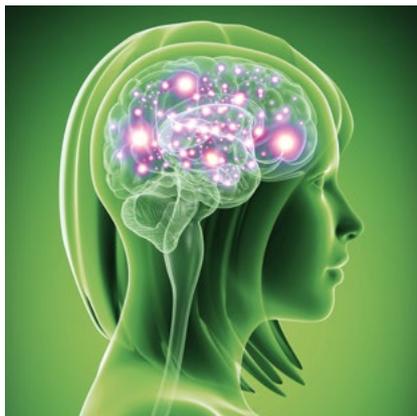


SCIENCE NEWS OF ANKLAM EXTRAKT GMBH



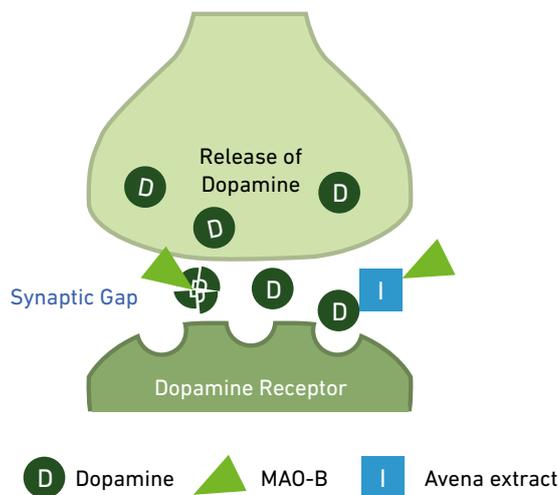
// Green oat (*Avena sativa*)



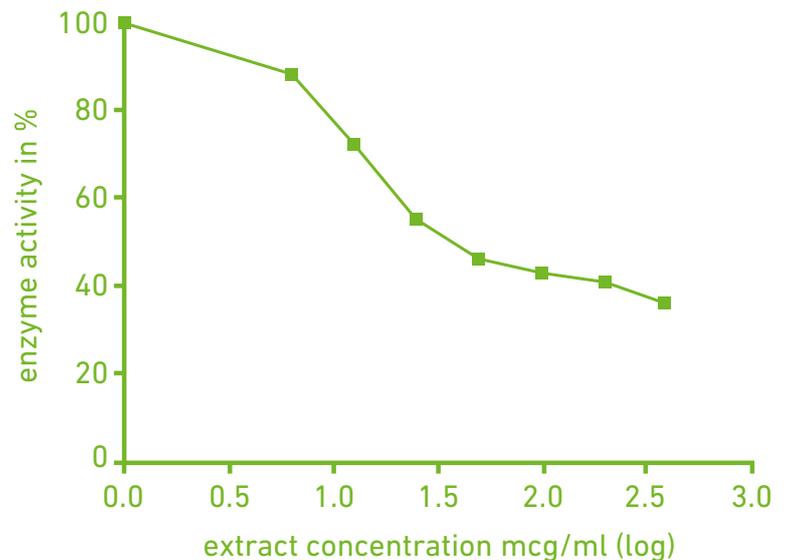
Avena sativa, or commonly known as green oat, is utilized in a broad variety of food, cosmetics and food supplements. As it contains valuable bioactive ingredients, *A. sativa* is scientifically proven to be effective in numerous fields of indications. In this article, we summarize the inhibitory mode of action of green oat extract on two distinct enzymes, namely phosphodiesterase 4 (PDE-4) and monoamine oxidase B (MAO-B). Both enzymes act in the central nervous system (CNS) and hold modulatory roles in anxiety, memory and depression.

Research in cognitive function, mental fitness as well as in symptoms of stress, depression and anxiety often conducts *in vitro* assays to test synthetic or botanical compounds. Two of the primarily used *in vitro* test systems are the phosphodiesterase type 4 (PDE4) inhibition and the monoamine oxidase B (MAO-B) inhibition. An inhibitor of the enzyme PDE4 is a substance that blocks PDE4s' degradative activity on cyclic adenosine

monophosphate (cAMP). cAMP, as a second messenger molecule, is involved in many biological processes. Subtypes of the large PDE4 enzyme family are prevalent in immune cells and cells of the CNS. In those cells, PDE4 hydrolyzes cAMP to its inactive form adenosine monophosphate (AMP). As mode of action, the inhibition of PDE4 blocks the hydrolysis of cAMP, leading to an increase in cAMP levels and thus effecting several signaling pathways within the cell. PDE4 inhibitors are known to deploy procognitive (e.g. long-term memory improvement), neuroprotective and anti-inflammatory activities. The second test system that is commonly used in CNS research for cognitive function is the *in vitro* inhibition of the MAO-B enzyme. MAO-B enzyme inhibitors have been used for several decades to treat anxiety and depressions as well as Parkinson's disease and were found to hold memory enhancing effects. The inhibition of MAO-B enzymes leads to an enhanced availability of monoamine neurotransmitters like serotonin,



// **Figure 1:** Mode of Action: Avena Extract at the Synapse of Dopaminergic Neurons



// **Figure 2:** MAO-B Inhibition by Anklam Extract's Green Oat Herb Extract

norepinephrine and dopamine. Due to the enzyme inhibition, neurotransmitter concentrations are kept high in the synaptic gap between neurons, leading to a longer beneficial activity of the neurotransmitters (see Figure 1).

Anklam Extrakt GmbH initiated an *in vitro* study to prove a potential positive effect of its green oat extract (*Avena sativa*) on cognitive function. The tests were conducted by a well-established European research

institution. Thereby the aim of this study was to determine the inhibitory effect of green oat extract on the activity of MAO-B (see Figure 2) and PDE4 *in vitro* and to perform a comparison of the efficacy of the Anklam Extrakt GmbH *A. sativa* extract with a competitive product. In summary, the green oat extract of Anklam Extrakt GmbH showed good inhibitory effects for both enzymes PDE4 and MAO-B. This indicates that the ingestion of green oat leads to the inhibition of the aforementioned enzymes

and thus might have a positive impact on mental fitness, cognition and mood. Furthermore, the *in vitro* enzyme inhibition of the tested extracts was bioequivalent to those of known market products.

Additional data on file.

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