in in vitro cell based assays. *Cytotechnology*. 2013;65(5):887-894. doi:10.1007/s10616-012-9530-6.
21. Di Bella G, et al. Production process contamination of citrus essential oils by plastic materials [abstract]. *J Agric Food Chem* [online]. 2001 Aug;49(8):3705-8.
22. Hamidpour M, et al. Chemistry, Pharmacology, and Medicinal Property of Sage (*Salvia*) to Prevent and Cure Illnesses such as Obesity, Diabetes, Depression, Dementia, Lupus, Autism, Heart Disease, and Cancer. *Journal of Traditional and Complementary Medicine*. 2014;4(2):82-88.
23. Manoguerra AS, et al. American Association of Poison Control Centers. Camphor Poisoning: an evidence-based practice guideline for out-of-hospital management[abstract]. *Clin Toxicol* (Phila) [online]. 2006;44(4):357-70.
24. Canadian Centre for Occupational Health and Safety. OSH Answer Facts Sheets: Synergism [Web page]. Canadian Center for Occupational Health and Safety Web site. Available at: <https://www.ccohs.ca/oshanswers/chemicals/synergism.html>. Accessed March 29, 2018.
25. Zhang Y, et al. Assessing the Metabolic Effects of Aromatherapy in Human Volunteers. *Evidence-Based Complementary and Alternative Medicine*. 2013; 2013: Article ID 356381. doi:10.1155/2013/356381
26. Ali B, et al. Essential oils used in aromatherapy: A systemic review. *Asian Pacific Journal of Tropical Biomedicine*. 2015;5(8): 601-611.
27. Etman M, et al. Emulsions and rectal formulations containing myrrh essential oil for better patient compliance. *Drug Discov Ther*. 2011 ;5(3):150-156.
28. Dundar E, et al. The effects of intra-rectal and intra-peritoneal application of *Origanum onites* L. essential oil on 2,4,6-trinitrobenzenesulfonic acid-induced colitis in the rat. *Exp Toxicol Pathol*. 2008 Apr;59(6):399-408.
29. National Association for Holistic Aromatherapy. Exploring Aromatherapy: Safety Information. NAHA Web site. Available at: <https://naha.org/explore-aromatherapy/safety/>. Accessed July 25, 2018.

30. U.S. Food & Drug Administration. Pharmaceutical Quality/Manufacturing Standards (CGMP). FDA Website. Updated October 16, 2017. Available at: <https://www.fda.gov/drugs/guidancecomplianceregulatoryinformation/guidances/ucm064971.htm>. Accessed April 1, 2018.
31. U.S. Food & Drug Administration. Office of Pharmaceutical Quality. FDA Website. Updated March 28, 2018. Available at: <https://www.fda.gov/AboutFDA/CentersOffices/OfficeofMedicalProductsandTobacco/CDER/ucm418347.htm>. Accessed April 2, 2018.
32. Makary MA, Danie M. Medical error—the third leading cause of death in the US. *BMJ*. 2016; 353 doi: <https://doi.org/10.1136/bmj.i2139>.
33. WebMD. Drug Side Effects Explained. WebMD Website. Available at: <https://www.webmd.com/a-to-z-guides/drug-side-effects-explained#1>. Accessed April 18, 2018.
34. Food and Drug Administration. CFR – Code of Federal Regulations Title 21. FDA Web site. Available at: <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=182.2>. Accessed May 2, 2018.
35. Food and Drug Administration. How FDA Evaluates Regulated Products: Drugs. FDA Web site. Available at: <http://www.fda.gov/AboutFDA/Transparency/Basics/ucm269834.htm>. Accessed March 6, 2018.
36. International Standardization Organization. ISO/TC 54 – Essential oils. ISO Web site. Available at: [http://www.iso.org/iso/iso\\_catalogue/catalogue\\_tc/catalogue\\_tc\\_browse.htm?commid=48956](http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_tc_browse.htm?commid=48956). Accessed December 2, 2017.
37. Mori M, et al. Quality Evaluation of Essential Oils. *YAKUGAKU ZASSHI*. 2002; 122(3): 253-261. Article in Japanese. Available at: [https://www.jstage.jst.go.jp/article/yakushi/122/3/122\\_3\\_253/\\_pdf-char/ja](https://www.jstage.jst.go.jp/article/yakushi/122/3/122_3_253/_pdf-char/ja)
38. International Organization for Standardization. About ISO. ISO Web site. Available at: <https://www.iso.org/about-us.html>. Accessed July 26, 2018.
39. Association of French Normalization Organization. Standards- All Published Standards. AFNOR Web site. Available at: [http://www.afnor.org/en/profiles/activity\\_area/industry/normes/normes/%28limit%29/25/%28page%29/2](http://www.afnor.org/en/profiles/activity_area/industry/normes/normes/%28limit%29/25/%28page%29/2) =. Accessed December 2, 2017.
40. Association of French Normalization Organization. ISO 9001 Certification – Quality. AFNOR Web site. Available at: <http://www.afnor.org/en/certification/smq001#p17578>. Accessed March 15, 2018.
41. Association of French Normalization Organization. Normes. AFNOR Web site. Available at: [http://www.boutique.afnor.org/recherche/resultats/categorie/normes/ics/huiles-essentielles-71.100.60%20?utm\\_source=portail&utm\\_medium=referral&utm\\_campaign=editions](http://www.boutique.afnor.org/recherche/resultats/categorie/normes/ics/huiles-essentielles-71.100.60%20?utm_source=portail&utm_medium=referral&utm_campaign=editions). Accessed March 15, 2018.
42. Stewart, D. *The Chemistry of Essential Oils Made Simple: God's Love Manifest in Molecules*. Marble Hill, MO. 2005. Care Publications.
43. Tisserand R, Young R. *Essential Oil Safety - E-Book: A Guide for Health Care Professionals*. Churchill Livingstone Elsevier. 2014. Available online at: <https://books.google.com/books?id=DbEKAQAAQBAJ&printsec=frontcover#v=onepage&q&f=false>
44. Shutes, J. The Quality of Essential Oils. The School for Aromatic Studies. Website. Available at: <https://aromaticstudies.com/the-quality-of-essential-oils/>. Accessed July 14, 2018.
45. Sampaio BL, Edrada-Ebel R, Da Costa FB. Effect of the environment on the secondary metabolic profile of *Tithonia diversifolia*: a model for environmental metabolomics of plants. *Scientific Reports*. 2016;6:29265. doi:10.1038/srep29265.
46. Figueiredo AC, et al. Factors affecting secondary metabolite production in plants: Volatile components and essential oils. *Flavour and Fragrance Journal*. 2008; 20(4): 213-226.
47. K. Husnu Can Baser, Gerhard Buchbauer ed. *Handbook of Essential Oils: Science, Technology, and Applications, Second Edition*. CRC Press: Taylor and Francis Group. Boca Ranton, FL. 2016.
48. Young Living Essential Oils (YLEO). Young Living Seed to Seal: Standards Far Above the Standards. YLEO Website. Available at: [https://www.youngliving.com/en\\_US/discover/seed-to-seal](https://www.youngliving.com/en_US/discover/seed-to-seal). Accessed July 28, 2018.
49. Medication Administration: Why It's Important to Take Drugs the Right Way. Healthline. Available at: <https://www.healthline.com/health/administration-of-medication>. Accessed April 1, 2018.
50. Federico F. The Five Rights of Medication Administration. Institute for Healthcare Improvement. Available at: <http://www.ihl.org/resources/Pages/ImprovementStories/FiveRightsofMedicationAdministration.aspx>. Accessed April 3, 2018.
51. Grissinger M. The Five Rights: A Destination Without a Map. *Pharmacy and Therapeutics*. 2010;35(10):542.
52. Fernandez E, et al. Factors and Mechanisms for Pharmacokinetic Differences between Pediatric Population and Adults. *Pharmaceutics*. 2011;3(1):53-72. doi:10.3390/pharmaceutics3010053.
53. Dorne JL. Impact of inter-individual differences in drug metabolism and pharmacokinetics on safety evaluation [abstract]. *Fundam Clin Pharmacol* [online]. 2004 Dec;18(6):609-20.
54. Klotz U. Pharmacokinetics and drug metabolism in the elderly. *Drug Metab Rev*. 2009;41(2):67-76.
55. Ward E. Addressing nutritional gaps with multivitamin and mineral supplements. *Nutrition Journal*. 2014;13:72.
56. Richardson RA, Davidson H. Nutritional demands in acute and chronic illness. *Proc Nutr Soc*. 2003 Nov;62(4):777-81.
57. Mohn ES, et al. Evidence of Drug–Nutrient Interactions with Chronic Use of Commonly Prescribed Medications: An Update. *Pharmaceutics*. 2018; 10(1), 36; doi:10.3390/pharmaceutics10010036.
58. Ni Y, et al. NutriChem 2.0: exploring the effect of plant-based foods on human health and drug efficacy. *Database: The Journal of Biological Databases and Curation*. 2017;2017:bax044. doi:10.1093/database/bax044.
59. Pauli A, Schilcher H. Specific Selection of Essential Oil Compounds for Treatment of Children's Infection Diseases. *Pharmaceutics*. 2004;1(1):1-30.
60. D Mas. Chapter 1: Introduction to Chamomile. Chamomile. In: *Medicinal, Biochemical, and Agricultural Aspects*. Boca Raton, FL. CRC Press; 2015: 1-48. Available online at: [http://abc.herbalgram.org/site/DocServer/CRCPRESSChamomile-Section\\_1.5978-1-4665-7759-6.pdf?docID=6362](http://abc.herbalgram.org/site/DocServer/CRCPRESSChamomile-Section_1.5978-1-4665-7759-6.pdf?docID=6362). Accessed July 28, 2018.
61. *Matricaria chamomilla* (German chamomile). Monograph. *Altern Med Rev*. 2008 Mar;13(1):58-62. Available at: <http://archive.foundationalmedicinereview.com/publications/13/1/58.pdf>. Accessed August 1, 2018.
62. Srivastava JK, Shankar E, Gupta S. Chamomile: A herbal medicine of the past with bright future. *Molecular medicine reports*. 2010;3(6):895-901. doi:10.3892/mmr.2010.377.
63. Natural Medicines. German Chamomile Monograph. Available at: <https://naturalmedicines.therapeuticresearch.com/databases/food,-herbs-supplements/professional.aspx?productid=951#interactionsWithDrugs>. Accessed August 1, 2018.
64. Schneider P, Stuppner H, Ganzera M. Inhibitory effects of the essential oil of chamomile (*Matricaria recutita* L.) and its major constituents on human cytochrome P450 enzymes. *Life Sciences*. 2006 Feb; 78(8):856-61.
65. Fan H. Authenticity analysis of citrus essential oils by HPLC -MS on oxygenated heterocyclic components. *Journal of Food and Drug Analysis*. 2012; 23(1):30-39.

66. Sun J. D-Limonene: Safety and Clinical Applications. *Alternative Medicine Review*. 2007; 12(3). Available at: <http://www.altmedrev.com/archive/publications/12/3/259.pdf>. Accessed July 1, 2018.
67. Dugrand-Judek A, et al. The Distribution of Coumarins and Furanocoumarins in *Citrus* Species Closely Matches *Citrus* Phylogeny and Reflects the Organization of Biosynthetic Pathways. Chen C, ed. *PLoS ONE*. 2015;10(11):e0142757. doi:10.1371/journal.pone.0142757.
68. Bailey DG, Dresser J, Arnold MO. Grapefruit-medication interactions: Forbidden fruit or avoidable consequences? *CMAJ*. November 2-UV 6, 2012.
69. Williamson, EA. Inhibition of Cytochrome P450 2E1, Cytochrome P450 3A6 and Cytochrome P450 2A6 by Citrus Essential Oils. [Thesis] The University of North Carolina at Greensboro (UNCG ) Advisor: Gregory M. Raner. 2010; 66 pgs. Available at: [https://libres.uncg.edu/ir/uncg/f/Williamson\\_uncg\\_0154M\\_10494.pdf](https://libres.uncg.edu/ir/uncg/f/Williamson_uncg_0154M_10494.pdf). Accessed May 30, 2018.
70. IARC. D-limonene. IARC Monographs. Volume 73. Available at: <https://monographs.iarc.fr/ENG/Monographs/vol73/mono73-16.pdf>. Accessed August 1, 2018.
71. Examine. Limonene. Examine.com. Available at: <https://examine.com/supplements/limonene/>. Accessed August 8, 2018.
72. Miyazawa M, Shindo M, Shimada T. Sex differences in the metabolism of (+)- and (-)-limonene enantiomers to carveol and perillyl alcohol derivatives by cytochrome p450 enzymes in rat liver microsomes [abstract]. *Chem Res Toxicol* [online]. 2002 Jan;15(1):15-20.
73. Lupien S, et al. Cytochrome P450 limonene hydroxylases of *Mentha* species [abstract]. *Drug Metabol Drug Interact* [online]. 1995;12(3-4):245-60.
74. Cytochrome P450 (E.C. 1.14.-.-). *British Journal of Pharmacology*. 2009;158(Suppl 1):S215-S217. doi:10.1111/j.1476-5381.2009.005068.x.
75. Miyazawa M, Shindo M, Shimada T. Metabolism of (+)- and (-)-Limonenes to Respective Carveols and Perillyl Alcohols by CYP2C9 and CYP2C19 in Human Liver Microsomes. *Drug Metabolism and Disposition*. May 2002; 30(5): 602-607.
76. Natural Medicines. Limonene Monograph. Available at: <https://naturalmedicines.therapeuticresearch.com/databases/food,-herbs-supplements/professional.aspx?productid=1105#interactionsWithDrugs>. Accessed July 3, 2018.
77. New York Institute for Aromatic Studies. Synergism in essential oils and aromatherapy. Available at: <https://aromaticstudies.com/synergism-in-essential-oils-and-aromatherapy/>. Accessed March 3, 2018.
78. Yap PSX, Yiap BC, Ping HC, Lim SHE. Essential Oils, A New Horizon in Combating Bacterial Antibiotic Resistance. *The Open Microbiology Journal*. 2014;8:6-14. doi:10.2174/1874285801408010006.
79. Examine. Lavender. Examine. Com. Available at: <https://examine.com/supplements/lavender/>. Accessed August 1, 2018.
80. Examine. Peppermint. Examine.com. Available at: <https://examine.com/supplements/peppermint/>. Accessed August 1, 2018.
81. Dresser GK, Wacher V, Wong S, Wong HT, Bailey DG..Evaluation of peppermint oil and ascorbyl palmitate as inhibitors of cytochrome P4503A4 activity in vitro and in vivo [abstract]. *Clin Pharmacol Ther* [online]. 2002. Sep;72(3):247-55.
82. Elmore, L. Effects of Essential Oils on the Liver. Lindsey Elmore web site. May 19, 2018. Available at: <https://lindseyelmore.com/effects-of-essential-oils-on-the-liver/>. Accessed May 28, 2018.
83. LoBisco S. Are Essential Oils Safe for Children (and Adults)? November 25, 2015. Available at: <https://dr-lobisco.com/are-essential-oils-safe/>. Accessed July 2, 2018.
84. Shin N-Y, et al. Protein Targets of Reactive Electrophiles in Human Liver Microsomes. *Chemical research in toxicology*. 2007;20(6):859-867. doi:10.1021/tx700031r.
85. Ketterer B, Coles B, Meyer DJ. The role of glutathione in detoxication. *Environmental Health Perspectives*. 1983;49:59-69.
86. He NG, et al. The role of glutathione S-transferases as a defense against reactive electrophiles in the blood vessel wall [abstract]. *Toxicol Appl Pharmacol* [online]. 1998 Sep;152(1):83-9. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/9772203>. Accessed March 21, 2018.
87. Ketterer B. Glutathione S-transferases and prevention of cellular free radical damage [abstract]. *Free Radic Res* [online]. 1998 Jun;28(6):647-58.
88. Nakamura Y, et al. A phase II detoxification enzyme inducer from lemongrass: identification of citral and involvement of electrophilic reaction in the enzyme induction [abstract]. *Biochem Biophys Res Commun* [online]. 2003 Mar 14;302(3):593-600. Available at: <https://www.ncbi.nlm.nih.gov/m/pubmed/12615076/>. Accessed April 17, 2018.
89. Thusoo S, et al. Antioxidant Activity of Essential Oil and Extracts of *Valeriana jatamansi* Roots. *BioMed Research International*. 2014;2014:614187. doi:10.1155/2014/614187.
90. Gonçalves RS, et al. Antioxidant properties of essential oils from *Mentha* species evidenced by electrochemical methods. *Revista Brasileira de Plantas Medicinais*. 2009; 11(4), 372-382.
91. Misharina TA, et al. [Effects of low doses of essential oil on the antioxidant state of the erythrocytes, liver, and the brains of mice] [online]. *Prikl Biokhim Mikrobiol* [online]. [Article in Russian]. 2014 Jan-Feb;50(1):101-7. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/25272759>. Accessed April 2, 2018.
92. El-Hosseiny LS, Alqurashy NN, Sheweita SA. Oxidative Stress Alleviation by Sage Essential Oil in Co-amoxiclav induced Hepatotoxicity in Rats. *International Journal of Biomedical Science: IJBS*. 2016;12(2):71-78.
93. Sultan MT, Butt MS, Karim R, et al. Nigella sativa fixed and essential oil modulates glutathione redox enzymes in potassium bromate induced oxidative stress. *BMC Complementary and Alternative Medicine*. 2015;15:330. doi:10.1186/s12906-015-0853-7.
94. Sheweita SA, El-Hosseiny LS, Nashashibi MA. Protective Effects of Essential Oils as Natural Antioxidants against Hepatotoxicity Induced by Cyclophosphamide in Mice. Lehmler H-J, ed. *PLoS ONE*. 2016;11(11):e0165667. doi:10.1371/journal.pone.0165667.
95. Amorati R, Foti MC, Valgimigli L. Antioxidant activity of essential oils [abstract]. *J Agric Food Chem* [online]. 2013 Nov 20;61(46):10835-47. doi: 10.1021/jf403496k.
96. Atsumi T, Tonosaki K. Smelling lavender and rosemary increases free radical scavenging activity and decreases cortisol level in saliva. *Psychiatry Res*. 2007 Feb 28;150(1):89-96.
97. Elmore L. *50 Answers to Common Questions About Essential Oils*. Growing Healthy Homes. Bartlesville, OK. 2017.
98. Weinsilboum, RM. Phenol sulfotransferase in humans: properties, regulation, and function [abstract]. *Fed Proc* [online]. 1986 Jul;45(8):2223-8.
99. Sundaram RS, et al. Human intestinal phenol sulfotransferase: assay conditions, activity levels and partial purification of the thermolabile form. *Drug Metab Dispos*. 1989 May-Jun;17(3):255-64.
100. Court MH. Feline drug metabolism and disposition: pharmacokinetic evidence for species differences and molecular mechanisms. *Veterinary Clinics of North America: Small Animal Practice*. 2013; 43(5), 1–20.

101. Djilani A, Dicko A. *The Therapeutic Benefits of Essential Oils, Nutrition, Well-Being and Health*. Dr. Jaouad Bouayed ed. 2012; 160.
102. Jacobson L. Essential oils which inhibit blood clotting. *Using Essential Oils Safely*. April 23, 2015. Available at: <https://www.usingeossafely.com/essential-oils-which-inhibit-blood-clotting/>. Accessed July 1, 2018.
103. Webb NJ, Pitt WR. Eucalyptus oil poisoning in childhood: 41 cases in south-east Queensland. *J Paediatr Child Health*. 1993 Oct;29(5):368-71.
104. Jacobs MR, Hornfeldt CS. Melaleuca oil poisoning. *J Toxicol Clin Toxicol*. 1994;32(4):461-4.
105. Olleveant NA, Humphris G, Roe B. How big is a drop? A volumetric assay of essential oils [abstract]. *J Clin Nurs* [online]. 1999 May;8(3):299-304.
106. Lis-Balchin M. Essential oils and 'aromatherapy': their modern role in healing [abstract]. *J R Soc Health* [online]. 1997 Oct;117(5):324-9.
107. Lis-Balchin M. Possible health and safety problems in the use of novel plant essential oils and extracts in aromatherapy [abstract]. *J R Soc Promot Health* [online]. 1999 Dec;119(4):240-3. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/10673845>. Accessed August 1, 2018.
108. Halcón LL. Aromatherapy: therapeutic applications of plant essential oils [abstract]. *Minn Med* [online]. 2002 Nov;85(11):42-6. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/12498066>. Accessed August 18, 2018.
109. Maddocks-Jennings W, Wilkinson JM. Aromatherapy practice in nursing: literature review. *J Adv Nurs*. 2004 Oct;48(1):93-103.
110. American Botanical Council. Herbal Medicine: Expanded Commission E. Fennel Oil. Available at: <http://cms.herbalgram.org/expandedE/Fenneloil.html>. Accessed April 2, 2018.
111. Foeniculum vulgare: A comprehensive review of its traditional use, phytochemistry, pharmacology, and safety. *Arabian Journal of Chemistry*. November 2016. Available at: <http://www.sciencedirect.com/science/article/pii/S1878535212000792>
112. Fennel. Natural Standard Database. Available at: <https://naturalmedicines.therapeuticresearch.com/databases/food,-herbs-supplements/professional.aspx?productid=311>. Accessed July 16, 2018.
113. Examine. Fennel Oil. Examine.com. Available at: <https://examine.com/supplements/fennel-essential-oil/#summary1-1>. Accessed April 18, 2018.
114. Alexandrovich I, et al. The effect of fennel (Foeniculum Vulgare) seed oil emulsion in infantile colic: a randomized, placebo-controlled study. *Altern Ther Health Med*. 2003 Jul-Aug;9(4):58-61.
115. Mark Blumenthal: Quality and Efficacy of Herbal Medicines: Interview by Craig Gustafson. *Integrative Medicine*. 2015; 14:4. Available at: [http://www.imjournal.com/openaccess/quality\\_and\\_efficacy\\_of\\_herbal\\_medicines.pdf](http://www.imjournal.com/openaccess/quality_and_efficacy_of_herbal_medicines.pdf)
116. Blumenthal M, Busse WR, Goldberg A, Gruenwald J, Hall T, Riggins CW, et al; eds. *The Complete German Commission E Monographs: Therapeutic Guide to Herbal Medicine*. 685 pages. Austin, TX: American Botanical Council; 1998. ISBN 096555550X.
117. Mountain Rose Herbs. Essential Oils and Dilution & Conversions Guides. Mountain Rose Herbs [Website]. Available at: <https://blog.mountainroseherbs.com/dilutions-conversions>. Accessed July 28, 2018.
118. Shutes J. Exploring Aromatherapy: Methods of Application. National Association for Holistic Aromatherapy. Available at: <https://naha.org/explore-aromatherapy/about-aromatherapy/methods-of-application>. Accessed July 28, 2018.
119. Jacobson L. Diluting Essential Oils Safely – safe dilution guidelines for all ages. *Using Essential Oils Safely* [Website]. April 2, 2015. Available at: <http://www.usingeossafely.com/diluting-essential-oils-safely-safe-dilution-guidelines-for-all-ages/>. Accessed July 28, 2018.
120. Rocky Mountain Oils. Essential Oil Dilution. Rocky Mountain Oils [Website]. Available at: <https://www.rockymountainoils.com/dilution-rate/>. Accessed July 28, 2018.
121. Zielinski E. Aromatherapy Essential Oils 101 – Guide to Safe and Effective Use. Dr. Eriz Z Web site. Available at: <https://drericz.com/aromatherapy-essential-oils/>. Accessed July 28, 2018.
122. Carnahan, J. Restoring Digestive Health with the 5-R Program. Dr. Jill. May 2011. Available at: <https://www.jillcarnahan.com/2011/05/03/restoring-digestive-health/>. Accessed May 1, 2018.
123. Bland J. The Gut Mucosal Firewall and Functional Medicine. *Integrative Medicine: A Clinician's Journal*. 2016;15(4):19-22.
124. Metagenics Institute. 5R GI Restoration Program Guide. Gastrointestinal Health. Metagenics. 2013. Available at: [http://www.oakwayhealthcenter.com/store/GUIDES\\_GI\\_Sustain\\_Guide.pdf](http://www.oakwayhealthcenter.com/store/GUIDES_GI_Sustain_Guide.pdf). Accessed May 1, 2018.
125. Force M, Sparks WS, Ronzio RA. Inhibition of enteric parasites by emulsified oil of oregano in vivo [abstract]. *Phytother Res* [online]. 2000 May;14(3):213-4.
126. Schillaci D, et al. Origanum vulgare subsp. hirtum essential oil prevented biofilm formation and showed antibacterial activity against planktonic and sessile bacterial cells. *J Food Prot*. 2013 October; 76(10):1747-52.
127. Becerril R, Nerín C, Gómez-Lus R. Evaluation of bacterial resistance to essential oils and antibiotics after exposure to oregano and cinnamon essential oils. *Foodborne Pathog Dis*. 2012;9(8):699-705. doi: 10.1089/fpd.2011.1097.
128. Goerg KJ, Spilker TH. Effect of peppermint oil and caraway oil on gastrointestinal motility in healthy volunteers: a pharmacodynamic study using simultaneous determination of gastric and gall-bladder emptying and orocecal transit time. *Aliment Pharmacol Ther*. 2003; 17: 445–451.
129. Ferrari N, ed. Health benefits of peppermint. Harvard Medical School HealthBeat. July 30, 2007.
130. Shams R, Oldfield E, Copare J, Johnson DA. Peppermint oil: clinical uses in the treatment of gastrointestinal diseases. *JSM Gastroenterol Hepatol*. 2015. Available at: <http://www.jsimedcentral.com/Gastroenterology/gastroenterology-3-1036.pdf>. Accessed July 20, 2016.
131. Examine. Summary of Peppermint. Examine. Com. Available at: <https://examine.com/supplements/peppermint/>. Accessed July 7, 2018.
132. American Botanical Council. Herbal Medicine: Expanded Commission E. Peppermint Oil. Available at: <http://cms.herbalgram.org/expandedE/Peppermintoil.html#Administration>. Accessed July 6, 2018.
133. Examine. Origanum vulgare. Examine.com. Available at: <https://examine.com/supplements/origanum-vulgare/>. Accessed July 15, 2018.
134. Natural Medicines. Oregano Monograph. Available at: <https://naturalmedicines.therapeuticresearch.com/databases/food,-herbs-supplements/professional.aspx?productid=644#dosing>. Accessed July 7, 2018.
135. Mooyottu S, et al. Protective Effect of Carvacrol against Gut Dysbiosis and Clostridium difficile Associated Disease in a Mouse Model. *Frontiers in Microbiology*. 2017;8:625. doi:10.3389/fmicb.2017.00625.

136. Zou Y, et al. Oregano Essential Oil Improves Intestinal Morphology and Expression of Tight Junction Proteins Associated with Modulation of Selected Intestinal Bacteria and Immune Status in a Pig Model. *BioMed Research International*. 2016;2016:5436738. doi:10.1155/2016/5436738.
137. Wu KL, et al. Effects of ginger on gastric emptying and motility in healthy humans. *Eur J Gastroenterol Hepatol*. 2008 May;20(5):436-40. doi: 10.1097/MEG.0b013e3282f4b224.
138. Sasidharan I, Nirmala Menon A. Comparative chemical composition and antimicrobial activity fresh & dry ginger oils (*Zingiber officinale* roscoe) *International Journal of Current Pharmaceutical Research*. 2010;2:40–43.
139. Bode AM, Dong Z. The Amazing and Mighty Ginger. In: Benzie IFF, Wachtel-Galor S, editors. *Herbal Medicine: Biomolecular and Clinical Aspects*. 2nd edition. Boca Raton (FL): CRC Press/Taylor & Francis; 2011. Chapter 7. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK92775/>
140. Liju VB, Jeena K, Kuttan R. Gastroprotective activity of essential oils from turmeric and ginger. *J Basic Clin Physiol Pharmacol*. 2015 Jan;26(1):95-103. doi: 10.1515/jbcpp-2013-0165.
141. Höferl M, et al. Composition and Comprehensive Antioxidant Activity of Ginger (*Zingiber officinale*) Essential Oil from Ecuador. *Nat Prod Commun*. 2015 Jun;10(6):1085-90.
142. Lua PL, Zakaria NS. A brief review of current scientific evidence involving aromatherapy use for nausea and vomiting [abstract]. *J Altern Complement Med* [online]. 2012 Jun;18(6):534-40. doi: 10.1089/acm.2010.0862.
143. Agah S, Taleb AM, Moeini R, Gorji N, Nikbakht H. Cumin Extract for Symptom Control in Patients with Irritable Bowel Syndrome: A Case Series. *Middle East Journal of Digestive Diseases*. 2013;5(4):217-222.
144. Eisenman SW, et al. Qualitative variation of anti-diabetic compounds in different tarragon (*Artemisia dracunculus*) cytotypes. *Fitoterapia*. 2011;82(7):1062-1074. doi:10.1016/j.fitote.2011.07.003.
145. Effects of garlic and juniper berry essential oils on ruminal fermentation and on the site and extent of digestion in lactating cows. *J Dairy Sci*. 2007 Dec;90(12):5671-81.
146. Sac Fernandes C, De Souza H, De Oliveria G, Costa J, Kerntopf M, Campos A. Investigation of the Mechanisms Underlying the Gastroprotective Effect of *Cymbopogon Citratus* Essential Oil. *Journal of Young Pharmacists: JYP*. 2012;4(1):28-32. doi:10.4103/0975-1483.93578.
147. Wanapat M, et al. Manipulation of rumen ecology by dietary lemongrass (*Cymbopogon citratus* Stapf.) powder supplementation. *J Anim Sci*. 2008 Dec;86(12):3497-503. doi: 10.2527/jas.2008-0885.
148. Boukhatem MN, et al. Lemongrass (*Cymbopogon citratus*) essential oil as a potent anti-inflammatory and antifungal drugs. *The Libyan Journal of Medicine*. 2014;9:10.3402/ljm.v9.25431. doi:10.3402/ljm.v9.25431.
149. Boukhatem MN, et al. Lemongrass (*Cymbopogon citratus*) essential oil as a potent anti-inflammatory and antifungal drugs. *The Libyan Journal of Medicine*. 2014;9:10.3402/ljm.v9.25431. doi:10.3402/ljm.v9.25431.
150. Shojaii A, Abdollahi Fard M. Review of Pharmacological Properties and Chemical Constituents of *Pimpinella anisum*. *ISRN Pharmaceutics*. 2012;2012:510795. doi:10.5402/2012/510795.
151. Chedid V, Dhalla S, Clarke JO, et al. Herbal Therapy Is Equivalent to Rifaximin for the Treatment of Small Intestinal Bacterial Overgrowth. *Global Advances in Health and Medicine*. 2014;3(3):16-24. doi:10.7453/gahmj.2014.019.
152. Examine. Ginger Professional Monograph. Examine.com. Available at: <https://examine.com/supplements/ginger/>. Accessed April 7, 2018.
153. American Botanical Council. Herbal Medicine: Expanded Commission E. Ginger Root. Available at: <http://cms.herbalgram.org/expandedE/Gingerroot.html#Administration>. Accessed March 29, 2011.
154. Natural Medicines. Ginger. Available at: <https://naturalmedicines.therapeuticresearch.com/databases/food.-herbs-supplements/professional.aspx?productid=961#dosing>. Accessed March 29, 201.
155. Nazzaro F, Fratianni F, De Martino L, Coppola R, De Feo V. Effect of Essential Oils on Pathogenic Bacteria. *Pharmaceutics*. 2013;6(12):1451-1474. doi:10.3390/ph6121451.
156. Yap PSX, Yiap BC, Ping HC, Lim SHE. Essential Oils, A New Horizon in Combating Bacterial Antibiotic Resistance. *The Open Microbiology Journal*. 2014;8:6-14. doi:10.2174/1874285801408010006.
157. Hawrelak JA, Cattley T, Myers SP. Essential oils in the treatment of intestinal dysbiosis: A preliminary in vitro study. *Altern Med Rev*. 2009 Dec;14(4):380-4.
158. Si W, et al. Antimicrobial activity of essential oils and structurally related synthetic food additives towards selected pathogenic and beneficial gut bacteria. *Journal of Applied Microbiology*. December 2015.
159. Ballabeni V, et al. Ocotea quixos Lam. essential oil: in vitro and in vivo investigation on its anti-inflammatory properties [abstract]. *Fitoterapia* [online]. 2010 Jun;81(4):289-95.
160. Placha I, et al. Effect of thyme oil on small intestine integrity and antioxidant status, phagocytic activity and gastrointestinal microbiota in rabbits. *Acta Vet Hung*. 2013 Jun;61(2):197-208
161. Cross DE, et al. The effect of herbs and their associated essential oils on performance, dietary digestibility and gut microflora in chickens from 7 to 28 days of age. *Br Poult Sci*. 2007 Aug;48(4):496-506.
162. American Botanical Council. Herbal Medicine: Expanded Commission E. Lavender flower. Available at: <http://cms.herbalgram.org/expandedE/Lavenderflower.html>. Accessed August 1, 2018.
163. Examine. Lavender. Examine.com. Available at: <https://examine.com/supplements/lavender/>. Accessed August 3, 2018.
164. Natural Medicines. Lavender Monograph. Available at: <https://naturalmedicines.therapeuticresearch.com/databases/food.-herbs-supplements/professional.aspx?productid=838#dosing>. Accessed August 2, 2018.
165. Uehleke B, et al. Phase II trial on the effects of Silexan in patients with neurasthenia, post-traumatic stress disorder or somatization disorder. *Phytomedicine*. 2012 Jun 15;19(8-9):665-71. doi: 10.1016/j.phymed.2012.02.020.
166. Kasper S, et al. Silexan, an orally administered Lavandula oil preparation, is effective in the treatment of 'subsyndromal' anxiety disorder: a randomized, double-blind, placebo controlled trial. *Int Clin Psychopharmacol*. 2010 Sep;25(5):277-87.
167. Koulivand PH, Khaleghi Ghadiri M, Gorji A. Lavender and the nervous system. *Evidence-based Complementary and Alternative Medicine: eCAM*. 2013;2013:681304.
168. Mayer LA. The neurobiology of stress and gastrointestinal disease. *Gut*.2000;47:861-869.
169. Zhang Y, et al. Assessing the Metabolic Effects of Aromatherapy in Human Volunteers. *Evidence-Based Complementary and Alternative Medicine*. 2013: 2013, Article ID 356381, 9 pages.