

The usage and popularity of herbal remedies have been growing all over the world in the last decades. Over 80% of the general population relies on medicinal plant materials or products containing them for some part of their healthcare. However, the scientific evidence concerning the clinical effectiveness, **safety, or mechanism of action of plant extracts and raw plant materials is still lacking in many cases**. Additionally, the research shows that 30 up to 60% of currently used drugs are compounds of natural origin or derived from natural products. This data indicate that the investigation of plant extracts and isolated natural products is a challenging field with the need for further development and extensive research.

Gut microbiota (GM) is a complicated and huge microbial community that plays a crucial role in maintaining the homeostasis of human organism. The tremendous development in the research focused on the associations of GM with health and the pathogenesis of many diseases can be observed from the being of the XXI<sup>st</sup> century. In several studies, it was shown that the well-being of **GM is an essential factor regulating central nervous system homeostasis, while its disturbances contribute to the development of many psychiatric disorders, including anxiety and depression**. This interaction is defined in the literature as a gut-brain axis. On the other hand, many studies (included ones conducted by PI) proved that medicinal plant materials ingested either in the form of traditional preparations or as ingredients of commercially available drugs and food supplements **can interact with the GM**. The plant materials can affect the biodiversity of GM, and the GM can alter the structure of natural products contained in plant extracts leading to the production of novel bioactive metabolites.

In the context of anxiety development, progression, and treatment, significant attention has been recently paid to the condition and metabolic role of intestinal and blood-brain barriers. In this aspect, the role of GM has also been often addressed. The breakdown in the integrity of both barriers may lead to the increased permeability of factors (i.e., bacterial lipopolysaccharides or peptidoglycans) and resulting in inflammatory response associated with anxiety and depression. *Lavandula angustifolia* Mill., also called true/English lavender, is a source of important medicinal plant material - lavender flower (*Lavandulae flos*). It is a source of essential oil rich in monoterpenoids but also the flowers are often used in the form of self-prepared infusions to treat mild symptoms of mood disorders, including different forms of anxiety. The infusion is usually freshly prepared and ingested 2-3 times a day. In previous reports, most of the attention was paid to the anxiolytic activity of volatile compounds contained in lavender flowers. However, the form of an infusion, which in fact is a boiling water extract, usually contains small amounts of essential oil and is rich in other more polar natural products, which can contribute to the beneficial effects *in vivo*. **Whenever the oral intake is considered, the interaction with GM of the plant remedy must be addressed**. The available literature lacks any information supported by basic studies on the interactions of lavender infusion with GM and intestinal barrier. The area of metabolism of compounds contained in lavender infusion by GM, their bioavailability, and integrations with blood-brain barrier is also not clear. On the other hand, the efficacy of herbal tea prepared from lavender flowers or raw material was confirmed clinically, with no information on the potential mechanism of action or compounds responsible for the observed effects as well as their pharmacokinetics.

**The current proposal aims to provide scientific evidence on the interaction of lavender flowers infusion with GM in the context of the treatment and prevention of anxiety disorders in humans. The planned experiments will address the role of lavender flowers infusion and its postbiotic metabolites produced in the gut in the maintenance of intestinal and blood brain barriers.**

Obtained results help with proposing the new mechanism of action of natural products contained in lavender flowers in the prevention and treatment of anxiety disorders.