

PLANT-EXTRACTS AS MEDICINES?!

Traubensilberkerze

Herbal medicines – also known as phytopharmaca – enjoy a considerable importance, be it in the medical treatment of patients or in self-medication. Phytopharmaca are defined according to German laws regulating the use of drugs as being substances derived from „plants or parts thereof, whether processed or unprocessed“. They are mixtures of several substances and are therefore fundamentally different from drugs based on active substances in the pure state; their medical activity derives from the mixture that is used in the therapy („phytotherapy“). Phytotherapy has a long tradition that can be traced back into antiquity.

Herbal medicines are readily accepted by the public

It is puzzling at first sight why one should use a plant extract as a medicine rather than identifying, isolating and using the active constituents from the mixture. The use of the mixture can however have many advantages, for instance if the active constituent is unknown but the mixture has a proven clinical effectiveness.

Difficulties in identifying the active components can have many causes. Often, several components of the extract are responsible for the medical effect, whereas the isolated pure substances show little or no activity; this phenomenon is known as synergic activity. Furthermore, *biologically active* compounds are often represented in nature by inactive precursors, which are only converted into their active forms by enzymatic activation or chemical modification in the alimentary canal after oral administration. This is the case for many *glycosides*; such compounds are therefore almost impossible to detect by the usual biochemical *in vitro* methods.

AN EXAMPLE OF A SUCCESSFUL PHYTOPHARMACON

Clinical studies have shown that extracts from rhizomes of the black cohosh (*Cimicifuga racemosa*) are effective against menopausal problems. The activity cannot yet be attributed to any particular substances. The extract may be used instead of hormone preparations (oestrogens) in the treatment of corresponding symptoms. It can also be used together with the hormones if its own activity is insufficient, whereby smaller amounts of hormones are needed.



St. John's wort has been used as a herbal medicine since antiquity and is employed today as a mild antidepressant because of its ability to lighten moods.

Even if one or more active components of an extract are known, further substances may be responsible for an optimal effect. One example is the increased tolerance that many phytopharmaca display compared with chemically synthesised drugs. However, such phytopharmaca are not always free from side-effects or interactions with other drugs. Because of their natural sources, phytopharmaca have the advantage of being well accepted by the public; one consequence of this is the readiness of patients to take the medicines regularly, which is important for the success of the treatment.

Phytopharmaca are subject to the same strict regulation as other medicines

Despite the established advantages of many phytopharmaca, the use of mixtures of seven-

Biological activity

A substance is described as biologically active if it has a demonstrable effect on the biological processes of an organism.

Glycosides

Natural products involving sugar moieties. The non-sugar part is the so-called aglycone and can be separated from the sugar.

In vitro test systems

(in vitro, Latin, literally "in glass", thus "in the test-tube"). Investigative methods that are used to test the effects of substances (e.g. natural products) on metabolic processes or on the viability of cells grown in culture (i.e. outside the human or animal organism).

Drug

A drug is a substance of plant or animal origin used for the preparation of medicines. In the narrower sense, the word is also used for a dried medicinal herb or parts thereof (e.g. flowers, leaves, roots, bark, seeds, fruit).

Clinical studies

Tests of the therapeutic effectiveness of a medicine on humans. Clinical studies are subject to strict legal regulation.

Normalisation

Standardised extracts with known active agents are prepared to contain the same amount of the main active component; the amount of extract can vary.

Standardisation

For extracts whose main active constituents are unknown and thus themselves compose the medicine, the entire process from the cultivation of the plant to the preparation of the extract is standardised. The preparations contain the same amount of total extract. Additionally, the content of a major component of the extract may be cited, but this is not adjusted and may therefore vary.



Extracts of the medicinal plant hawthorn (*Crataegus spec.*) are used in cases of weakness of the heart

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St. John's wort extract from *Hypericum perforatum*. The total extract is used. Active constituents cannot be identified and standardised extracts are therefore used. Clinical studies have shown good efficacy compared with synthetic chemical drugs in the treatment of light to moderate depression.

ral substances raises fundamental questions and in turn gives rise to criticism. One problem is the uniformity of extracts. How can one rely on the quality of an extract that is not only dependent on the quality of the plant material (*drug*) used, but also on the method of preparation (the extraction process and the nature and quantity of the extracting agent)? Can extracts whose active constituents are not even known be regarded as meaningful and up-to-date medicines? Moreover, might not substances that are present in the extract together with the actual active agents have a negative influence on the main medical activity? Who can guarantee that the alleged effect of a plant extract is genuine and is not simply based on vague historical tradition?

Such criticisms are often encountered. For this reason, it is important to establish that plant extracts are subject to the same strict regulations as are all other medicines. This means that phytopharmaca should only be licensed as medicines if their efficacy, harm-

lessness and pharmacological properties (such as shelf life) have been established *in clinical studies*. It is of course an intrinsic property of a plant extract that not all components are always present in the same concentrations, but constant quality is assured by *standardisation* and *normalisation*. The use of phytopharmaca that fulfil these strict requirements is described as „rational phytotherapy“ and should be clearly distinguished from the broad use of remedies of plant origin that are not supported by any scientific investigations (see p. 19, pure compounds as pharmaca).

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AN EXAMPLE OF A SUCCESSFUL PHYTOPHARMACON

Willow bark extract from *Salix purpurea* contains salicylic acid, which served as the chemical lead for the development of aspirin® (acetylsalicylic acid). Acetylsalicylic acid has been a successful medicine for over 100 years, and further potential uses have recently been identified.

Because of the success of aspirin®, the original extract is no longer used.



Feverfew (*Tanacetum parthenium*) was used in the middle ages against fever and headaches.

AN EXAMPLE OF A SUCCESSFUL PHYTOPHARMACON

Feverfew extract from *Tanacetum parthenium*. The total extract is used as a prophylactic against migraines and is thus important because, otherwise, the symptoms can only be treated once they have developed. The active constituents are unknown.

Additional Literature

Phytoextrakte - Produkte und Prozesse, Entwicklung interdisziplinärer Lösungswege, Workshop und Strategiepapier (2004), DECHEMA e.V., Frankfurt a.M.

Handbuch der Phytotherapie (2003), Jänicke, Grünwald, Brendler (Hrsg.), Wissenschaftliche Verlagsgesellschaft mbH Stuttgart

Links on the Web

Bundesinstitut für Arzneimittel und Medizinprodukte
www.bfarm.de/de/index.php

Bundesverband der Arzneimittelhersteller e. V. mit Informationen u. a. zu Pflanzlichen Arzneimitteln und zur Biotechnologie im Arzneimittelbereich
www.bah-bonn.de