Tidbits of Science

Fish casings for flawless skin?

How fish casings could play a role in future skincare products

There are some pretty weird ingredients in cosmetics and skincare products. One example is snail mucin, which is used for its moisturizing and antioxidant properties. But researchers reporting in the journal ACS Omega may have found something even stranger to smear on your face: molecules made by fish gut bacteria. In cultured cells, the compounds showed skin-lightening and wrinkle-preventing properties, making them potential ingredients for your future skincare routine.

Even though fish intestines seem to be the absolute last place to look for cosmetic active ingredients, the idea is not completely far-fetched. Many important drugs have been found in bizarre places – the antibiotic properties of penicillin were famously discovered after a failed experiment went moldy. More recently, the brain cancer drug marizomib has been extracted from microbes found in marine sediments on the seabed. Two potentially untapped sources of new compounds could be the gut microbes of red sea bream and black-headed sea bream, fish found in the western Pacific. Although these microbes were first identified in 1992 and 2016, respectively, there have been no studies on the compounds they make. Hyo-Jong Lee and Chung Sub Kim therefore wanted to find out whether these bacteria produce any metabolites that could have cosmetic benefits.

The team identified 22 molecules formed by the gut bacteria of red sea bream and black-headed sea bream. They then investigated the ability of each compound to inhibit the enzymes tyrosinase and collagenase in lab-grown mouse cells. (Tyrosinase is involved in melanin production, which causes hyperpigmentation in aging skin. Collagenase breaks down the structural protein collagen and thus causes wrinkles). Three molecules from the red sea bream bacterium inhibited both enzymes best without damaging the cells, making them promising anti-wrinkle and skin-lightening agents for future cosmetic products.

[1] **Red sea bream**, Order Eupercaria, Family Sparidae Marine fish with regularly ossified skeleton. Body oblong, quite deep, with small head, of superior profile quite convex and short nose. Large eyes. Medium mouth; the front teeth of both jaws are curved and pointed. Silver gray, pinkish or reddish color and a black spot on the lateral line.

Stardust in the bathroom

EMPA[3] researchers and biotech start-up develop nanoceramics against skin diseases

Widespread skin diseases such as psoriasis or neurodermatitis are difficult to treat. Together with an industrial partner, EMPA researchers have found an innovative solution: nanoceramic stars create tiny skin wounds and allow nucleic acid molecules to reach their site of action.

When materials scientists look at the stars, they may be able to see the future – at least when it comes to stars made of nanoceramics. EMPA researchers in Dübendorf and Thun are developing innovative treatment methods for widespread skin diseases together with their industrial partner ALDENA Therapeutics. The team relies on nanoceramic stars that "go through the skin".

Channeling therapies into the skin

Modern active ingredients would not penetrate deep enough into the affected skin layers if they were applied to conventional ointments or lotions. However, if the skin could be made permeable in the short term, the large therapeutically effective molecules could be channeled to their destination. For example, siRNA molecules, short for "small interfering RNA", are used for new therapies. These molecules can contribute to the regulation of protein production through targeted interactions with the body's own messenger RNA (mRNA). This can interfere with disease processes and block damaging processes. Drugs with this principle of action already exist for some metabolic disorders and hereditary diseases.

Michael Stuer and Patrick Hoffmann (EMPA) therefore used nanoceramics made from alumina particles to create a three-dimensional, sharp-edged shape. After sintering, three-armed stars with a diameter of around 0.8 millimeters were formed, which can be used to temporarily open the skin barrier for the siRNA molecules. "The 3D stars with tapered arms cause micro-wounds in the skin that quickly close on their own," explains Michael Stuer. However, there is enough time for the active ingredient molecules to penetrate the skin.

Prick-free medication

But EMPA and its industrial partner ALDENA Therapeutics want to go even further: In a next step, Stuer wants to change the recipe so that the nanoceramic stars become biodegradable or decay into (star) dust after application. In the future, the current ceramic material could be bound to a biopolymer or replaced by a bioglass. This would significantly expand the area of application. "Patients could then simply wash off the therapy stars after application," says Stuer.

And finally, the area of application is not limited to skin diseases. For example, up to 30 percent of all children and young adults suffer from a phobia of injections. Administering a remedy by injection to those affected triggers great anxiety and even fainting. In everyday medical practice, this is a challenge for everyone involved. The nanoceramic stars could also be a good solution to supply these people with the necessary drugs or vaccines easily and without skin pricks, according to the EMPA researcher.

[3] Swiss Federal Laboratories for Materials Science and Technology

Ig Nobel Prize goes to Takanori Takebe for his study on "breathing with the butt"

Go ahead, make jokes – but seriously, this research could one day save lives.

On the one hand, Takanori Takebe (MD, PhD), would prefer to be remembered for his numerous groundbreaking contributions to organoid medicine. On the other hand, the expert from Cincinnati Children's and Tokyo Medical and Dental University may never be forgotten for his work showing that people can "breathe" through their butts.

Takebe's unusual finding about an alternative way to oxygenate the bloodstream made headlines when a successful animal model study was published on the cover of the journal "Med" in June 2021. Now he has received the ultimate biting scientific award: an Ig Nobel Prize[2].

Takebe is from Japan and has held academic positions in Tokyo and the United States. At Cincinnati Children's, Takebe is director of commercial innovation at the Center for Stem Cell and Organoid Research and Medicine (CuSTOM). In Japan, he is a professor at the Tokyo Medical and Dental University Research Institute.

A few years ago, he was also concerned about a strange, eel-like fish called loach. Sometimes this freshwater bottom dweller gets into water that contains too little oxygen. In this case, the fish supplements water respiration through its gills by sucking surface air directly into its intestines.

What if people could do something similar? Well, it seems quite possible.

"There are numerous health conditions, including shortness of breath in newborns, that can threaten life because the ability of the lungs to deliver oxygen to the bloodstream is disrupted. These include injuries or inflammation of the airways, pneumonia that fills the lungs with fluid, and so on. During the COVID pandemic, many patients suffered from the global shortage of ventilators and limited access to ECMO," says Takebe. "Enteral ventilation could be an important alternative for oxygen supply. Our initial studies show that our ventilation system is able to support patients with severe respiratory failure."

The concept of butt-breathing involves the administration of a liquid (perfluorocarbon) that can be loaded with much more oxygen than water normally contains. Administered through a rectal tube, the lower intestine can absorb oxygen from the fluid and direct it directly into the bloodstream – similar to an enema. Takebe and colleagues have shown that this method has helped rodents and pigs survive oxygen-deficient conditions that would otherwise have been fatal. More research is needed to evaluate and fine-tune the delivery system, especially for sick people in different situations.

[1] The **Ig Nobel Prize** (ig = ignoble) is a satirical award to honor achievements that *first make people laugh and then make them think*. The prize is awarded by the Cambridge-based journal Annals of Improbable Research.

Fighting pests with biodiversity instead of insecticides

Genotype mixing can increase yields of wheat and rice and reduce pesticide usage

Pesticides are not always needed: In an extensive field study, researchers at the University of Zurich have shown that biodiversity within a plant species can be used for pest control. This is because species with different genotypes work together to ward off the attacks of herbivorous insects.
Plants interact with the individuals they surround – just like humans. If, for example, people in the environment are susceptible to infections, one's own risk of infection increases. However, if they are resistant, it decreases. The same applies to plants: when different genetic types of the same species are planted together, certain combinations are more resistant to pests and diseases. This positive effect on biodiversity is called associative resistance.

Food security and biodiversity protection

One of the challenges of modern societies is to reconcile food security with environmental protection and biodiversity. Pests and diseases threaten harvests, which is why chemical pesticides are used in agriculture. However, pesticides can reduce the diversity of insect species. "This is where associative resistance as a cultivation method to secure food production and at the same time preserve biodiversity could help," says Kentaro Shimizu, Director of the Institute of Evolutionary Biology and Environmental Sciences at the University of Zurich (UZH).
But which combinations of plants with different genotypes – the individual genetic endowments – should be planted in mixed stands to ward off pests and diseases? For example, if you want to select two out of a total of 199 genotypes, there are 19,701 possible combinations. With the help of a physical model, UZH researchers have now developed a new method to predict possible interactions between individuals at the genetic level.

Extensive fieldwork on the Irchel campus

The researchers conducted large-scale experiments on the Irchel campus of UZH and in Japan over a period of two years. The genome sequences for the 199 genotypes of the plant Arabidopsis thaliana collected worldwide were already available. The researchers randomly mixed more than 30 individuals of each of the 199 genotypes and planted a total of 6,400 individuals. This immense data set, which was collected on the Irchel campus thanks to the university's research garden, was the key to this study," says UZH Professor Shimizu.
Until now, there have been no analytical methods to investigate the interactions at the level of the genome – the entire genetic information – between neighboring plant individuals. Dr. Sato's team therefore developed a new computer method: a genome-wide association study called "Neighbor GWAS". This is based on a model of physics used to analyze interactions between magnets. The team used it to analyze how pest infestation is influenced by the combination of juxtaposed individuals with different genotypes. At the same time, the researchers took into account the results of the field trials.

Pest reduction of up to 25 percent

The analysis showed that numerous genes are involved in interactions with surrounding individuals. Using machine learning, the plant scientists were able to use the model to predict the damage of herbivores and identify advantageous combinations of genotype pairs that have associated resistance.
Over the course of two years, another large-scale field trial was carried out and around 2,000 plant individuals were planted in pairs with those genotypes for which three levels of associative resistance were predicted. The results from the field trial showed that – compared to planting a single genotype – the mixture of two genotypes reduced damage caused by herbivores by 24.8 percent and 22.7 percent, respectively, at the highest and second-highest levels of associative resistance, respectively.

Future developments

"This study is a milestone in research into the interactions between plant individuals. It shows how important biodiversity is: Firstly, the genetic diversity of crops itself can reduce pest infestation. Secondly, fewer pesticides in agriculture contribute to preserving biodiversity, including insects," Kentaro Shimizu summarizes.
Meta-studies show that wheat and rice, for example, achieve between 4 and 16 percent higher yields when genotypes are randomly mixed. According to Shimizu, thanks to the genome information available for these crop species, the new method could optimize the selection of genotype mixtures by predicting associated resistance, thus increasing the yields of these agriculturally important plant species even further, while reducing pesticide use.

Cause of the "yo-yo effect" deciphered

Fat cells have a "memory" that is based on epigenetics.

Fat cells store memories of obesity in their cell nucleus. These memories remain even after a weight loss program, making it more likely for someone to put the weight back on. Researchers at ETH Zurich demonstrated this in mice and found evidence that similar mechanisms are also present in humans.

Anyone who has ever tried to get rid of a few extra kilos knows the frustration: the weight drops initially, only to be back within a matter of weeks – the yo-yo effect has struck. Researchers at ETH Zurich have now been able to show that this is all down to epigenetics.
Epigenetics is the part of genetics that's based not on the sequence of genetic building blocks but on small yet characteristic chemical markers on these building blocks. The sequence of building blocks has evolved over a long period of time; we all inherit them from our parents. Epigenetic markers, on the other hand, are more dynamic: environmental factors, our eating habits and the condition of our body – such as obesity – can change them over the course of our lifetime. But they can remain stable for many years, sometimes decades, and during this time, they play a key role in determining which genes are active in our cells and which are not. "Epigenetics tells a cell what kind of cell it is and what it should do," says Laura Hinte, a doctoral student in the group led by Ferdinand von Meyenn, Professor of Nutrition and Metabolic Epigenetics.

An epigenetic memory of obesity

The researchers looked for the molecular causes of the yo-yo effect in mice. They analyzed fat cells from overweight mice and those that had shed their excess weight through dieting. Their investigations revealed that obesity leads to characteristic epigenetic changes in the nucleus of fat cells. What's special about these changes is that they remain even after a diet. "The fat cells remember the overweight state and can return to this state more easily," von Meyenn says. The scientists were able to show that mice with these epigenetic markers regained weight more quickly when they again had access to a high-fat diet. "That means we've found a molecular basis for the yo-yo effect."

"Because of this memory effect it is so important to avoid being overweight in the first place"

Ferdinand von Meyenn

They also found evidence for this mechanism in humans. The ETH Zurich researchers analyzed fat tissue biopsies from formerly overweight people who had undergone stomach reduction or gastric bypass surgery. The tissue samples came from various studies carried out at Karolinska Instituted in Stockholm and at Hospitals in Leipzig, Dresden and Karlsruhe. In these samples, the researchers analyzed gene expression rather than epigenetic markers. However, the results are consistent with those of the mice.

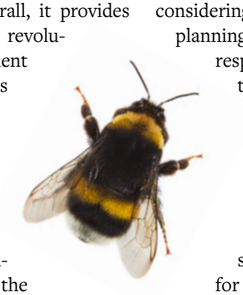
Prevention is the key

Something the researchers haven't investigated is how long fat cells can remember obesity. "Fat cells are long-lived cells. On average, they live for ten years before our body replaces them with new cells," Hinte says.
It's not currently possible to change the relevant epigenetic marks in the cell nucleus with drugs and thus erase the epigenetic memory. "Maybe that's something we'll be able to do in the future," Hinte says. "But for the time being, we have to live with this memory effect." Von Meyenn adds: "It's precisely because of this memory effect that it's so important to avoid being overweight in the first place. Because that's the simplest way to combat the yo-yo phenomenon." The researchers are directing this message primarily at children and young people and their parents.
With their work, the ETH researchers have shown for the first time that fat cells possess an epigenetic memory of obesity. However, they don't assume that fat cells are the only cells with such a memory. "Other body cells might also play a part in the yo-yo effect," von Meyenn says. It's quite conceivable that cells in the brain, blood vessels or other organs also remember obesity and contribute to the effect. Whether this is actually the case is what the researchers want to find out next.

A new era of allergy treatment

Scientists reveal the early molecular key to curing life-threatening allergies

In a groundbreaking clinical trial just published in Nature Communications, researchers have uncovered the early immune mechanisms behind the extraordinary success of insect venom immunotherapy. In the study, early molecular and cellular changes were detected as early as 8 hours immediately after the first administration of immunotherapy, changes that will pave the way for healing immune tolerance. Overall, it provides new insights that could revolutionize allergy management and improve outcomes for millions of people suffering from chronic immune disorders.



Allergic diseases are increasing rapidly worldwide and are becoming the most common chronic diseases mediated by the immune system, largely due to modern lifestyle factors and environmental influences. While allergen-specific immunotherapy (AIT) is the only available treatment that can potentially cure certain allergies, its effectiveness varies widely across different forms of allergies. Insect venom allergies – such as those caused by bee or wasp stings – are the exception, for which AIT offers clinical cure rates of over 90–95%.

By examining how the immune system develops long-term tolerance to insect venom, the clinical research study identified key molecular and cellular switches that occur in the early stages of treatment, giving hope for improvement in AIT in other allergic conditions where AIT is less successful, and contributing to the overall efforts to combat the worldwide allergy epidemic.

"This work is a breakthrough for allergy science," explained the study's first author, Prof. Sebastian Bode. "We have uncovered early immune responses, including the regulation of IL-6 – a molecule normally associated with inflammation – that could play a completely unexpected crucial role in restoring immune tolerance. These findings could drive the development of more effective treatments for other allergies."

The study included over 200 blood samples from patients recruited, treated and analyzed in depth at CHL by a team of allergy specialists. This is the most comprehensive and thorough data analysis ever performed on patients with insect bite allergy. This allergy affects around 2.6% to 4% of the population in Europe and globally, i.e. around 13 to 20 million people in the EU and the UK, who are at risk of an insect bite being fatal if they are not treated with an insecticide AIT.

In addition to its scientific contributions, the study also has practical implications. It shows the importance of considering circadian rhythms when planning clinical trials, as immune responses fluctuate throughout the day. The results have also led to the creation of an interactive immune data platform that is directly linked to the publication, allowing researchers worldwide to explore the results of the study and use them as a basis for further research.

"This is translational research at its finest," added Professor Jan Gutermuth from the Department of Dermatology at Vrije Universiteit Brussel. "Our work bridges clinical practice and cutting-edge science by using insect venom immunotherapy as a clinical model to unlock the secrets of immune tolerance. The potential to change the treatment of allergies is immense."

"The findings are expected to have far-reaching implications, not only for improving allergy treatments, but also for understanding immune tolerance in other chronic diseases. By deciphering the 'molecular magic' of insect venom immunotherapy, researchers are one step closer to tackling the global allergy epidemic and advancing personalized medicine," concluded Professor Markus Ollert, lead author of the paper and director of the LIH Department of Infection and Immunity.

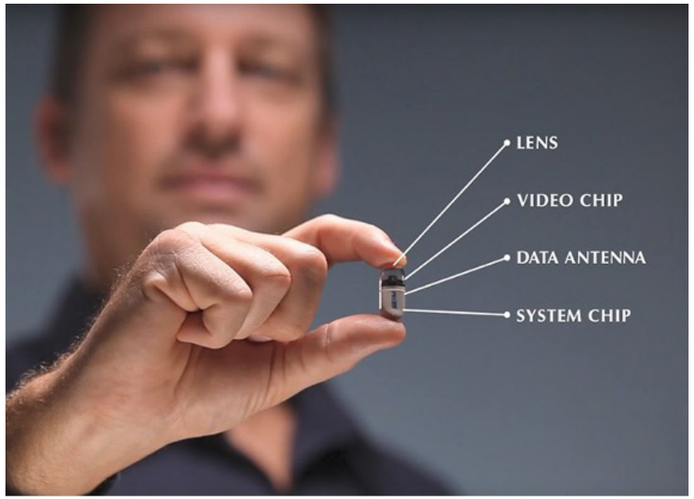
How the latest sensors analyze body fluids

A new generation of wearable sensors will fundamentally change medicine.

The next generation of wearables will also be able to measure biochemical data from body fluids. Continuous, minimally invasive and non-invasive measurement of certain biomarkers is possible in almost every phase of life, regardless of location. ETH Zurich researchers have shown what particular points need to be taken into account to ensure that such devices can be used successfully in the future.

Using a smartwatch to measure pulse, and a smartphone app to monitor blood pressure: wearable sensors already track some of the body's vital functions fairly reliably, and some of these devices can already be used in clinical diagnostics. However, diagnoses based on biochemical data still require samples of body fluids such as blood and urine, which have to be sent to the lab for analysis. Collecting these can be painful and complicated as well as time-consuming and often costly.

But the next generation of wearable sensors is set to provide biochemical analyses as well. In the future, such sensors will gather valuable insights into their wearer's state of health by analyzing body fluids such as sweat, breath, saliva, tears and urine. Although many of these advances are not yet ready for the market, they are certainly feasible. This is what led Dr. Noé Brasier, Early-Career Fellow at the Collegium Helveticum, and ETH Professor Jörg Goldhahn to join forces with leading researchers in the field of wearable sensors and conduct a comprehensive review. Their overview was recently published in the journal Nature.



From infants to senior citizens

The advantages of wearable sensors are obvious: they allow continuous monitoring of health variables without patients having to visit a doctor's surgery or pharmacy. "For elderly people who suffer from heat stress, it would make life a lot easier if a wearable device could remind them in good time to drink enough, or if a sensor could sound an alarm when their electrolytes reach a critical level," says Brasier, himself a physician and the paper's lead author.

Moreover, such sensors are either non- or only minimally invasive. Brasier provides an example: "Attempts to take blood from babies and infants, not to mention to insert a catheter, aren't always successful. This can lead to significant delays and is often distressing for the young patients and their parents. It would be much easier and more convenient to have a sensor on the baby's skin or in their nappy perform the laboratory and/or urine analysis."

Equally, face masks that were additionally capable of detecting viruses such as SARS-CoV-2 without the need for an unpleasant nasal swab would have been welcome during the last pandemic.

A lot is possible – but does it make sense?

The researchers' creativity is impressive, as is the sheer variety of conceivable devices – ranging from a dummy that measures whether infants are dehydrated, to tattoos that indicate blood sugar levels and contact lenses that provide data from the wearer's tears. "When we discussed the possibilities with engineers, physicians and colleagues from other disciplines a year ago, we realized that we needed to think about what kinds of sensor make sense and what points ought to be given particular weight when developing such devices," says Goldhahn, the paper's senior author.

The key consideration is self-evident: the wearables must be something that patients want to wear. "That's why we recommend always developing the sensors together with the people who will need them later," Brasier says. But the medical benefits of such devices also need to be critically assessed. Not everything measured offers a clinical benefit. "It's not about measuring any old variable. It's a question of what that reading means in the relevant context and what the clinical consequences are," he says.

For example, CRP is a marker for inflammation in the body and is measured in milligrams per liter. In healthy adults, the CRP level is normally physiologically below 5 mg/l. "If a patient has a blood-CRP level of 150 mg/l, this only tells us so much. What's decisive for a clinical assessment is whether the value on the previous day was normal, or whether it was 300 mg/l. Then we can say whether the person's health has deteriorated or improved."

Display the readings well

Then there are the technical hurdles: How long can a sensor keep measuring? How can it be stored and cleaned? How much electricity does it consume, and from what source? And most importantly, how good and reliable is the data it provides? "Careful validation of the measurement data will be key to whether a given device becomes established or not," Goldhahn says, "because nobody is going to rely on uncertain readings."

In a further step, the signals from the wearables must be processed, interpreted and displayed in a way that makes sense to users – be they the patients themselves or healthcare professionals. In the future, that will increasingly be a job for artificial intelligence, which in turn will further accelerate the development of wearables.

Fascinated by sweat

It was sweat that led the lead author Brasier to become acquainted with wearables. While many people turn up their noses at the thought of this body fluid, Brasier can't speak of it highly enough: "Different situations will always cause us to sweat differently and on different parts of the body. But that's not the only reason why our sweat contains an incredible amount of information."

Using this information is a simple and straightforward way to draw conclusions about someone's state of health. "The surface of the skin is my clear favorite, but the choice of sensor naturally depends on the medical application. In the case of pneumonia, for instance, it's probably better to analyze the patient's breath," Brasier says. However, having prepared the new overview, he is well aware that there is a lot of research and development work still left to do – not least when it comes to clinical concepts. Only then will the new wearables ultimately be granted official approval and provide a benefit for everyone involved, especially patients.

The secret of barn dust

Findings open up new avenues for the treatment of sick children.

For small children, it acts like a protective elixir against asthma and other allergies from birth: the dust from the traditional cowshed. What exactly conveys this effect is of great interest to researchers. However, deciphering it in terms of allergy prevention is a lengthy process, but it has now taken another step forward: Researchers at the Dr. von Hauner Children's Hospital of the LMU Hospital have analyzed how cells of the immune system react to barn dust and thus contribute to the "protective farm effect". The results were recently published in the journal "Allergy".
The hygiene hypothesis is now established in science. Tenor: The child's immune system should be "trained", especially in the preschool years, through regular contact with certain "good" microorganisms. The immune system must learn not to react excessively and not to attack harmless substances or to attack the body's own structures.

Dust from the cowshed has a preventive effect

Researchers at the Dr. von Hauner Children's Hospital of the LMU Hospital Munich have shown that the frequent and continuous contact of young children with the farm environment, especially with the dust from the cowshed, has a preventive effect. Children growing up there, for example, get significantly less asthma than those who live in the city. Based on these findings from epidemiological studies, scientists are researching the basics of this phenomenon in their laboratories worldwide.
What changes in the immune system through stimulation with barn dust?
On the one hand, they want to know which specific substances or microorganisms trigger the protective effect. On the other hand, they are interested in what exactly changes in the immune system so that it does not attack the body's own or harmless structures, and a healthy balance of the immune system is established. In this sense, a team led by Prof. Dr. Bianca Schaub has now taken a big step forward. In a cell culture approach in the laboratory, they stimulated various immune cells of the blood with stable dust.

Study shows that barn dust affects the immune system of children already suffering from asthma

"We were able to show that in children with manifest asthma, certain cells of the innate immune system are reduced after stimulation with farm dust," says study first author Claudia Beerweiler, "whereas subgroups of cells of the acquired immune system are increased, including B cells and certain T helper cell populations. In addition, certain molecules associated with inflammation, cell toxicity, antigen presentation, and special T helper cells are reduced. Cell toxicity is the ability of certain substances or microorganisms to damage or destroy cells. Antigen presentation is a central process in a defense reaction in which structures of microorganisms are made recognizable to certain immune cells.

Anti-inflammatory effect already proven in earlier studies

"We now know that the innate immune system plays a much greater role in the development of allergies, and also in their prevention, than we thought for decades," says Bianca Schaub. Previous work has already shown that protection by farm dust is mediated by an anti-inflammatory effect. In a recently published study with the participation of LMU researcher Prof. Dr. Erika von Mutius, it turned out that dusts from the cowshed contain transport proteins, so-called lipocalins. They modulate the function of the human immune system. Two of these substances are found in significantly increased levels in barn dust.

Findings open up new avenues for the treatment of sick children

So, one building block follows the other to reveal the secret of the barn dust. The researchers have a clear goal: to identify the beneficial substances and administer them to all those children who do not live on a farm – in which form is currently being explored. The target group of children that could be treated in this way also needs examining in detail. "The fact that stimulation with barn dust can modulate the immune reactions in the laboratory even in asthmatics with disease," says Bianca Schaub, "may also open up new avenues for the therapy of already symptomatic children."

How much energy does a quantum computer consume?

If you were to use a quantum computer to solve any simple problem right now, it would consume much more energy than a conventional computer, but quantum computers are not going to be used for that type of situation.

This question is difficult to answer because the technology is still under development. To give you an idea: Currently, only small quantum computers with many errors exist. We do not yet have a fault-tolerant quantum computer, i.e., a computer that performs operations that we can trust 100% and with which we can efficiently solve relevant problems.
Errors occur because quantum physics is very sensitive. Quantum states consist of a superposition of states (e.g., several different positions) and lose this superposition as soon as they interact with the environment, causing the information they contain to be lost. For this reason, the quantum systems we can control are small and must be kept at a very low temperature. The greatest energy consumption of quantum computers currently comes from cooling these systems to temperatures close to absolute zero (approx. -273 °C) and from the control systems used to stabilize the quantum states. However, performing the quantum operations themselves requires almost as much energy as a conventional computer.
Even under these conditions, quantum states remain unstable, so we need what is known as error correction. This error correction is achieved by adding additional qubits, which are the quantum mechanical equivalent of conventional arithmetic operations, so that some of these qubits are used to correct those intended for the calculation.
Once we have overcome this technological hurdle, we will be able to solve problems that a classical computer cannot solve, so it will no longer make sense to compare the energy consumption of one with that of the other. Regardless of how much energy it consumes, the quantum computer will be much more efficient in that it can solve problems that are impossible for a classical computer. If you now ask a quantum computer to solve a simple problem, it will consume much more than a conventional computer, but quantum computers will not be used for such problems. That would be like trying to light your living room with a spotlight from a football stadium.

Quantum computers are not yet efficient, but they will be in the future.

To illustrate: a laptop has a power output of around 60 watts. And the power output is proportional to the energy consumption. 60 watts is the typical power output of a light bulb. For quantum computers, it would be around 20 kilowatts, or 20.000 watts. This means that if I want to solve a problem and need an hour to do so, a laptop consumes 60 watt hours of energy, while a quantum computer would consume 20.000 watt hours. Furthermore, tests have shown that quantum computers take much longer to solve a simple problem than traditional computers because they have not yet been optimized. They are not yet efficient, but they will be in the future.
Another interesting point is that with a classic computer, computing power increases linearly with the number of processors, i.e., if you use twice as many processors, you have twice as much computing power. With a quantum computer, however, performance increases exponentially: with five qubits, you can process 25 states, but with ten qubits, you can already process 210. The difference is enormous.
We can say in advance that the energy consumption of quantum computers will no longer be a limitation once we have optimized quantum computers, i.e., fault-tolerant computers with more efficient cooling and control systems.