

# ABOUT BRAINLIT

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PATENTED LIGHT SYSTEMS FOR  
HEALTH & WELL-BEING





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# BRAINLIT

## INTRODUCTION

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BrainLit is a health-tech company that focuses on light system solutions to improve well-being, health and performance. The company was founded in Lund in 2012 by Tord Wingren, one of the inventors of Bluetooth technology. Together with a dedicated team, BioCentric Lighting™ (BCL), developed a lighting system focusing on human health and well-being. BioCentric Lighting™ mimics natural daylight indoors, which forms the basis of BrainLit's product families.

The patent portfolio has since grown and the company today sells a number of different lighting systems that are adapted to the needs of individuals and organizations. Among these is BrainLit Alven, a stand-alone solution launched during the pandemic in 2020 which is ideal for both offices and home workplaces. The following year, BrainLit launched BrainLit UVen, a unique system that uses UV-C lighting to quickly, safely and automatically disinfect both air and surfaces to create safer environments. BrainLit is headquartered in Lund and operates globally with subsidiaries and through partners.

# BIOCENTRIC LIGHTING™

BrainLit is best known for BioCentric Lighting™, a patented technology that delivers imitated daylight indoors to help you maintain your natural circadian rhythm.

There is good documentation to prove the positive impact of light on health, well-being and productivity of those who work, study or stay in premises with BioCentric Lighting™.

The unique properties of BioCentric Lighting™ are developed based on the very latest research. The system consists of sensors, LED luminaires, IOT controls, AI, cloud data solutions and BCL Light Recipes and relies on a number of patent families. BrainLit's long-term goal is to improve individual well-being – based on each individual's conditions and light preferences – by making BioCentric Lighting™ accessible in the environments in which we humans spend most of our time.

Humans experience and are influenced by light in several different ways: light illuminates environments to help us navigate, light has a strong influence on our biological functions and light also affects our state of mind. BioCentric Lighting™ considers all of these areas, which most modern lighting systems do not. A key added value of BioCentric Lighting™ is the energy savings obtained with LED technology and smart algorithms for control and dimming.

Nearly 50% of our protein-coding genes follow the circadian rhythm<sup>1,2</sup>, which means that light is of fundamental importance to our health and survival. On average, we spend 21 of 24 hours of the day indoors<sup>3</sup>, usually in a low-quality lighting environment<sup>4</sup> which over time can negatively affect our health<sup>5</sup>. This societal problem was the reason for BrainLit's patent for BioCentric Lighting™. BioCentric Lighting™ is an advanced, connected and self-learning system built on symbiotic intelligence i.e. the combination of humans, machines, algorithms and AI. Variations in color temperature and light intensity correspond to the changes in daylight over the course of day and stimulates the circadian rhythm which in turn contributes to improved well-being and better health.

1). R. Zhang et al. A circadian gene expression atlas in mammals: implications for biology and medicine. Proc Natl Acad Sci U S A 111, 16219-16224 (2014).

2). M. D. Ruben et al. A database of tissue-specific rhythmically expressed human genes has potential applications in circadian medicine. Sci Transl Med 10 (2018).

3). N.E. Klepeis et al. The national human activity pattern survey (NHAPS): a resource for assessing exposure to environmental pollutants. J Expo Anal Environ Epidemiol 11(3):231-52 (2001).

4). Center for Environmental Therapeutics. Consensus recommendations for optimum indoor lighting. <https://cet.org/consensus-recommendations-for-optimum-indoor-lighting/>. Access date 2021-10-20.

5). O. Osibona et al. Lighting in the Home and Health: A Systematic Review. Int J Environ Res Public Health 18(2), 609 (2021).

# VALIDATED BY SCIENCE

BCL is fundamentally designed from the deep understanding of the circadian system in human beings by our scientific board, with professors in medicine, environmental psychology, psychiatry and physics as prominent members. Each member is in place to ensure that BrainLit continues to reflect the latest research and understanding of human physiology.



**Klas Sjöberg**  
**Chairman of the Scientific Board**  
PhD. Consultant and Associate Professor at the Gastro Clinic at Skåne University Hospital.



**Thorbjörn Laike**  
**Member of the Scientific Board**  
PhD. Professor of Environmental Psychology at the Department of Architecture and Built Environment, Lund University.



**Lennart Minthon**  
**Member of the Scientific Board**  
PhD. Professor at Lund University, MultiPark: Multidisciplinary research on Alzheimer's disease. Founder of Minneskliniken. Co-founder of companies focussing on dementia care.



**Lars Samuelson**  
**Member of the Scientific Board**  
PhD. Professor of Semiconductor Electronics at Lund University. Awarded the "Einstein Professorship" by the Chinese Academy of Sciences. Appointed Fellow of the American Physical Society.



**Madeleine Selvander**  
**Member of the Scientific Board**  
PhD. Ophthalmologist. Former senior consultant at Skåne University Hospital. Head of private ophthalmology clinic Sundets Ögonläkare.



**Tord Wingren**  
**Founder, Innovations, Strategy & Partnerships**  
More than 30 years' experience within IT and communication industry. Pioneered Bluetooth by writing its first specification. Innovator and patent initiator of BrainLit's basic patents. M.Sc Electrical Engineering.

## MADELEINE SELVANDER

- We investigate scientific research that may become relevant for BrainLit and discuss new ways to implement scientific findings.



Science never sleeps, research goes on all day, every day. Thus a science based company like BrainLit must always keep up with the latest scientific findings, or risk becoming obsolete. For this reason, since the company was founded, it has developed its product around the advice provided by its scientific advisory board, tasked with keeping management updated and finding new ways to implement the technology.

Madeleine Selvander is one of the members of the scientific advisory board. As an ophthalmologist and former eye surgeon, she literally knows the workings of the human eye from the inside out. Not to mention how it is affected by light and what impact this in turn has on the rest of our biology.

- BrainLit's technology is based on two different aspects of science. On the one hand, the technological base of LED lights, optics and nano technology to produce short wavelength light and recreate daylight conditions indoors. On the other hand, how our bodies react to the light gathered in our eyes, and our ability to analyse this, explains Madeleine Selvander.

Less than 20 years ago a new kind of photoreceptor cell was discovered in the human eye. The ipRGCs cell is a special type of ganglion cell found in a deeper level of the retina than the rods and cones. This type of cell reacts to blue wavelength light, around 480 nm, and control our circadian rhythm.

### Adapting to individual chronotypes

- Indoor luminaires, for example lightbulbs, halogen lights and fluorescents, produce very little light with these wavelengths. When we lack this stimulus, we lose our sense of day or night. A day and a night equals 24 hours, but most people have a circadian rhythm slightly longer than 24 hours, so we need the light to set our rhythm or it will start lagging. For office workers, this means that they become evening persons, but still have to get up early in the morning and suffer from sleep deprivation, says Madeleine Selvander.

- We investigate scientific research that may become relevant for BrainLit and discuss new ways to implement scientific findings. This is the foundation of BrainLit's technological vision; providing indoor light with the quality of natural outdoors light and thus resetting our circadian rhythms instead of letting workplace conditions gradually wear us down. For Madeleine Selvander, who is not only an ophthalmologist but also has an engineering background, her first contact with BrainLit seemed determined by fate.

- I met Peter K Andersson, who was then the CEO of BrainLit, and he mentioned something about light and how it affects us. To be honest, I was very skeptical, but also intrigued and curious. If I was unaware of this, the same had to be true for many others as well. So I became persistent in telling them they needed help from someone younger - and maybe from a woman, she laughs.

Today, she is one of the experts of the scientific advisory board. Klas Sjöberg, chief physician of gastroenterology at the world renowned University of Lund is the chairman and summons the board every six weeks. The other members are Thorbjörn Laike, professor of environmental psychology, Lennart Minthon, professor of clinical memory research, Lars Samuelsson, professor of semiconductor electronics and Tord Wingren, the founder of BrainLit, who contributes in all areas from his unique perspective and vision.

### Aligning research and technology

- We investigate scientific research that may become relevant for BrainLit and discuss new ways to implement scientific findings. Often BrainLit has technological solutions that may be used in research, but no one has yet done that research. For instance, BrainLit has the patent and the technological solution for personalized light conditions, but the research on how personalized light differs from standard light is currently quite limited. This is mostly due to the problem of the individual variations and the challenge to get accurate data of the actual light they are exposed to, says Madeleine Selvander

Sometimes the technology is ahead of the science. In this case the scientific advisory board acknowledge the possibility to accelerate research by offering researchers the use of BrainLit's technology to get more accurate data. But despite the wide areas of expertise gathered in the board, there are still subjects that need further exploration.

- We will invite experts in chronobiology and how our biology is affected by the circadian rhythm and BioCentric Lighting. Together, we have a more than basic understanding of the functions, but to have access to truly deep knowledge of this intricate relationship... That would be so interesting! Madeleine Selvander concludes.

# OUR SOLUTIONS



BRAINLIT  
ELVEN

## BRAINLIT ELVEN – LIGHT FOR EVERY ENVIRONMENT

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BrainLit Elven is our system for fixed installations. The system promotes human well-being with BioCentric Lighting™ in all types of professional environments. BrainLit Elven is flexible and scalable, making it easy to use. BrainLit Elven consists of our control system, several sensors, and a versatile luminaire portfolio.



BRAINLIT  
ALVEN

## BRAINLIT ALVEN – LIGHT THAT IS YOURS

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BrainLit Alven™ is the world's first connected, dynamic, free-standing BioCentric Lighting system that delivers a dynamic and personalized lighting environment to one or multiple users. With the BrainLit app, users can adjust the light and save light settings for future use. For organizations there is also a web-based interface for lighting control and administration. BrainLit Alven features the same simple use as with BrainLit Elven and the same intricate interaction with LED luminaires, sensors, IOT controls, AI and cloud data solutions.





BRAINLIT  
:U V E N

## BRAINLIT UVEN - LIGHT FOR SAFER ENVIRONMENTS

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BrainLit UVen is a unique system that uses UV-C lighting to quickly, safely and automatically disinfect both air and surfaces to create a safe and healthy environment for customers and staff. Unoccupied areas are exposed to UV-C light for disinfection. An advanced safety system using radar and infrared sensors identifies that the area is unoccupied. BrainLit UVen then automatically engages a disinfection sequence to eliminate any pathogens from both the air and surfaces. The room will then be disinfected for the next person entering. If someone enters the space during disinfection the presence detection is triggered, and it simply switches from UV-C lighting to regular lighting.

BrainLit UVen is available to order in CE certified markets and is already installed with customers. Application areas mainly include toilets and changing rooms.

# OUR SEGMENTS

## OFFICE

Traditional office lighting does not support our physiological needs. Lighting in office environments has traditionally focused on ergonomics and visual function, but light is not only for vision. The importance of office lighting is crucial for employee well-being, productivity and comfort. Studies among office workers have shown that those who receive light that stimulates the circadian system, especially during the first half of the working day, have an increased sleep quality and reduced sleep onset latency. BrainLit UVen can be integrated into toilets and other public areas, ensuring a safer working environment.



## EDUCATION

BioCentric Lighting is adapted to suit the needs of children and young adults as well as teachers and other staff to ensure a comfortable environment. During the darker months of the year when exposure to daylight is limited, access to high-quality indoor lighting is crucial for well-being. BioCentric Lighting can help promote learning, enhance performance and improve sleep.



## HEALTHCARE

In healthcare, patients are usually indoors 24 hours a day, which can have negative effects on sleep. A good night's sleep is vital for recovery and well-being. It is well known that sleep quality among patients in hospitals is affected by factors such as discomfort, anxiety, noise, inappropriate light exposure, pain, etc. BrainLit's BioCentric Lighting can be used to synchronize the circadian rhythm amongst patients and staff through fixed installations or through stand-alone luminaires.



## SPORTS

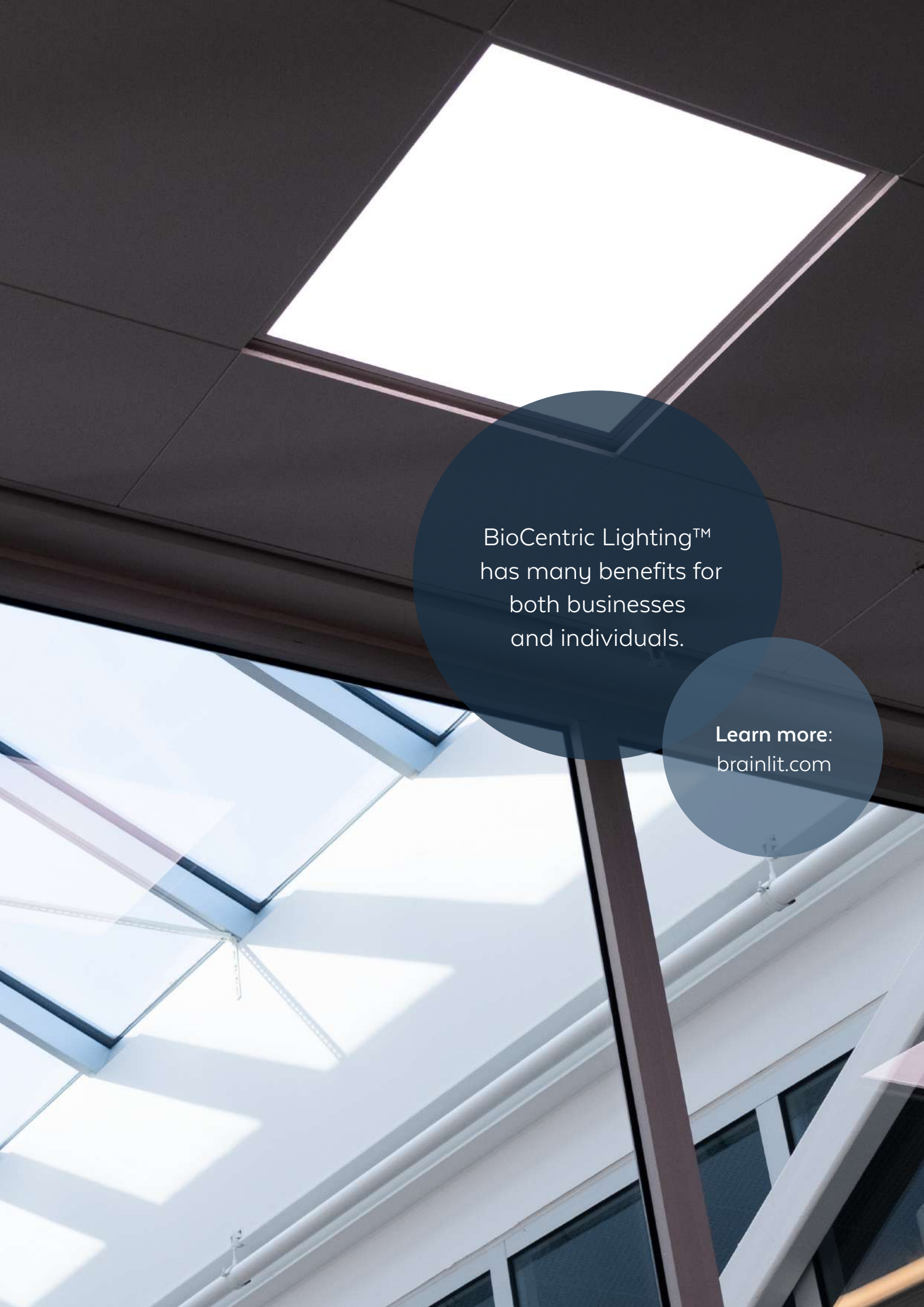
Different individuals have different chronotypes where the most known types are evening or morning people. For athletes, this is especially true as the circadian rhythm affects performance. Light can therefore be used to modulate the rhythm. Studies have shown major differences in performance depending on time of day. BioCentric Lighting can be adapted to different chronotypes and can be used in different sports to improve performance. In shared changing rooms, BrainLit UVen can be used to disinfect surfaces and help increase safety.



## HOSPITALITY

Lighting plays a key role in creating comfortable and natural environments. BioCentric Lighting is ideal for use in meeting rooms such as conference rooms, public areas, reception areas, etc. Different light settings can be used during the day depending on the activity. For example, light recipes such as "Relax" can be used in lounge environments to help guests unwind.





BioCentric Lighting™  
has many benefits for  
both businesses  
and individuals.

**Learn more:**  
[brainlit.com](http://brainlit.com)



# OUR CUSTOMERS

At BrainLit, we are constantly working to build meaningful relationships with our customers. In the Nordic region, Swedbank, Castellum, EY and Sony have chosen BrainLit's BioCentric Lighting. Customized solutions for healthcare environments are delivered with our partner Arjo. BrainLit UVen is available to order in CE certified markets and is already installed with customers. If you are considering a new lighting solution for your workplace or if you have a personal interest in the effect of light on our health, our customer testimonials can provide a deeper insight into areas of application. Read more about our customers and installations on our website [www.brainlit.com](http://www.brainlit.com).





# CRUNCHFISH

FROM THE USER'S PERSPECTIVE

At BrainLit, we are constantly working to build meaningful relationships with our customers. We value providing resources so that everyone can get an idea of the benefits behind BioCentric Lighting™ and how it can be applied to different segments. Whether you are thinking about getting a BCL system installed in your place of work or you have a personal interest in our solution, our Stories can give you an insight in our business and customers. Immerse yourself in the history of BrainLit or read more about our installations.



– Now, our office space is like one big dynamic light shower. We are all much more alert and feel better.

Joachim Samuelsson, Crunchfish

–Working at Crunchfish is intense right now. I sleep less than normal as there is so much to do. BioCentric Lighting keeps me alert during the workdays, and in the evenings, it helps me to quickly fall asleep. Then I wake up feeling rested, ready to take on another day. Those focused morning hours keep me ahead of the game, Joachim Samuelsson the CEO explains.

The Crunchfish office is situated in the thriving old harbor area of Malmö, in the Media Evolution City building, a modern co-working space established in 2012 in an old factory building. The 1,100 square meter office is branded The Penthouse and spans the entire 4th floor. Crunchfish sublets parts of the space to five other tenants.

One third of the area is occupied by Crunchfish itself. This has been fully equipped with BioCentric Lighting, but it is also one of the first installations to utilize the personal settings of the new BrainLit Alven. The BioCentric Lighting system is also installed in the open shared area and in the office of Pej, one of the other tenants at The Penthouse, where Joachim Samuelsson was an early investor and serves as a member of the board.

– Our landlord Wihlborgs paid for the installation and charges for it as part of our rental agreement. That is a great deal for everyone. We enjoy better Health as a Service without making a capital investment, and Wihlborgs raises the value of the office space. That is the preferred way for us as we will not take the installation with us if we move, Joachim Samuelsson says.

## A healthier work environment

–You would previously feel your mind starting to slack during the afternoon, Samuelsson says. You kept looking at your watch and wondering when it was time to go home. Since we installed BioCentric Lighting, that doesn't happen anymore. Now, our office space is like one big dynamic light shower. We are all much more alert and feel better. The slightly increased monthly rent is well worth being more efficient and healthier.



Learn more  
[www.brainlit.com](http://www.brainlit.com)



IMPROVING LIFE WITH BIOCENTRIC LIGHTING™



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