NATURAL TOXINS IN TRADITIONAL MEDICINES
some MYTHS removed.

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Introduction:

A lot of misleading information has been published for many years about commonly occurring "toxins in plant medicines." This has not only occurred in the media, but also in many scientific publications. I have been studying the literature relating to the toxicity of medicinal plants over many years. Therefore, I am fully aware that as much myth and superstition is promoted by members of the medical and science professions, as by people working in so called 'complementary medicine.' **The Publics safety is put at risk by the promotion of such myths.**

I have chosen Pennyroyal as my subject as it is a classic example of incorrect information LEADING TO DEATHS AND SEVERE ILLNESS. Some Herbalists, most Aromatherapy organisations and authors (actively supported by science professionals), have been very active in promoting myths about the dangers of these plants and their oils. If it were not for them, then the incidence of women who have poisoned themselves in vain attempts to procure abortions would have been substantially lower.

I feel this article may trigger a flood of people claiming the use of pennyroyal has been an effective abortificacient. However the evidence is clear, **no such physiological action exists.** We should never of course forget that the most powerful mechanism influencing what happens in the body is the mind. If someone takes pennyroyal and strongly believes it will work, then it may well do, but it is not directly due to this wonderful oil.

The following investigation was an effort to put into context statements made by some researchers about naturally occurring plant toxins. The claims made about plant toxins are frequently greatly exaggerated. Potential hazards are rarely (if ever) weighed against the huge amounts of HARM caused to human health and the environment, by synthetic chemicals and their eco-persistant wastes.

There is a great deal of concern about synthetic oestrogenic chemicals. Some scientists believe these may be responsible for the significant decline in male fertility.

An alarming report has proved that high levels of pesticide residues are found in human breast milk. *P. M. Quinsey et al. 1995. Food Chem. Toxic. vol. 33, No. 1, pp 49-56.*

It is therefore vital to remember, that these synthesised chemicals have been tested and declared safe by scientists working on behalf of various regulatory authorities. Due to this, we should be asking very hard questions about the methods these scientists have used to ascertain safety. We should also ask if these same people can be trusted to accurately evaluate potential hazards from natural toxins occurring in plants.

One thing I say to students in my classes is "certainly some chemicals occurring in plants can easily kill you. However if they do, at least the chemicals concerned are environmentally friendly by biodegrading along with your body". This is totally different from toxic residues from many man-made chemicals. Some of these chemicals can persist for many years in the environment, and can and do harm future generations.

PENNYROYAL OILS

(Mentha pulegium & hedeoma pulegioides varieties.)

THEIR LACK OF TOXICITY WHEN USED AS THERAPEUTIC AGENTS.

Introduction to article:

Pennyroyal oil is frequently quoted as being “dangerous for use during pregnancy”. Yet, the documented cases of human poisoning via attempts to induce abortions find scant evidence of such an action. Medical textbooks from the turn of the century state that "attempts to procure abortions using Pennyroyal were rarely successful" *Cushny. Pharmacology & Therapeutics 1918.*

The consumption of several millilitres of pennyroyal oil is highly likely to cause toxic effects. However, the DOSE needed to cause death (around 20 grams), is similar to the amount required by a common over the counter drug PARACETAMOL - UK name. There are thousands of cases of paracetamol poisoning each year from far lower doses - mainly from self overdose. Despite these statistics, no significant policing has occurred of the restrictions on the volumes it can be sold in.

Authoritative proof that Pennyroyal oil used in sensible amounts is not toxic or hazardous exists as follows:

Toxicity levels:
The oral LD50 in rats is reported to be 0.22-0.58 g/kg. (average 0.4). O. Moreno 1973. Reports to the R.I.F.M.

d-pulegone was classified as a permitted FOOD ADDITIVE by The Council of Europe in 1974. In annex 11-426 it is allowed in beverages at 250 mg. per kg. and in mint confectionery at 350 mg/kg. Therefore, eating 100 grams(4 ounces) of pulegone flavoured confectionery, would provide the equivalent of 35 mg. of pulegone or nearly **2 drops of the oil** (assuming a pulegone content in the oil of 70%).

The UK Food 1992 statutory instrument, still permits these levels of use for food flavourings. It is unlikely that regulatory authorities would permit these volumes if there were any sound evidence of abortifacient activity. There are no warning labels suggesting that a pregnant woman does not consume peppermints to ease morning sickness, or on mint flavoured drinks, toothpastes, mouthwashes, etc.

Effects via the skin:
The dermal LD50 in rabbits is 4.2 g/kg. *O. Moreno 1973. Reports to the R.I.F.M.* Low dermal toxicity must indicate that very little oil is getting into the blood through the skin of animals, and almost certainly far lower levels from dermal absorption in humans.

A 6% solution of the oil has been tested on the skin of humans, and at that level no sign of irritation or sensitisation occurred. *A. Kligman 1973. Reports to the R.I.F.M.*
Note: This lack of adverse reactions can indicate low dermal absorption. 6% is far in excess of what is used for a routine massage.

A 10% solution of d-pulegone (which constitutes 60-90% of the oil), was tested on humans and produced no sign of adverse effects. It was found only poorly absorbed after it was applied to Guinea pig skin for 2 hours. F. Meyer 1965. Br. patent 1,001,949. Therefore only the minutest traces with NO toxicological significance, are likely to be detected in the systemic circulation following dermal application.

Other modes of absorption:
There is now sound evidence that significant levels of some fragrance chemicals can enter the

bloodstream via inhalation. However, if only 1 to 2 drops of pennyroyal oil were used in a massage blend, then the total systemic intake must still be below that permitted in foods.

Deaths and poisonings:
Death has been reported after the CONSUMPTION of 25 mls. of the oil, *J. Sullivan et al. 1979. J.A.M.A. Vol. 242, No. 26, pp 2873-2874.* **At that level of use, it makes the toxicity of Pennyroyal oil very similar to that of paracetamol, a freely available SELF SERVICE medicine.**

The relevant data for toxicity in humans comes from American reports. Large volumes of oil were consumed in UNSUCCESSFUL attempts to promote abortion, see ref. above plus; *J.A.M.A. V.241, No. 21, 2246* which appears to be based on the same report as the former reference.

In the above reports it was stated that "one woman CONSUMED 7.5 mls. and another woman 10 mls. of Pennyroyal oil." They were both quite ill for a couple of days. Following treatment, both recovered fully and were discharged after a few days. No residual liver or other discernible damage was reported (somewhat different to the organic damage that occurs following Paracetamol overdose). In one of these cases, pregnancy testing was positive, but it is not reported if the abortion attempt succeeded.

d-pulegone and unreliable testing:
There are numerous research papers relating to the toxicity of d-pulegone (the major component of pennyroyal). The vast majority are based on results obtained from mice and rats, or from tests in-vitro on isolated tissues. Using these kinds of tests, it is common to find ASSUMPTIONS being made, that similar toxicity will occur in humans. This is despite it being known that many natural toxins are metabolised differently in animals. We had a similar case with Basil, where experiments on animals and men produced differences in the metabolism of the offending substances. *A. Anthony et al. 1987. Fd. Chem. Toxic. Vol. 25, No.11, 799-806.*

Most of the research on d-pulegone, has used the synthetic rather than the natural extracted chemical. Synthesised chemicals are well-known for not displaying precisely the same biochemical reactions as the natural form. This can be due to traces of impurities, with unknown biochemical reactions, present in most 'lab grade' chemicals. It can also be due to significant differences in isomeric ratios, between natural and synthetic versions of the same (in theory) chemicals.

Most researchers have administered massively higher doses to animals, than would normally be experienced by humans, and by such highly unreliable methods as intra-peritoneal injection. The tendency has been to simply ignore that humans and animals have different intestinal tracts. Their guts evolved differently, partly in order to deal with plant toxins commonly present in their respective natural diets, or to be able to exploit food sources unusable by other creatures.

Other research reports on d-Pulegone & Pennyroyal oil.
Below are just a few examples of many research papers that I have on this subject. Most of these display irrelevant and misleading science.

W. P. Gordon et al. Drug Metab. & Disp. 1987. Vol. 15, No.5, 589-594.
In this research 300 mg./kg. of d-pulegone was administered by intra-peritoneal injection into mice. **Note**: this would equate to a 70 kg. human having roughly 21 ml. injected directly into the peritoneum. Hardly surprising that liver damage occurred in the mice!

R. McClanahan et al. Chem. Res. Toxicol. 1989, 2, 349-355.
Note: Similar to the above but dose 280 mg./kg. by intra-peritoneal injection.

D. Thomassen et al. J. Pharm. & Exper. Therap. 1988, Vol. 244, No. 3, 825-829.
Intra-peritoneal injection into rats, 4 doses daily of 75 mg./kg. each dose.
Note: 300 mg./kg. of pulegone equals around 0.3 grms. of pennyroyal oil. In this research it should be noted that "technical grade" pulegone was used containing 2% of impurities. For testing cell metabolism isolated liver cells were used. As there is no part of the body not under the influence of

peripheral factors such as neuronal or hormonal control, I would always question results achieved from using pieces of isolated tissue, and then assuming identical results in the whole living creature.

W. P. Gordon et al. Toxicol. & Appl. Pharmacol. 1982, Vol. 65, 413-424.
Damage was caused to the liver and lungs of mice with 400 mg./kg. and 500 mg./kg. into rats, by intra-peritoneal injection of THE WHOLE OIL.
Note: this paper reports on the human death following the consumption of 500 mg./kg. equivalent to 25 ml. of the oil. What on earth is the point of giving the same amount of oil to animals and by an unnatural route, in view of the known data from human poisoning. What were they trying to prove?

P. Madyastha et al. Bio. & Biophys. Res. Comm. 1985, Vol. 128, No. 2, 921-927.
Once again 400 mg./kg. of d-pulegone into rats stomachs daily for 3-4 days.
Note: equivalent to an adult of 70 kg. CONSUMING roughly 28 ml. (if he survived for the first day) again **what were they trying to prove???**

There have been several reports that pennyroyal and pulegone can cause contractions in isolated animal uterine muscle. Such proposed "evidence of abortifacient activity" **is misleading in the extreme.** Common causes of powerful uterine muscle contractions are: making love, masturbation and breast feeding. Are scientists therefore suggesting that these activities during pregnancy abort any properly implanted foetus? One of many examples of how unintelligent scientific researchers can be! If such uterine contractions did result in the expulsion of a foetus, then the chances are it is nature taking its course and simply rejecting something that is imperfect.

SUMMARY:

It seems none of the scientific evidence presented to date can substantiate the claimed dangers to a foetus from the occasional use of pennyroyal oil IN THERAPEUTIC AMOUNTS by internal or external means.

The fact that Pennyroyal extracts have been traditionally used to induce menstruation, cannot be assumed to be conclusive evidence of an abortifacient activity. The non-pregnant uterus is in a completely different biochemical state to the pregnant uterus. Once implantation of a foetus has occurred it can be extremely difficult to shift, as was well known prior to the days of modern abortion techniques. Additionally, the factors controlling menstruation can be 100% under psychological influences. I would suggest that the fragrance of some plants may help unblock emotional inhibition of bodily functions. Therefore, it can't be assumed that any direct physiological actions are occurring from the use of extracts of this plant.

The most important hazard associated with this oil, is the potential for accidental consumption by a child. LD50 data suggests a lethal dose of pennyroyal oil for a child could be around 3 ml.
Note: Eucalyptus oil has killed a child following only 5 ml. and few calls have been heard suggesting that this oil is restricted.

I would not wish this information to be taken as implying that we should all start using pennyroyal oil for treating ailments during early pregnancy. However, if other treatments were not working, then it appears to no more hazardous than many other essential oils. This is provided the amount allowed in food is not exceeded. This information only holds good for the essential OIL, there has not been sufficient investigation of the HERBAL extract to see if it contains water soluble chemicals which could induce abortion, although I doubt it.

All anecdotal and unverified reports of pennyroyal causing problems are not dealt with in this report. This is because we have sufficient SOUND evidence on which to base safety judgements. Of course if anyone does stupid things like using any essential oil day in, day out, for months or years, then toxic side effects are very likely. This is no different to taking numerous conventional medicines over long periods of time.

Therapeutic uses:

Pennyroyal oil is so powerful that only 1-2 drops are required for conditions such as bronchial infections. Inhalation from hot water, or inhalation when used in massage, is the best means of getting the oil to where it is needed. This of course further reduces the potential systemic intake to BELOW THAT ALLOWED IN FOOD.

The oil and herbal extract have an ancient history of therapeutic use to ease **severe menstrual pain.** I have treated several patients suffering from bad period pain by massaging the diluted oil over the uterus and into the sacral area. By combining local massage with the inhalation of this wonderful fragrance, pain relief has occurred within 10-15 and often has lasted for several hours. Somehow the inhalation of this oil seems to relieve uterine congestion, getting the flow going and thereby also helping relieve pain. It sometimes enhances conventional analgesia when effective pain relief is not forthcoming. Female colleagues have told me that just a sniff of this oil can stop cramping becoming more acute.

Pennyroyal is a herb of Venus and therefore traditionally has been used to deal with a whole variety of female ailments. It therefore seems improbable that the plant could harm that exclusively female function of bringing new life to the world.

Pennyroyal oil has many therapeutic benefits which there is not enough space to go into here, but more information can often be found in medical textbooks published before the early 1900s.

In conclusion, perhaps the reader should ask themselves why it is, that an essential which is a permitted food flavouring, appears on the 'NOT TO BE USED' lists issued by aromatherapy organisations. The use of this oil by therapists allied to those organisations, would also probably invalidate their insurance. Therefore, perhaps you should also be asking about the ability of aromatherapy organisations to 'set the standards'. How is it that people with inadequate knowledge seem to be able to fool insurance companies and education authorities into thinking that they know what they are talking about? Vital questions for a trade setting standards within the field of health care!

GENERAL METHODOLOGY OF INVESTIGATING NATURAL PLANT TOXINS.

A few scientists have acknowledged that one cannot assume genotoxicity in natural products simply because one isolated chemical demonstrates this property. Certain plant chemicals in isolation are known to cause severe skin reactions. However, fragrance chemists know that when these same chemicals are mixed with others, in a similar manner to that occurring in nature, then a significant reduction in the chemicals ability to cause problems often occurs. Such synergistic effects are rarely considered when the toxicological properties of plant extracts are investigated, instead all they tend to look at are the effects of individual chemicals.

Some researchers investigating plant toxicity, and whose employers whether public or private expect RESULTS. Find that if they can't confirm toxic effects from using the whole plant or its extracts, then they can always create them. They do this by looking for trouble among the hundreds of individual chemicals occurring in most plants. In even more desperate efforts to prove their point when they can't find evidence of toxicity in higher mammals, they turn their attention to lower creatures and/or highly vulnerable isolated tissues. These are then exposed to far higher amounts of substances than the creatures, or humans, are ever likely to be exposed to in their lifetime. The resulting problems such as cancer, organ and embryo damage, are then deemed in their eyes to mean the substance is dangerous. **By such methods even olive oil looks embryotoxic.** *A. Abramovici et al. Toxicology 1983, 29, 143-156.*

We would all be well advised to remember that some of the most potent plant toxins have been used for generations as our most potent medicines. Examples such as Atropine, Morphine,

Digitalis are all potent toxins in excess, yet in the appropriate amount are invaluable therapeutic agents: SO ARE MANY OTHER SO CALLED “TOXIC PLANTS.”

Why do most pharmacologists, and doctors assume that only they are capable of using potent natural medicines safely? Traditional healers have used powerful medicinal plants for hundreds of thousands of years. Of course along the way, world-wide, these medicines have killed a few thousand people. However, if the deaths resulting from misuse of plant based medicines over the last 100.000 years were totalled. I doubt that they would amount to anywhere near the numbers of people killed or severely damaged world-wide in the last 50 years by synthesised drugs and other man made chemicals.

These hazardous substances have been developed by science graduates, who then have the nerve to pontificate on how dangerous some of the chemicals in plants are. If their methods of investigating the dangers of substances were so reliable. Why is it we have had a constant string of drugs being removed from sale, due to severe adverse side effects which have not shown up in pre-launch testing?