Statement to pro-cognitive light of Spectrasol s.r.o.

People living in modern society – both children and adults, sick and healthy – spend most of their time in buildings. Buildings are constructed according to valid hygienic standards. However, these standards are very low for the area of natural illumination - e.g. the standard for offices requires at least 2% of external illumination in half of the area (ČSN EN 17037/2019). This issue significantly reduces the contrast between the natural light signal during the day and night. The reduction in light contrast is further enhanced by artificial lighting in the evening and at night.

The alternation of light and darkness is a very important signal in evolution terms. Circadian rhythms have developed as adaptation to this cycle. To this day, light is the main synchronizer of biological rhythms. Hence disrupting or diminishing light synchronization can lead to various circadian dysregulations, often associated with somatic and mental illnesses.

It is well known that the lack of bright light (e.g, in winter) is associated with a higher incidence of depressive states. Seasonal mood swings are most pronounced in seasonal affective disorder. However, a breakthrough study in 2013 showed that there is also a clear link between the intensity of sunlight and the prevalence of attention deficit hyperactivity disorder, which is one of the most common psychiatric disorders in children (Arns et al., 2013).

Light treatment (phototherapy) is used in seasonal affective disorder or circadian rhythm disorders (advanced or delayed sleep phases), as supportive treatment of non-seasonal affective disorders (Penders et al., 2016), in post-partum depression (Swanson et al., 2018)), in the treatment of insomnia (Janků et al., 2019). It has been successfully used to influence fatigue in cancer patients (Johnson et al., 2018) and there are still many other areas where it could be beneficial, but relevant studies have not been performed, yet.

In a situation with insufficient natural daylight, it is advisable to replace it with artificial lighting as close to daylight as possible. Light sources of Spectrasol s.r.o. are very attractive in this respect because they have a unique light spectrum and shine with a high intensity. They are not perceived as unpleasant or dazzling due to good spatial distribution. They imitate bright sunlight almost perfectly. Moreover, these light sources do not generate very short wavelengths, which are associated with the risk of retinal damage. On the contrary, they contain other colours throughout the spectrum, including red, ensuring quality colour perception. Recent study at Grammar School Na Pražačce showed positive influence of pro-cognitive lighting of Spectrasol s.r.o. on the cognitive performance of pupils, especially in the winter. There was no typical decline in performance compared to test results at a control grammar school. The results of

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mathematics at the Grammar School Na Pražačce improved compared to the previous year and the total number of late arrivals decreased (Maierová and Kytka, 2020). We are convinced that this kind of lighting is beneficial not only for schools, but also for other areas associated with a lack of natural daylight, i.e. medical and social facilities, laboratories, office and production areas, etc.

National Institute of Mental Health cooperates with Spectrasol s.r.o. in several application areas and intends to put on a a joint grant project focused on the use of procognitive or biodynamic lighting in the field of mental health.

On behalf of the research team

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