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Understanding the relaxation effects of Essential oils by their interactions with neurotransmitter receptors in the brain

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Essential oils (EOs) are the fraction of volatile phytochemicals in plants comprising more than 300 different volatile organic compounds, with chemically differentiated structures 1. In general, Eos are &It;~300 Daltons in size and contain lipophilic aromatic structures that can be collectively separated from other plant components and tissues by steam or solvent distillation 2. Inhaled Eos are accessible to the brain either via the olfactory system or by crossing the blood-brain barrier, with demonstrated benefits for regulating mood and are consistently reported to promote relaxation effects. The neuro-receptor mediated mechanisms of EOs were explored, by in silico evaluation of the ligand-binding properties of EOs with neurotransmitter receptors and seeking relationships to the functional measure of reference pharmaceutical compounds. Compared with the diverse receptor binding patterns observed for reference compounds dominated by EEG-delta wave frequencies, the binding patterns of EOs were remarkably consistent and replicated a sub-clinical affinity pattern corresponding to the inhibitory glycine- α -GLRA3 and dopamine-D2 receptors, and produced responses dominated by EEG-alpha wave frequencies. In addition, EOs also displayed patterns of receptor binding behavior similar to the neuro-active drugs: piracetam (improves neural plasticity without sedation) and propofol (promotes sedative-hypnotic effects), suggesting that the EOs too could act on receptors in a sub- therapeutic manner. The effects of EOs on modulating alpha (i.e., restful and reflective brain states), and also contributing toward changes in theta and beta brain rhythms implicates the regulation of cholinergic and mono-aminergic pathways, which are also sensitive to redox chemistries in the brain. These findings may suggest that the acute effects of EOs on brain functions reflect a combination of modulation of neurotransmission via both receptor and chemical interactions with neurotransmisters.

Biography

Louise Bennett is Professor of food chemistry at Monash University with interests in the health and physical-functional properties of foods. These research interests span multiple disciplines and projects that seek to transform foods into dietary tools that promote value-addition and nutritional security.