Slide 1 · Sleep and Migraine:
How do they influence each other - and why?

Good afternoon and a warm welcome to today's IFA Lunch & Learn.

My name is Colette Andrée; I am a chemist, pharmacist and neuroscientist, and I lead MIGRAINE ACTION, Switzerland's national information, counselling and research organisation for headache and migraine.

I would like to take you into a topic that affects every one of us: sleep.

For people with migraine, however, sleep is far more than simple recovery. It is part of a sensitive neurological system that helps determine how resilient we are the next day and how likely a migraine attack is to occur.

Today, however, this is **not about giving people with migraine a list of sleep rules. It is about understanding the interaction and deriving realistic options for action** - for people with migraine themselves, but also for workplace health management.

We will take a brief look at the brain, discuss serotonin and melatonin, and then apply these insights to everyday working life.

Before we begin with the science, let us consider a familiar statement that many people with migraine will recognise.

Slide 2 · One night. Two possible working days.

You will probably recognise the sentence: 'I slept for eight hours - and still do not feel rested.' It shows why **sleep duration alone tells us very little.** Eight hours in bed do not automatically mean eight hours of restorative sleep. **Sleep quality, timing, regularity and whether sleep was frequently interrupted also matter.**

The illustration shows two possible versions of the same working day:

one marked by exhaustion and sensory overload,

and one with greater stability and reserve.

What would your answer be: **Which costs more performance the following morning**

- a short night or an emerging migraine attack?

The scientifically honest answer is:

The two often cannot be separated neatly. Unusual tiredness, yawning, slower thinking or a strong need for rest may already be **part of the premonitory phase of a migraine attack.** Poor sleep may then be **judged to be the cause**, even though the attack has **already begun biologically.**

This distinction matters because it prevents blame. People with migraine have not automatically 'slept incorrectly'.

Our aim is to recognise **recurring patterns** and stabilise **modifiable factors** without turning every poor night into a problem.

Before looking at migraine in more detail, I would like to place **tiredness in the context of the modern workplace.**

Slide 3 · A tired workforce: German trend, Swiss relevance

Before discussing migraine, **it is worth looking at the workforce as a whole.**

A recent German Health Report compared surveys of employees aged 35 to 65.

The **proportion reporting sleep problems** rose from 47.5 to 78.9 per cent between 2009 and 2016. Medical treatment for sleep problems and the use of sleep medication also increased.

These German figures must not be presented as Swiss prevalence data, but the message is readily transferable:

Non-restorative sleep and tiredness are not rare private side issues; they affect performance, safety, health and absence from work. For Switzerland, a recent report describes **sleep or sleep-wake disorders** in at least one in three people; at the same time, these disorders often remain undiagnosed or inadequately treated.

Two points are therefore **important for organisations**.

First, tiredness can have many causes - from working hours and stress to a medical sleep disorder or an emerging migraine attack.

Second, asking 'Have you had enough sleep?' is not sufficient. Recovery, rhythm, strain and possible illness are what matter.

I would therefore like to ask you briefly: Where do you encounter tiredness at work - mainly as an individual problem or as a consequence of working conditions?

Please keep this perspective in mind as we now consider why migraine is more than a headache and what happens in the brain and body during an attack.

Slide 4 · Migraine is a network event - not just a headache

Migraine is a neurological disease, not simply a particularly severe headache.

An attack **involves several phases and different functional systems.** The pain is often pulsating, usually very intense, frequently one-sided and aggravated by normal physical activity.

At the same time, light, sounds and smells may become almost unbearable. Nausea, vomiting and pronounced exhaustion are also possible.

The cognitive changes are **particularly relevant to everyday work.**

People with migraine report slower thinking, word-finding difficulties, problems with reading and reduced concentration.

These impairments **may begin before the actual pain** and continue after it has subsided.

An attack may therefore last considerably longer than is visible from the outside. This explains why someone may return to work the day after an attack but not yet be fully able to perform.

Let us now consider: **why does an attack occur on one particular day - and not on another?**

Slide 5 · An attack rarely has just one 'trigger'

Many people search **for the one trigger**: was it the cheese, the weather, the stress or the poor night?

A more helpful model is the individual migraine threshold. Several factors can accumulate over hours or days. They include changes in sleep, an increase or decrease in stress, hormonal changes, irregular meals, insufficient fluid intake or intense sensory stimuli.

The important point is: not every factor carries the same weight for every person, and not every presumed trigger is truly causal.

Chocolate craving is one example. It may already be part of the premonitory phase. **If the attack begins later**, the chocolate may then be incorrectly labelled as the trigger. **The same can happen with tiredness and sleep.**

The threshold model is helpful **because it moves away from blame and opens up options for action.**

Sleep **is a modulating factor** - not a personal failing. Nor do I want to promote rigid trigger avoidance. Constantly trying to prevent every deviation can increase anxiety and restriction.

Robust routines, a realistic acute-treatment plan and migraine care in line with current medical standards **are more useful**.

And that brings us to the next question: what actually constitutes healthy sleep?

Slide 6 · Healthy sleep has four dimensions

Healthy sleep **can be described in four dimensions:**

duration, quality, timing and regularity.

Healthy adults are generally advised to obtain **at least seven hours of sleep.** This is a guide, not an individual prescription. Some people need a little more, others a little less.

The second dimension is **quality:** can we fall asleep within a reasonable time, avoid prolonged periods of wakefulness and wake feeling largely restored?

The third dimension is **timing.** Sleep is particularly effective when it is aligned with the internal biological clock. People who **regularly work against their own sleep phase** may feel unrefreshed despite obtaining enough hours.

The fourth dimension is **regularity.** A broadly stable rhythm is particularly helpful **for many people with migraine.** This does not require minute-by-minute perfection. A reliable wake time and manageable differences between working days and days off can already make a substantial difference.

Sleeping considerably longer at weekends may also coincide with an attack in some people. **This does not mean that sleeping in is forbidden.** The timing of caffeine, meals, daylight and activity often changes at the same time. We should therefore consider **the overall pattern** rather than holding one variable responsible.

The central message is: more sleep is not automatically better. What matters is whether sleep is sufficient, restorative and appropriately timed.

But why can we sometimes not fall asleep despite being tired? A useful model helps explain this.

Slide 7 · Two systems determine when we can sleep

In simplified terms, our sleep is regulated by two interacting systems.

The first is **sleep pressure.**

> It **rises** with every hour awake and **falls** during sleep. **Adenosine plays an important role.** Caffeine blocks adenosine receptors and can therefore temporarily weaken the signal of tiredness.

THE OTHER system is circadian regulation - **the 24-hour system.**

> The internal clock synchronises alertness, body temperature, hormone release and readiness for sleep. Its **strongest time cue is light** - especially morning light. Morning daylight can therefore help to stabilise the rhythm.

These two processes explain an apparent paradox: a person may be completely exhausted yet still be unable to fall asleep in the evening. **Sleep pressure is high, but the internal clock is still sending a wake signal.**

Conversely, someone may spend a long time in bed and still feel unrefreshed **when timing and sleep quality are unfavourable.**

Jet lag, shift work and large differences between the working week and the weekend pull the two systems apart.

This instability may be relevant for people with migraine. Nevertheless, it would be wrong to give every shift worker with migraine the same recommendation. The individual's response, the possibilities within the organisation and, where appropriate, occupational-health advice are what matter.

A practical approach is to maintain a reasonably reliable wake time, combined with morning daylight and a conscious caffeine strategy.

Changes should be introduced gradually.

Sleep pressure and the internal clock explain tiredness and timing.
And we will now look at **why stress can nevertheless keep the body in a wake mode**.

Slide 8 · Stress keeps the body and brain in wake mode

Stress is not inherently harmful. **It is a useful alarm response through which the body and brain increase attention, energy and readiness to act.** Adrenaline and noradrenaline temporarily accelerate heart rate and responsiveness. **This helps us meet demands.**

This slide shows **the sequence from an alarm signal through wake mode to more fragile sleep.**

If activation does not settle sufficiently after an intense day, inner tension, cortisol activity and rumination may remain present for longer. **Sleep onset can be delayed; sleep becomes lighter, more fragmented and less restorative.**

The illustration on the right makes this state visible: the body is in bed, but the brain remains in work and in alarm mode.

The distinction is important: not all stress is harmful, and an intense working day does not automatically cause a poor night. The critical factor is insufficient or unreliable recovery - **particularly in people with high sleep reactivity.**

For many people, this means: after a period of strain, a deliberate transition is needed - not a perfect evening routine.

In addition to the stress systems, two signalling molecules also connect the regulation of sleep and migraine: **serotonin and melatonin.**

Slide 9 · Serotonin and melatonin link rhythm and pain

Serotonin and melatonin are often presented in greatly simplified terms:

Serotonin as the happiness hormone and melatonin as the sleep hormone. Biologically, both systems are much more complex.

Tryptophan is **converted to serotonin through several steps.** In the pineal gland, melatonin can be produced from serotonin. **This process is regulated by light information and the central internal clock in the hypothalamus.**

Serotonin, also known as 5-hydroxytryptamine or 5-HT, **contributes to alertness and the regulation of REM sleep** and, at the same time, **modulates pain signals** in brainstem and trigeminal networks.

Its effect, however, depends on the receptor involved, the brain region and the timing.

The statement 'migraine is caused by a serotonin deficiency' is therefore scientifically too simplistic.

Triptans nevertheless show how important serotonin is in migraine treatment. Triptans as acute migraine treatment they do not generally raise serotonin levels. Instead, they mimic serotonin and act at specific 5-HT receptors and this **inhibits trigeminovascular signalling pathways** during a migraine attack.

Melatonin is primarily a signal of biological darkness. It helps the body recognise the night phase and promotes readiness for sleep. **It is not a simple off switch.** Migraine-prevention trials have reported positive findings, including with 3 mg immediate-release melatonin, but also negative results with other doses and formulations. **The evidence is not sufficiently clear for melatonin to be a standard solution for every person with migraine.**

Important for practice to keep in mind : **Endogenous melatonin** and **a supplement** are not the same. Dose, timing, product quality, interactions and individual health conditions must be considered. Supplement use should therefore be discussed with a doctor or pharmacist.

With this biological background, we can now LOOK AT the cycle of **stress, sleep and migraine.**

Slide 10 · Stress, sleep and migraine reinforce one another

- **Stress activates** alertness and stress systems.
- **Cortisol, autonomic activation , tension and rumination** can delay sleep onset, fragment sleep and reduce recovery.

But people respond very differently. **The term sleep reactivity describes how strongly a person's sleep responds to strain.**

Disrupted sleep can, in turn, reduce the available reserve. Sensory processing, stress regulation and pain modulation change. The migraine threshold may fall in people with migraine.

This does not mean that every stressful day or poor night must trigger an attack. It means that several factors may interact during a vulnerable phase.

A migraine attack creates further stress in turn: through pain and sensory sensitivity, **but also through** performance pressure, uncertainty, cancelled commitments or work that must be caught up later.

Worry about the next attack can additionally promote wakefulness at night. This creates **a cycle in which stress, disrupted sleep and migraine reinforce one another.**

The cycle can, however, be influenced.

Intervention points include effective migraine treatment, targeted treatment of insomnia or other sleep disorders, stress regulation and appropriate working conditions.

The practical question is not: who is to blame? It is: where can we interrupt the cycle with a realistic measure?

A particularly common misinterpretation concerns **tiredness before a migraine attack.**

Slide 11 · Trigger or early symptom? Timing matters

On the left are possible triggers: shortened sleep, frequent awakenings or a clearly shifted rhythm.

On the right are possible early signs of an attack that has already begun: unusual tiredness, yawning and reduced concentration.

The symptoms may look similar but have a different biological meaning.

If a person becomes unusually tired in the evening, goes to bed early and wakes with migraine the next morning, they may think: 'Too much sleep triggered the attack.' **In fact, the early need for sleep may already have been part of the attack.**

How can we distinguish between the two?

Surely not from a single night.

A simple diary kept for two to four weeks is useful: noting : bedtime, wake time, perceived sleep quality, unusual tiredness, migraine symptoms and acute medication intake.

We then examine the sequence over time: What came first, and what followed within 24 hours?

The diary is not intended to create constant self-monitoring. It is enough to recognise recurring patterns. If recording increases anxiety or places an additional burden on sleep, it should be simplified or paused. Professional assessment is useful, particularly when attacks are frequent.

What does this dynamic look like **during a typical working day**?

Slide 12 · The workplace can break the cycle

Imagine a typical working day.

The person **gets up at seven** despite not feeling restored. **At nine**, bright light, screen work and perhaps the first meeting follow. **The lunch break is missed.** The attack begins in the afternoon. Because important tasks have been left unfinished, work continues in the evening. This shifts the next sleep phase - and the cycle begins again.

Where could we interrupt it?

There is more than one correct answer.

- **A slightly more flexible start may help.**
- **A genuine lunch break** can stabilise meals and recovery.
- **Glare and noise** can be reduced.

A clear migraine **attack plan** enables early action **instead of** working through symptoms for hours.

A **realistic cover arrangement** also prevents all the work from having to be caught up late in the evening.

Working through an attack - known as presenteeism - is particularly relevant to organisations.

A **short, early interruption may make better economic sense than several hours of impaired performance.**

Therefore having **a quiet and dark room at disposal at work is often very helpful for migraine sufferers.**

The supporting possibilities naturally depend also on the role. A nurse, a production employee and an office worker **have different degrees of flexibility**. We therefore need individual, job-specific solutions – and not a standard list.

To conclude, here are a few practical measures that people can try themselves.

Slide 13 · Individual measure: anchor sleep

The illustration on the right takes us from morning through the day and evening into the night.

The first individual measure is: anchor sleep.

A particularly effective anchor is a **reasonably consistent wake time. Morning daylight** supports the internal clock. Even a **short walk outdoors** can be more helpful than bright indoor light alone.

During the day, regular movement and reasonably predictable meals support stability. Caffeine should be used consciously: avoid constantly changing amounts and taking it too late in the day. Abruptly omitting caffeine at weekends may also promote headaches in sensitive people.

In the evening, the aim is not to ban every screen. A more useful approach is to reduce light and activation deliberately. Anyone who works intensively, has difficult conversations or constantly answers messages immediately before sleep remains physiologically activated. **A short transition can help.**

When someone lies awake for a long time at night, the bed should not become a place for rumination and work. After prolonged wakefulness, it may help to get up briefly, do something quiet in dim light and return only when sleepy again. For a clinical sleep disorder, **cognitive behavioural therapy for insomnia** is evidence-based and goes far beyond sleep hygiene.

But please do not **select seven changes at once**. One or two measures observed over two weeks are more informative and more realistic.

And to finish, I will **summarise** the three most important ideas.

Slide 14 · What still matters tomorrow

First: sleep and migraine influence each other.

Poor sleep can reduce the individual's reserve; at the same time, tiredness and changes in sleep may already be part of an emerging attack.

Second:

Regularity and recovery matter more than perfection. The aim is not a flawless sleep plan or the prevention of every deviation. A few robust anchors are useful - for example, a reliable wake time, morning light, regular breaks and a well-prepared acute-treatment plan.

Third:

Working conditions can break the cycle. **Light, working hours, breaks, autonomy, communication and a culture of trust** can all be influenced**.**

Small adjustments can improve work participation and self-efficacy.

The most important limitation is:

Good sleep is not a promise of a cure for migraine. Migraine remains a neurological disease that needs correct diagnosis and individual treatment.

Sleep disorders such as insomnia or sleep apnoea should also be recognised and treated.

This also **closes the visual circle back** to the opening slide: the interplay between the brain, the night and a new morning represents the central message.

When people with migraine, healthcare professionals and employers work together, there is less uncertainty, earlier scope for action and better participation in working life.

This brings me to the end of the talk, and I look forward to your questions.

Scientific literature

Selection of key references used in the presentation and manuscript.

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