Debunking Functional Group Theory: Not Supported by Current Evidence and Not a Useful Educational Tool

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EXECUTIVE SUMMARY

What is Functional Group Theory?

Since 1990, functional group theory (FGT) has been a recognized way of categorizing essential oils according to their main chemical constituents to explain—and predict—the effects of an essential oil on the body. Constituents are classified according to their functional group, or chemical family, in a quadrant "grid system."

About This Review

As knowledge of essential oil chemistry has grown considerably, the authors began to question whether FGT is still a useful tool for learning about the biological effects of essential oils. They looked at the published scientific literature for the majority of essential oil constituents. As a way of investigating FGT in depth, they reviewed reports of monoterpene alcohols (MAs), the most widely studied chemical family. They looked at what is known about the activity of MAs on the body, those essential oils with the highest proportion of MA constituents, and reviewed their categorization according to FGT.

Review Findings

The authors found very few instances where a biological effect was either limited to, or especially potent in, any one chemical family. They found that many of the known pharmacological effects of essential oils are not consistent with their FGT categorizations; therefore, they are listed as exceptions. After reviewing 19 MAs and 154 scientific reports, the authors found very little supporting data for FGT. A significant finding was that MAs, which are predicted by FGT to be stimulants, are in fact sedatives. The authors could find no supporting evidence that the FGT grid system has any relationship with pharmacological activity.

Conclusions

The authors concluded that FGT is often misleading and is too simplistic of a tool to be useful, because the categorizations often suggest relationships that are not supported by current knowledge. This may be because FGT does not identify many important molecular features of essential oil constituents. Rather than attempting to plug these into loosely defined categories with multiple exceptions, the authors suggest a more practical model: simply learn about the effects of individual essential oils and constituents, and why such effects occur.