



We three kings and Christmas trees: pharmacotherapy from presents and diseases from decorations

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We seldom identify the holiday season with medical matters, but perhaps we have been remiss in not doing so. Many holiday customs have medical significance — some positive, some negative. Christmas and the following 2 weeks host the highest cardiac and non-cardiac mortality of the major holidays,¹ but few people seem to dread the approach of December as a threat to their physical health. On the positive side, some ancient kinds of Christmas gifts turn out to have modern medical applications, while, not so positively, some modern decorations cause a fair degree of morbidity.

Here, solely to amuse and pique curiosity, not to provide an exhaustive review, we explore the pharmacology of the first Christmas gifts, as well as the potential benefits and hazards of some modern Christmas decorations.

Ancient gifts that keep on giving today

The first holiday custom we thought might have a medical application is the giving of Christmas gifts. This apparently originated with the arrival of the Magi, the three wise men, some time around the year 1 CE. Given the apostle Luke's vocation as a physician, we felt it only fitting to use his biblical account of the three wise men bearing gifts to the baby Jesus. But, alas, his gospel includes no account of this exchange, so we were forced to quote Matthew, a tax collector: "Then they opened their treasure chests and gave him gifts of gold, frankincense and myrrh."² Interestingly, all three of these items have modern medical applications.

Gold is the most obvious. As sulfhydryl-containing organic gold compounds, it has been used for rheumatoid arthritis and tuberculosis since the early 1920s, although elemental (metallic) gold was used for many centuries before. Elemental gold is largely inert, not reacting to any chemicals it encounters inside the body; however, it can be deposited in the soft tissue of the skin and eye, leading to a condition known as chrysiasis. Unfortunately, the gold deposits are actually an unappealing grey-blue, rather than the metallic gold glow that might be considered festive. Although the use of gold is not as common today as it was in previous years, exposure to modern therapeutic technology, such as the Q-switch laser, or even ultraviolet light, has resulted

in chrysiasis many years after gold therapy was discontinued.³ Gold also causes its share of problems when combined with another holiday tradition: ethanol. Case reports indicate that Goldschlager, a liquor that contains gold flakes, has been associated with lichen planus.⁴ Although frequently having a lacy white pattern, known as Wickham's striae, lichen planus too is unappealing, rather than festive.



The next gift of the Magi, frankincense, has several medical uses. This substance is obtained from trees of the genus *Boswellia*, by slashing the tree trunk longitudinally and harvesting the liquid released after it has dried to "tears".⁵ It has been valued greatly since ancient times, although its mechanism of action has only recently been discovered. Frankincense inhibits leukotriene synthesis via the inhibition of 5-lipoxygenase, but, interestingly, it does not block cyclo-oxygenase or 12-lipoxygenase.⁶ This mechanism is similar to that of the leukotriene-receptor antagonist, montelukast, and indeed frankincense has been shown to prevent exacerbations of asthma much more efficiently than placebo in a small study.⁷ Frankincense also appears to be bacteriostatic and larvicidal, and may yet prove beneficial as an antimicrobial.⁸ Further, it seems to have activity against skin cancer as an escharotic agent and stimulates apoptosis in colon cancer cells.⁵ It has also shown some cytotoxic activity against meningioma.⁵

Finally, myrrh, a secretion of plants of the genus *Commiphora*,⁹ is proving to have its own set of medical benefits. It appears to have an analgesic effect through action on opioid receptors.⁹ It also seems to have antimicrobial activity, and has recently been touted as a highly effective treatment for schistosomiasis in Egypt.¹⁰ Myrrh extracts have shown antibacterial activity against common pathogens such as *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*.¹¹ On a more practical level, myrrh combined with bee propolis (a hive sealant used as an alternative to beeswax) and, paradoxically, honey has been used to treat wounds in patients with diabetes mellitus, with great success in limited trials.¹² Another product of plants of the genus *Commiphora*, guggulipid, is purported to have a favourable effect on lipids — causing a modest decrease in low-density lipoprotein (LDL) cholesterol concentration, but a profound increase in high-density lipoprotein (HDL) cholesterol.¹³ However, randomised trials have failed to show this effect.¹⁴

Traditional decorations

Mistletoe, a plant popular as a decoration around the Christmas holidays, is also finding a myriad of medicinal uses. This tree parasite, thought to have been sacred to the Druids, and blamed for the death of the Norse god Balder, is commonly used as an excuse for stealing a kiss during the Christmas season. But mistletoe does not, to our knowledge, have any aphrodisiac qualities. However, it has been found to inhibit peristalsis, and has been suggested as a treatment for colic.¹⁵ A mistletoe extract has shown antihypertensive effects in rats, although safety in humans has not been established.¹⁶ Mistletoe extracts also apparently have activity against bladder carcinoma in both mice and rats.¹⁷ In humans, mistletoe has been used to treat prostate cancer.¹⁸

Modern decorations or dealers of disease?

The humble Christmas tree can be a source of disease, as well as providing pleasure. A young man in Molokai, Hawaii, contracted ophthalmomyiasis while unloading a Christmas tree.¹⁹ Perhaps the larvicidal effect of frankincense would have been of benefit to him in



this situation (as it might be to a herd of reindeer — flying or otherwise — infested by botfly larva).

As might be expected, children are not immune from the dangers of Christmas trees. A 2-year-old Canadian child with recurrent pneumonia eventually underwent a thoracotomy and right lower lobectomy for the disorder. The pathology examination revealed a 3 cm by 0.5 cm foreign body resembling the distal branch of an

evergreen tree.²⁰ Similarly, a 2-year-old Australian child apparently inhaled an ornament shaped like a Christmas tree, which caused asthma-like symptoms until it was removed laryngoscopically.²¹

Even artificial trees have been the source of disease. A 44-year-old English woman had a relapse of bird fancier's lung a long time after she got rid of her fine, feathered friend.²² Apparently, her symptoms were triggered by an artificial Christmas tree that had been her bird's favourite perch — protein deposits left on the branches were enough to cause the recurrence.

Christmas trees have also been — unfairly — blamed for sporotrichosis. It seems that, although Christmas-tree farming has been associated with this disorder, it is actually the sphagnum moss used to wrap the roots of the trees, rather than the trees themselves, that are the culprit.²³

Christmas trees are not the only unfairly maligned plant of the Christmas season. Perhaps the most notable medical feature of a common Christmas decorative plant — the poinsettia (*Euphorbia pulcherrima*) — is actually the lack of any adverse events associated with it. This festive red and green plant is used throughout the United States as both a Christmas gift and a holiday decoration, despite the widespread public notion that it is highly toxic. Recent investigations failed to show any fatalities — and indeed very few adverse events at all — associated with poinsettia ingestion.²⁴ Likewise, that common Christmas plant, holly (*Ilex aquifolium*), is traditionally thought of as poisonous, but a PubMed search of this genus and species revealed no reports of ill effects associated with traditional European holly. That said, there were also no reports on the safety of European holly ingestion either, so it is probably a dish best avoided. Other members of this species have been shown to have toxic effects when ingested in tea form.²⁵

So, as families and friends gather this Christmas holiday season, they can delight in the fact that most of the decorations in their homes are medically relevant. The traditional biblical gifts of gold, frankincense and myrrh are all doing their part to stamp out disease. The humble tree parasite, mistletoe, despite its toxic nature, has its place in the medical pharmacopoeia. Parents need not fear their toddlers drifting too close to the poinsettia, because the plants are pretty much harmless. On the other hand, they should keep an eye on that Christmas tree ...

Competing interests

None identified.

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