Damiana (Turnera diffusa Willd.) - A traditionally used aphrodisiac as modern PDE-5 inhibitor

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Damiana (*Turnera diffusa* Willd.) – a traditionally used aphrodisiac as modern PDE-5 inhibitor

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Traditional use of Damiana leaves

One of the oldest documented herbal remedies were the leaves from Turnera diffusa var. aphrodisiaca (Damiana), a shrub native to Mexico, Central America and the Caribbean.

Damiana leaves have been used as an aphrodisiac, as “love potion” and to boost sexual potency by the native peoples of Mexico [1], including the Mayan Indians. They have been used by both males and females for sexual stimulation, to increase energy, and to treat impotence as well menstrual problems. Throughout history different preparations and formulations have substantiated the reputation of Damiana as a valuable remedy. In the Western world Damiana preparations are well established in different pharmacopeias (BPC, USP, DAB). The most cited indication is aphrodisiac in traditional forms of tea and fluids as well as tablets. However, proven scientific confirmation is rare. Damiana extracts were shown to stimulate sexual behaviour in rats [2,3].

Phosphodiesterase-5

Selective phosphodiesterase-5 (PDE-5) inhibitors like Sildenafil, Tadalafil or Vardenafil are commonly used for the treatment of Erectile Dysfunction (ED). PDE-5 inhibitors are generally not considered as aphrodisiacs because they do not have any direct effect on the libido. However, increased ability to attain an erection may be interpreted as increased sexual arousal by users of these drugs.

An aphrodisiac is a substance that increases sexual desire. One link between PDE-5 inhibitors and aphrodisiacs might be the herbal drug Folia Damiana.

In order to measure the PDE-5 inhibitory activity, a selective in-vitro method for PDE-5 was established*. The method was validated by Sildenafil-citrate as positive control. For different extract preparations derived from Damiana leaves a dose-depending inhibition of PDE-5 was found (see Tab. 1 and 2).

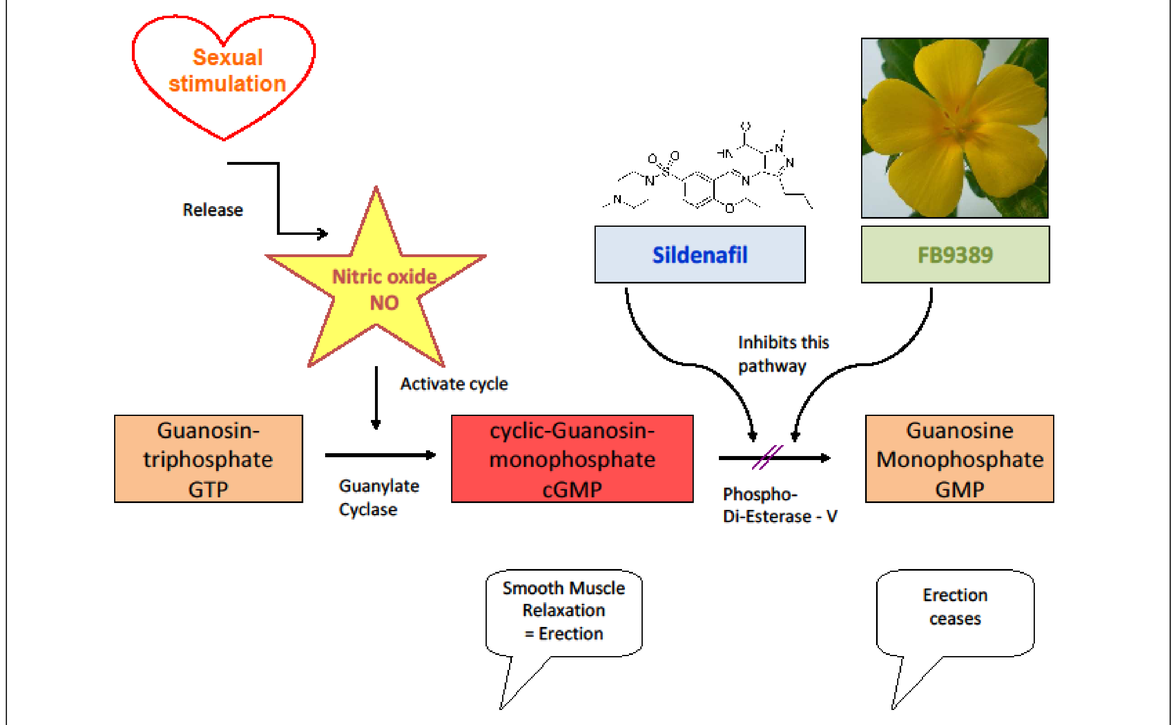
Extraction solvent	Water	Ethanol 30% w/w	Ethanol 70% w/w	Ethanol 99% w/w
PDE-5 IC50 µg/mL	>30	15 - 20	10 - 15	>30

Tab. 1 – Influence of the extraction solvent mixture

Turnera species	T. aphrodisiaca	T. diffusa var. diffusa	T.diffusa var. aphrod.	T. ulmifolia
PDE-5 IC50 µg/mL	10 - 15	10 - 20	10 - 15	10 - 20

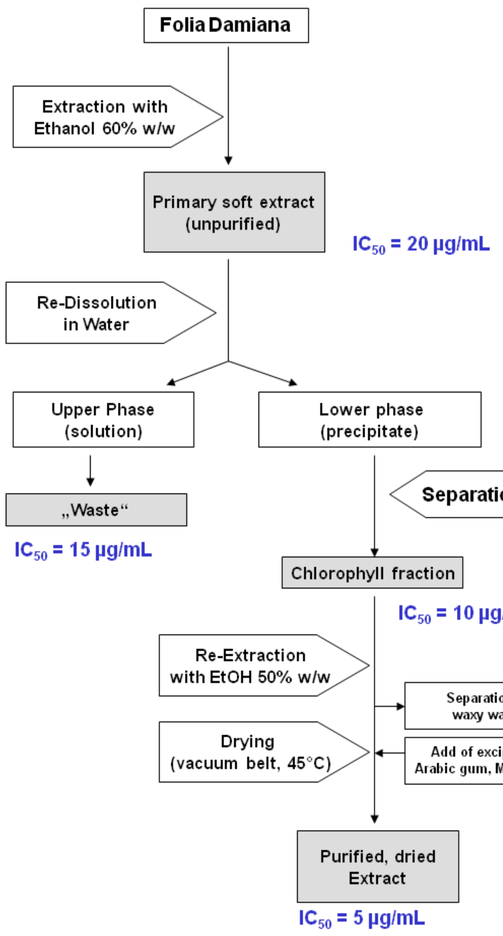
Tab. 2 – Influence of the Turnera species extract, made with EtOH 60% w/w.

Thus, one possible new mode of action for the traditional aphrodisiac Damiana was discovered. Among the different PDE types the inhibition potential on PDE-5 was the strongest and most selective. This mechanism could also be a reason why aphrodisiacs containing Damiana preparations are often combined with NO-triggering substances (e.g. Yohimbine, Arginine).



Modified acc. Chew et al., Erectyle disfunction, sildenafil and cardiovascular risk; Med. J. Aust. 172, 279 – 283, 2000)

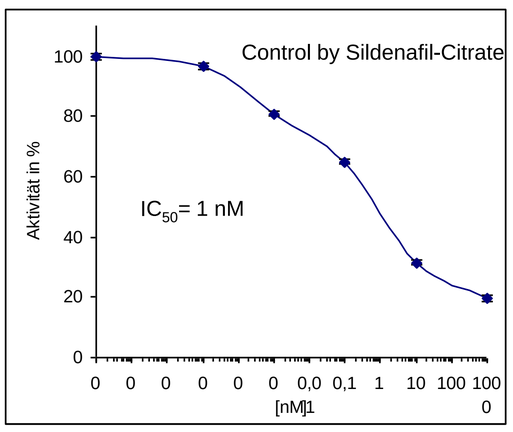
Extract manufacture

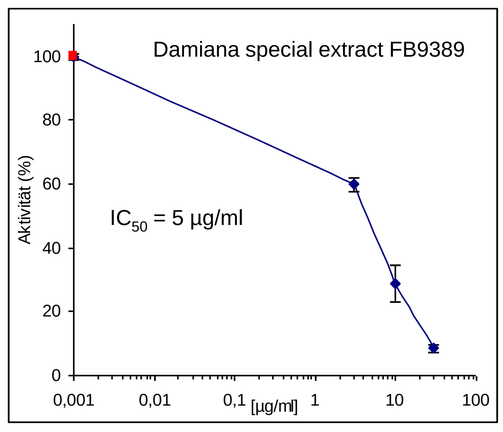


Based on the PDE-5 analysis we monitored the pharmacological activity of our extraction technology. The influence of the extraction solvent showed that ethanol-water concentrations of 60-80% w/w were the most actives (Tab. 1).

After further fractionation of a 60% w/w ethanolic extract we found the highest biological activity in the chlorophyll fraction. To handle this inhomogen fraction we carried out a re-extraction including the use of an extract emulsifier (Arabic gum). We got a homogen soft extract as well as a homogen dry extract (excipients: microcristalline cellulose, silicium dioxide). The Damiana special extract FB 9389 (Finzelberg item 0 137 303) is applied for a world-wide patent (WO 2008071684).

For this Damiana special extract FB9389 an IC50 value of 5 µg/mL was measured (n=3).





Summary

Our investigations showed for the first time, that Damiana leaf preparations influence PDE-5 activity in vitro [4]. In the present work a crude 60% w/w ethanolic Damiana extract was investigated for its inhibitory activity on PDE-5 in vitro and was further optimised using different purification techniques. In conclusion, PDE-5 inhibition might be a possible mechanism of action of Damiana. An human study on the effects of FB9389 on mild Erectile Dysfunction in male subjects is currently in progress.

References

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[4] Patent Application (2006) WO2008071684

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