

Étrend-kiegészítők: miben bízhatunk?

A koronavírus terjedése során újra a figyelem középpontjába kerültek a különböző étrend-kiegészítő készítmények. Hogyan vizsgálja a laboratórium az étrend-kiegészítőket?

Az étrend-kiegészítő készítmények nem számítanak gyógyszernek, viszont sok esetben rendkívül hatékony összetevőket tartalmaznak az étrend-kiegészítőnek nevezett, illetve a különleges táplálkozási célra szánt készítmények. Ezek lehetnek különböző vitamintartalmú készítmények, a fitness-termekben használt teljesítményfokozók, izomtömeg- vagy éppen potencianövelő szerek is.

Az étrend-kiegészítők forgalma a járványhelyzetben megnőtt, az emberek egyre inkább keresik ezeket a termékeket, ugyanakkor a fogyasztókban számtalan kétely is megfogalmazódik. Ezek jelentős része indokolt, hiszen – különösen az interneten rendelt termékek esetében – gyakran nehezen ellenőrizhető, hogy az adott termék valóban azt tartalmazza-e, amit a készítmény jelölésén deklaráltak.

A hamis, esetenként az egészségre is veszélyes szerek visszaszorítása érdekében jött létre a Biztonságos Étrend-kiegészítő Program, amely a piacra kerülő termékek kockázatelemzésével garantálja, hogy a programhoz csatlakozó patikák polcaira már csak az ellenőrzött, jó minőségű szerek kerüljenek ki. A remek kezdeményezés mellett a hatóság (OGYÉI-OÉTI) felügyelete és ellenőrzése, valamint a független laboratóriumok vizsgálatai, adhatnak megnyugtató választ.

Mit vizsgálnak a laboratóriumban?

Az egyik legnagyobb hazai független vizsgálólaboratórium analitikai vizsgálatai során az ügyfelek megrendelése alapján a potencianövelő szereknél a tiltott hatóanyagokat kutatja, a többi étrend-kiegészítő készítménynél pedig elsősorban azt vizsgálja, hogy azok valóban tartalmazzák-e a címkén megjelölt értékes összetevőket. Ezen belül többek között megvizsgálja a termék energiatartalmát, a benne lévő szénhidrát, fehérje, cukor és zsír mennyiségét valamint a zsírsavösszetételt.

A vitaminkészítményeknél a hozzáadott vitamintartalmat határozzák meg, de természetesen elemzik az esetleges szennyező anyagokat (fémek, toxinok), és elvégzik a beérkező termékek mikrobiológiai vizsgálatát is.

Mindemellett ellenőrzik a doppingszer-mentességet is (A „mentesség” jelző alatt ilyen esetben a laboratóriumi kimutatási határ – LOD – alatti mennyiséget kell érteni. A szerk.). A vizsgálatok során e célból méri a tiltott, anabolikus hatású szerek, hormonok és metabolikus módosítók, stimulánsok, narkotikumok, β 2-agonisták és β -blokkolók csoportjába tartozó komponensek mennyiségét, kimutathatóságát. Az

összes olyan Magyarországon bevizsgált étrend-kiegészítő adatai, amelyekben a laboratóriumi vizsgálatok során nem mutatták ki a nemzetközi doppinglistán szereplő, 100 leggyakrabban előforduló tiltott anyagot, a Doppingmentes.hu honlapon található meg.

A tárolási vizsgálatok során hőkezeléssel gyorsított öregedésnek teszik ki a mintákat, így győződnek meg arról, hogy stabil a termék, és a hatóanyagok címkén feltüntetett mennyisége a minőség megőrzési idő végéig megmarad.

Vizsgálati tapasztalatok – mire célszerű ügyelni?

A laboratórium szakembereinek legfontosabb tapasztalatai több, mint 12 000 minta vizsgálata alapján:

Míg a vitaminok, az ásványi anyagokat tartalmazó készítmények, a sportitalok, a probiotikumok, illetve a tejsavófehérjék alacsonyabb, addig a különböző fogyasztószerek, az izomtömeg-növelő és a testépítőknek szánt szerek, valamint a potencianövelő szerek és a növényi kivonatok jóval magasabb kockázatú termékeknek számítanak.

- Fontos, hogy a vásárlók ezeknek a termékeknek az eredetét mindig ellenőrizzék, lehetőleg ne rendeljenek belőlük az interneten olyan gyártóktól, akik nem azonosíthatók, illetve nem rendelkeznek Magyarországon is elérhető képviseléssel.
- Ne vegyünk „pult alól” származó illegális terméket.
- Akár egyetlen hamisított tableta elfogyasztása is veszélyes lehet, ezért is lényeges rendszeresen vizsgálni ezeket a termékeket.
- Kizárólag felelős gyártóktól származó, a hatóság vagy a független laboratóriumok által ellenőrzött termékeket vásároljunk!

Laboratorium.hu news

Analysing disinfectants

As the corona virus started to spread, several cosmetics companies began to produce water-alcohol products. What are these solutions composed of, what guarantees their efficacy and how are they analysed?

The food processing industry most frequently uses chlorine- and iodine containing preparations, quaternary ammonium compounds, peroxy derivatives and ampholit soaps as disinfectants. Chlorine-containing preparations release chlorine gas and exert their impact in an oxidative way. Their major advantage is their fast and certain antimicrobial effect in all temperature ranges – said Tamás Vadasi, Head of the Food Security Division of WESSLING Hungary Kft's independent testing laboratory – also testing disinfectants – in an interview given to Laboratorium.hu.

Antiseptic solutions (water-alcohol products) with bactericide, fungicide and especially viricide effect have recently been in short supply, and it is not an incident that producers have started to market them in large quantities.

What exactly are these preparations made of and what makes them effective?

The main role in the solution is played by ethanol (alcohol), given its disinfectant and antiseptic qualities, because it can dissolve the lipids and precipitate the proteins. The water-alcohol gels or solutions contain ethanol up to a degree of 60% or 70% (volume percentage) or in a concentration between 520 and 630 mg/g. The amount is inversely proportional to the recommended exposure time – the laboratory expert informed us, who also explained that the other common component used in disinfectants is hydrogen-peroxide. It is effective against bacterium spores potentially present in a product, is a strong oxidant, and is able to kill off microbes even in low concentrations (10-30%), its 3% water solution is used especially to disinfect wounds, and is recommended by pharmacies as well (ethanol is also a frequent agent in organic detergents). The disinfecting effect of hydrogen-peroxide is arising from releasing of one-atom-oxigene. Glycerine is added as a wetting agent, as it protects the skin on which the gel or the water-alcohol solution is applied.

How do we know these products are really effective? What guarantees their efficacy?

These water-alcohol products may be produced in the whole of the European Union, but they may only be marketed if their producers can verify their anti-microbial efficacy by a laboratory protocol.

The legislative regulations on biocides are rather complex. In Hungary, the essential rules are set forth by Government Decree 316/2013. In addition to the mandatory documents, the data sheet required for marketing (showing the biocide producer, its active substance, full composition, minimum durability, packaging material labelling, etc.) must also include the protocol of the analysis carried out according to the Euronorm standard or another, equivalent methodology by an accredited laboratory to verify the product's antimicrobial effect.

“In Hungary, only official virology laboratories are authorised to analyse and verify viricide effect, but of course larger, accredited laboratories also analyse disinfectants. In our own case at the WESSLING international network of laboratories, ethanol concentration is analysed in the disinfecting products by our laboratory in Paris, but the Microbiology Laboratory of WESSLING Knowledge Center in Budapest – with its track record of over

half a century – is accredited to test the bactericide and fungicide effect of chemical disinfectants and antiseptic agents for the food processing industry and generally for industry, and of course also for households and institutions – Tamás Vadasi said.

What is the specific analytical process?

In case of hand disinfectants, pre-determined doses of the product sample are added to a testing suspension made of bacteria, yeast cells and/or mould spores, respectively, and also to a solution containing an impact-influencing agent which is usually a substance modelling the contaminant, by which we model clean as opposed to contaminated circumstances.

We keep this mixture at a temperature of 20 ± 1 °C for 1 minute \pm 5 seconds. When the processing time is over, the bactericide and fungicide effect is halted by the application of the right method. *The above method is called dilution-neutralisation.* At this point, we determine the number of bacteria, yeast cells and mould spores which have survived in the sample concerned and convert the decrease into a cfu/ml value.

We use *Pseudomonasaeruginosa*, *Escherichia coli*, *Staphylococcus aureus* and *Enterococcus shirae* bacterium strains, as well as *Candida albicans* vegetative cells or *Aspergillus brasiliensis* spores specified in the analysis standards for these tests.

Disinfectants must ensure an appropriate impact, equivalent to a reduction of 5 orders of magnitude (10^5) for bactericides and a reduction of four orders of magnitude (10^4) for fungicides, specified in the relevant standards (MSZ EN 1276:2010, withdrawn standard, and MSZ EN 1650:2008:2013, withdrawn standard).

90% of the general disinfectants tested in the laboratory met the requirements, while in the case of hand disinfectants this number is somewhat lower, and typically their impact on moulds e.g. *Aspergillus* strains is weaker.

Only regular testing will result in products people can rely on to a possible best degree.

Pesticides – what is the opinion of the professionals?

Modern agriculture uses a broad range of plant protection products. In addition to the health risk they represent, regular testing of these agents is important also because their presence above limits may cause substantial losses to producers and distributors alike. Lay peo-

ple don't know always which kind compounds the pesticides are, and what real risk they can cause in the food chain.

The residues of chemicals used by agriculture against plant-, animal- and microbe pathogens landing in our food are called pesticide residues.

Without chemical plant protection, agricultural pests (weeds, insects, rodents, molluscs, etc.) can destroy up to a third mass of the crop (György Matolcsy: That certain 35%. Gyorsuló idő Publisher, Budapest 1978). However, with good agrotechnical practice, pest control can be kept the number of pests below the acceptable levels, but the residues of plant protection products or their degradation products may appear in foodstuffs for human consumption.

The pesticide residues entering the human body can cause detectable damage to human health only if the pesticides concerned have been used in higher than permitted concentration or if the withdrawal period has not been observed.

Nevertheless, even if one by one, the presence of specific pesticides is below the limit value, they may enhance each other's impact – harmful to human health – as a result of the „cocktail effect”.

The most commonly used plant protection chemicals are split into three major groups: pesticides, fungicides and herbicides – the experts of WESSLING Knowledge Centre pointed out.

In 60 % of the cases, plant protection products are pesticides, and these products contained harmful arsenic compounds and/or nicotine in the past. By today, they have been replaced by chlorinated carbohydrates and organic phosphorous compounds. The use of chlorinated carbohydrates started to spread after the discovery that DDT (dichloride-diphenil-trichlorine-ethane) had pesticide effects. DDT is extremely dangerous when entering the body of humans and animals because it accumulates in fat tissues and causes harmful deformations and even cancerous diseases. Chlorinated carbohydrates are harmful to fish and bees, too, and their use as plant protection products was prohibited in almost every country in the 1970s.

The second group of plant protection products is made up of fungicides, used to prevent the fungal diseases of various crop cultures and to decontaminate sowing seeds from fungal infestations. The inorganic fungicides contain mainly copper and elemental sulfur.

The third group is made up of herbicides. They are intended to protect agricultural crops against weeds, but some of their varieties can kill off all green plants in the treated area. The latter men-

tioned are called *total herbicides*. In certain cases, the crops assume the characteristic smell and taste of these herbicides, which may even be enhanced during the processes applied at the food processing plant or in the kitchen.

Most plant protection products concentrate on the outer surface of the produce, and most of it can be removed by washing or peeling. Test results have shown that in Hungary, half of the vegetables and fruits do not contain any detectable pesticide residue at all, and the amount of pesticides above limits hardly reaches one percent.

The reliable detection of pesticide residues or contaminants in food products imposes extraordinary expectations on testing laboratories. Due to the state of the art equipment used, the laboratory of WESSLING Hungary Kft analyse the raw materials and the products by multi-methodology and individual tests alike. Modern laboratories, including WESSLING Hungary Kft's, are easily able to detect one of the most debated herbicides named glyphosate by a procedure that needs the use of the so-called HPLC-MS (high-pressure liquid chromatography –mass spectrometry) technique.

Uniquely, WESSLING Hungary Kft is doing more than 600 different types of screening tests to detect plant protection product residues in vegetable-, fruit and other food samples. In addition, there is possibility to conduct group specific tests of certain food products and food raw materials for phosphorus-containing and chlorinated agents. It is also able to detect components only identifiable by individual methods (e.g. glyphosate, etephone, chlorate/perchlorate, chlorinemechvate/mepichvate, foseetil-Al, etc.); upon request, the screening test of fresh vegetable and fruit samples is augmented by testing for dithiocharbamates; and the laboratory also tests animal feed samples (especially for chlorinated plant protection products, dioxins and PCBs).

Coronavirus followed by Legionella?

When reopening buildings after long-term closure during the corona virus pandemic, special attention must be paid to the safe operation and testing of the building's potable water network, domestic hot water network and their air-handling and air-conditioning system. Stagnant water represent significant microbiological risk, especially in view of the *Legionella* bacterium which may even cause legionellosis, a deadly disease – the laboratory experts warn.

After the corona virus pandemic reaches its peak, the economy is expected to start working again.

However, as buildings or building parts have been closed or only used to a limited degree, the risk of *Legionella* and other contaminating bacteria proliferating in stagnant sections in our water systems has increased – Tamás Vadasi, Tamás Bordás and Gergő Kalinovits, experts working at the WESSLING Knowledge Centre independent laboratory explained in response to a question asked by Laboratorium.hu.

Health-care institutions, the hotel sector, wet cooling towers and public baths are high-risk facilities. In order to protect the health of guests and of local staff, all water systems must be operated safely already while the closure lasts, and the necessary laboratory tests must be performed before these facilities are re-opened.

What is *Legionella*? Why should we be careful in connection with the pandemic?

Legionella pneumoniae is a bacterium that lives in artificial and natural environments, reproducing especially fast in lukewarm or warm water. It causes serious disease if it is released into the environment through water mist and if humans inhale this so-called aerosol. The disease it causes, i.e. legionellosis (legionnaire's disease), is in effect an atypical pneumonia, and in the case of people with a weak immune system it may even cause a respiratory condition leading to death – just remember the case in the Philadelphia hotel in 1976. Its symptoms include fever and a dry cough.

The best conditions conducive to the proliferation of *Legionella*:

- water temperatures between 20-50 °C,
- the availability of the necessary nutrients (in artificial systems, this means microorganisms, the components of water, corrosion products and the sludge accumulating in water systems),
- stagnant water in water pipes ensuring the time necessary for proliferation;

By the increase in bacterium concentration, the risk of disease increases as well. In the case of buildings which were temporarily out of use, it is necessary to end or minimise the circumstances described above when operating water systems.

How can the risk of *Legionella* be most effectively reduced before reopening a building?

The experts interviewed by Laboratorium.hu have emphasized the necessity of testing, and directed attention to the specific requirements (in the case of air handling systems and air-conditioning devices selected randomly – in compliance with Ministry

of Human Resources Decree No. 49/2015. (XI. 6.) laid down in legislation.

In drinking water and domestic warm water systems – especially in stagnant water parts – it is generally recommended to test for the growth of microorganisms (Coliform, *Escherichia coli*, mesophilic germ count at 22 °C, *Pseudomonas aeruginosa*, *Enterococcus*). *Legionella* should be monitored in a monitoring system at points previously determined by risk assessment. In ventilation systems, air conditioners in particular can become infected with *Legionella*. Tests performed on the basis of monitoring should be repeated on a random basis.

The following advice may prove very useful in making sure that the above tests be completed with a reassuring result and the facility operators can successfully prevent the proliferation of *Legionella*:

When operating drinking water networks, make sure that water flows are uninterrupted. Wherever the use of drinking water is not continuous, it is necessary to rinse and allow stagnant sections to empty regularly, i.e. at least every week (for duration of at least 2 minutes on each tap, until the temperature stabilises). While water is disposed of, it is necessary to make sure that aerosol production remains at a minimum, and workers are recommended to wear a mask during the process.

Terminal sanitary fixtures should be cleaned and de-scaled, as the pollution colonising on out-of-use fixtures provide a breeding ground and more extensive areas for the reproduction of bacteria. In the case of domestic warm water networks operated at lower water consumption levels without full water disposal, the continuous circulation of water must also be ensured, and we also recommend that operators disinfect the water by regular temperature increases: for at least three hours, the water temperature in the pipes must be increased to above 70 °C, and then the process must be applied section by section, starting from the outflow tap located at the longest distance, with each outflow tap subjected to a 3 minute rinsing with hot water, with the temperature checked at the same time.

The continuous exchange of air must be ensured even if operation is maintained with fewer staff. Beyond this, building parts standing empty should be aired regularly. Buildings are expected to be re-opened just when the cooling season sets in, and this requires extra care during the maintenance and disinfection of air-conditioning devices.

When applying the measures above and the laboratory tests recommended, we can do a great deal to prevent that beside the SARS-CoV-2 virus, another infamous pathogen, i.e. *Legionella* may threaten our health.

Dietary Supplements: what can we trust?

With the massive spread of the coronavirus, various dietary supplement products have been brought in focus. How our laboratory tests dietary supplements? Find out in the latest compilation of Laboratorium.hu.

Such preparations, called dietary supplements and/or intended for specific nutritional purposes, contain sometimes extremely effective ingredients but are not qualified as medicinal products. They can be various preparations containing vitamins, performance-enhancing substances used in fitness centres, muscle mass gainers, or male potency enhancers.

The current epidemic situation triggered a quantum leap in their turnover, these products are getting to be in demand, yet there is a rising consumer concern also. In a great part such concerns are well-founded, as sometimes it is difficult to verify – in particular for online products – whether or not the stuff really contains what the label states.

In Hungary the Safe Dietary Supplement Program was drawn up with the intention to suppress counterfeit supplements which are sometimes dangerous to the human health. By a risk assessment of the marketed products the program warrants that only controlled, high-quality products be placed on the shelves of the pharmacies joining the program. In addition to this excellent initiative, supervision and control by authority (OGYÉI-OÉTI) and testing by independent laboratories can provide reassuring answers.

What is tested in the laboratory?

In analytical testing, one of the largest independent testing laboratories based on customer orders looks for prohibited active pharmaceutical ingredients in potency-enhancers and checks the declared nutritional values on the label in the case of products marked valuable food supplements. As part of the test protocol, energy content, quantities of carbohydrate, protein, sugar and fat – including fatty acid composition – in the product are determined.

Added vitamin content will be determined in vitamin preparations, but certainly potential contaminants (metals, toxins) are also detected and microbiological examination of incoming products will also be performed.

Furthermore, absence of doping drugs must also be verified (In this case, the term “absence of doping or doping-free” refers to the amount below the

laboratory detection limit, LOD. The Editor.). These tests aim to detect drugs banned by anti-doping agencies such as anabolic agents, hormones and metabolic modifiers, stimulants, narcotics, β 2-agonists and β -blockers in the samples.

The data of all dietary supplements tested in Hungary, in which the 100 most common prohibited substances specified on the international doping list were not detected during laboratory tests, can be found on the Doppingmentes.hu website.

Using heat treatment, samples are exposed to accelerated ageing in stability tests to make sure the product is stable and active pharmaceutical ingredient quantities remain valid up to the end of the retention period.

Experiences of investigations – What should you beware of?

Key findings of the professionals of the laboratory based on more than 12000 samples analysed are as follows:

While vitamins, mineral preparations, sports drinks, probiotics and whey proteins represent a lower level of risk, the various weight-loss drugs, muscle mass gainers and other products for body-builders, as well as potency enhancers and plant extracts are seen as products with substantially higher-risks.

- It is important that customers always check the origin of these products, preferably do not order them online from manufacturers who cannot be identified or not have a representative plant, at least office in Hungary.
- Do not take illegal products from “under the desk”.
- Even a single adulterated tablet can be harmful, so it is important the regularly laboratory check of these products.
- Only buy products from responsible manufacturers that have been inspected by the authority or independent laboratories.