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(54) **Title:** FOOD SUPPLEMENT OR MEDICINAL OR PHARMACEUTICAL COMPOSITION INHIBITING VIRUS INFECTION, ADVANTAGEOUSLY INFECTION OF SARS-COV-2 AND IBV CORONAVIRUSES AND FORMULATION THEREOF

(57) **Abstract:** The present invention is for use in the control of COVID- 19 coronavirus infection, which became worldwide in 2020. The present invention relates to the methylation of a metabolite, macromolecule, protein, RNA, DNA involved in a multicomponent food supplement with easily mobilizable methyl groups for the control of viral infection, preferably SARS-COV-2 and IBV coronaviruses, a pharmaceutical or pharmaceutical composition comprising at least one methyl donor and at least one methyl acceptor in such a way that that the ratio of methyl donors to methyl acceptors is in accordance with the preferred molar ratios. Definitions : Methyl donor compounds : Organic compounds methylated on N-, S- and 0 heteroatoms where methyl groups thereof transfer into transmethylation cycle after oxidative demethylation. Methyl acceptor compounds : Organic compounds for use in binding methyl (hydroxy methyl) groups. The invention also relates to a formulation method and a method of administration for use in preparing the compositions.

Food supplement or medicinal or pharmaceutical composition inhibiting virus infection, advantageously infection of SARS-COV-2 and IBV coronaviruses and formulation thereof

I. The subject matter of the invention

The subject matter of the invention is a multi-component, advantageously two or three component food supplement or medicinal or pharmaceutical composition comprising easy mobilizable methyl groups for use in reducing virus infection advantageously infection of SARS-COV-2 and IBV coronaviruses by changing the "set" of methyl groups of the body and the methylation level of cells by the modification of methylation level of metabolites, macromolecules, proteins, RNA, DNA in the transmethylation cycle of the cells, comprising at least one methyl donor advantageously the following and/or related compounds:

Methyl donors	**CAS**
Choline bitartrate	87-67-2
Formalin	50-00-0
Trimethyl lysine	19253-88-4
Glycine betaine	10743-7
Trigonelline	535-83-1
L-carnitine	541-15-1

and at least one methyl acceptor, advantageously the following and/or related compounds:

Methyl acceptors	**CAS**
L-ascorbic acid	50-81-7
L-arginine	74-79-3
L-homocysteine	6027-13-0
Curcumin	458-37-7
Resveratrol	501-36-0
Gingerol	23513-15-7

Nicotinic acid	59-67-6
Guanidine	113-00-8
Histamine	51-45-6
Glutathione	70-18-8
Carbamide	57-13-6

in such a way that the quotient of molar ratio of the methyl donors and methyl acceptors is higher than "one "and is in 4:1,5 range of molar ratio, advantageously corresponds to 3:2 molar ratio.

Furthermore, the subject matter of the invention is related also to the formulation process of the compositions according to the invention.

The subject matter of the invention is for use in reducing of the worldwide spread COVID-19 coronavirus infection.

Definitions:

Methyl donor compounds: Organic compounds methylated on their N-, S- and O heteroatoms where methyl groups thereof transfer into transmethylation cycle after oxidative demethylation.

Methyl acceptor compounds: Organic compounds for use in binding methyl (hydroxy methyl) groups.

II. Prior art, state of the art, mode of action

Results of intensive investigations proved that the maintenance of health and inner balance of body and the inhibition of development of different diseases are associated not only with individual's genetic make-up but also with the nutrition, diet, and other lifestyle choices.

The negative effect of the excessive accumulation of free radicals on the human body and the role of this accumulation in the development of different diseases of plants, animals and humans.

One of the main characters of recommended plant or plant-origin compositions for use in prevention of diseases in the literature is the antioxidant capacity. Beside antioxidant capacity the study of endogenous transmethylation, the methylation level of living organisms and the physiological effect of the methyl donor compounds in the methylation cycle, their role in the metabolic process of the body, its regulation, in the supervision of the function of different genes get more and more into the centre of attention.[Corbin and Zeisel, 2012].

Several substitution reactions play a role in the regulation of cellular metabolism, allowing for rapid and reversible regulation of enzyme activity following the synthesis of the enzymes including transmethylation, i.e., the removal and the incorporation of methyl groups. Methylation, demethylation, and remethylating are common transformations in living organisms. [Sárdi, 1996; 2006]

The active form of L-methionine, the S-adenosyl-L-methionine (SAM), has been shown to be a "methyl donor" in endogenous transmethylation reactions [Paik et al. 1975; Szarvas et al. 1986].

Methyl donors are directly or indirectly involved in the methylation cycle, however, nucleic acids, proteins, peptides, amino acids, biogenic amines, nor-alkaloids, etc. can be used as acceptor molecules in enzymatic transmethylation reactions. Material quality distribution and quantitative changes of donors and acceptors characterize the physiological state of the biological system. [Sárdi and Tyihák, 1998]

The study of the mechanism of action of quaternary ammonium compounds (especially choline), the role of the human body in the metabolism and the regulation of cell function has also become an intensively researched field. [e.g. Sárdi et al. 2009]

Knowing the connections between the defects of methylation and demethylation processes and the development of various diseases, the "available" methyl pool of the organism can be influenced and normalized as needed, all of which can be approached chemically-biochemically and through nutrition. [Váli et al. 2007; Sárdi 2012; Blázovics et al. 2012]

The role of methyl donor compounds in human health

Intensive research is underway into the role of mobilizable methyl groups and methyl donor compounds in human health and proliferation. [e.g., Tyihák et al. 2001].

Several results have been reported for methylated compounds in living organisms, e.g., on its role in the metabolism of choline and in the regulation of cell function. [e.g. Corbin and Zeisel, 2012]

These published results demonstrate the nutritional-health role of methyl donor compounds available also in plants. [e.g., Mihai et al., 2002; Mann et al., 2006; Mudd et. al., 2007; David et. al., 2009; Kotsopoulos et al., 2010]

On one hand choline has been shown to inhibit cholesterol deposition, to aid metabolism, to use of fatty acids, and to detoxify the body, on the other hand, during the metabolism of the brain, choline is converted to acetylcholine, which plays a role in the transmission of stimuli and in the regulation of the function of nerves coordinating memory and muscle movement.[e.g., Yoshimoto et al. 2004).

People taking long-term choline have a reduced risk of cardiovascular disease [Rajaie és Esmaillzadeh, 2011].

Choline deficiency alters DNA methylation and thus gene expression [Zeisel, 2012]. Choline has also been shown to play an important role in fetal development, so a choline-rich

diet is especially important during pregnancy. [Medici et al. 2014].

Betaine, an oxidation product of choline, potentiates the detoxifying effect of the liver, helps protect against hepatic steatosis, and is a major player in endogenous transmethylation as a methyl donor. [Blázovics et al. 2012]

METHYL DONORS

Choline

Choline is a member of the B-complex, simply because it is not classified as a B-vitamin, because not only can our body get it from an external source, but it can also synthesize it. This requires the involvement of other substances, such as methionine and serine, folic acid, and vitamin B12.

Choline emulsifies fats and cholesterol, so they do not deposit in the liver, gallbladder, or blood vessel walls. As a phosphatidyl-choline, it preserves the integrity of the cell membrane, plays a role in the transfer of information, energy supply and intracellular communication between cells, and participates in the preservation of cellular structures and functions. During the metabolism of the brain, it is converted to acetylcholine, which plays a role in the transmission of stimuli. [Vivekananda et al. 2000]

Adequate choline levels in the brain can provide protection against certain types of dementia, most notably the development of Alzheimer's disease. Several studies have also looked at its effects in patients with pre-existing Alzheimer's disease, and in most experiments, choline supplementation has significantly improved patients' memory. [Tiraboschi et al. 2004].

Through its methyl groups, choline is involved in metabolism as a methyl donor. Choline deficiency in cell culture leads to apoptosis (a form of cell death) or programmed cell death. An

experiment in mice has shown that lecithin (mainly due to the choline it contains) can prevent connective tissue transformation of the liver and cirrhosis of the liver due to excessive alcohol consumption. Thus, lecithin and choline can be especially helpful in combating liver disease. [Baghdasaryan, 2008]

METHYL ACCEPTORS

Ascorbic acid

Along with other vitamins, minerals and nutrients, ascorbic acid acts as an antioxidant in the body. Primarily, it plays a protective role, neutralizing the free radicals that cause cell damage and mutations due to its antioxidant effect, which causes cell aging or cancerous degeneration. Together with white blood cells, it is involved in protecting the body against infections.

In the development of atherosclerosis, endothelial vasomotor function is abnormal, the potential mechanism of which is increased oxidative stress. Levine et al. (1996) hypothesized that the antioxidant ascorbic acid improves endothelium-dependent arterial dilation in coronary artery disease. Ascorbic acid has been shown to reverse endothelial vasomotor dysfunctions in the brachial circulation of patients with coronary artery disease. These results suggest that increased oxidative stress contributes to endothelial disorder in patients with atherosclerosis and that endothelial dysfunction may respond to antioxidant therapy.

Ascorbic acid contributes to the homeostasis of normal tissues and organs as well as to tissue regeneration. In the brain, ascorbate performs neuromodulatory functions and neutralizes reactive oxygen species formed during synaptic activity and neuronal metabolism. These properties are important because redox imbalance and abnormal protein aggregation play a

central role in the pathogenesis of neurodegenerative diseases, including Alzheimer's disease, Parkinson's disease and Huntington's disease, multiple sclerosis, and amyotrophic lateral sclerosis. Thus, ascorbic acid is primarily associated with a reduction in oxidative stress and a reduction in the formation of protein aggregates, which may contribute to a reduction in the cognitive and / or motor impairments observed during neurodegenerative processes [Moretti et al. 2017]

The aggregation of proteins into oligomers and fibrils is associated with several human pathophysiology. Ascorbic acid has been shown to destabilize pre-formed amyloid fibrils in a dose-dependent manner and to protect the human neuroblastoma cell line against amyloid-induced cytotoxicity. Results of Alam et al. (2017) indicate the role of ascorbic acid as a potential molecule in the prevention of human insulin aggregation and several related pathophysiology.

Dietary antioxidants, including ascorbic acid, appear to modify the risk of Alzheimer's disease (AD). [Bowman, 2012]

Low levels of cerebral ascorbic acid increase susceptibility to seizures in mouse models, decreased cerebral ascorbic acid transport, and Alzheimer's disease. These data suggest that avoiding ascorbic acid deficiency may be particularly important in relation to epilepsy and seizures, for example in populations at increased risk of Alzheimer's disease. Exogenous ascorbic acid treatments before and after a seizure reduce the severity of the seizures and the associated neurological damage in rodent models [Warner et al. 2015].

Ascorbic acid has been shown to be a promising memory enhancer in mice. Its protective effect is attributed to its antioxidant properties, which make sensitive brain cells less exposed to oxidative stress, thus reducing brain damage and improving nervous system function, thereby improving memory. It may also influence the treatment of dementia in elderly patients. [Parle and Dhingra, 2003]

Shivavedi et al. (2019) investigated the efficacy of ascorbic acid therapy in the treatment of depressive-like behavior in diabetics. Their results suggest that depression and diabetes mellitus have several pathophysiological properties (Bădescu et al. 2016; Zanoveli et al., 2016), including oxidative stress, inflammation, insulin resistance, and overactivation of the HPA axis (Stuart and Baune). , 2012). Ascorbic acid therapy has been found to be very effective in reducing oxidative stress.

L-arginin

Arginine is a semi-essential amino acid involved in the process of nitric oxide formation, which produces nitric oxide directly through nitric oxide synthase enzymes. It is especially important for certain diseases and chronic conditions, such as high blood pressure and type 2 diabetes, as these conditions are usually characterized by an increase in the enzyme that breaks down L-arginine (arginase), which results in a temporary deficiency; this prevents an increase in blood pressure in these conditions and can be partially remedied by increasing L-arginine intake or resolving the disease / disease state. [Wu and Morris, 1998].

Arginine is required by our body in several ways. It is involved in the formation of creatine, which also plays an important role in the body - its lack causes mental retardation. It also affects the production of agmatine, which is a signaling molecule in the body and an intermediate in the urea cycle, along with L-ornithine and L-citrulline.
Arginine helps the body make proteins and stimulates the release of insulin. As part of the nitric oxide cycle, it has

several positive effects on physically active people. The effects of arginine are best attributed to its ability to produce nitric oxide, which affects many other processes in the body. Nitric oxide is an important neurotransmitter, it helps to relax the arteries and thus improves blood circulation, thus helping to prevent cardiovascular disease. It is also useful in the treatment of peripheral vascular disease and in all other diseases that cause vasoconstriction and poor blood supply to the limbs. [Tong and Barbul, 2004]

It has a beneficial effect on type 2 diabetes.

One study confirmed that people with type 2 diabetes had lower than healthy levels of L-arginine. [Liu et al. 2016] In the case of inadequate arginine metabolism, L-arginine replacement can help restore molecular balance. Individuals with type 2 diabetes usually experience oxidative stress. A human study demonstrated that arginine supplementation may reduce this negative effect of the disease. [Jablecka et al. 2012; Liu et al. 2016]

Experiments have shown that L-arginine indirectly activates SOD(Superoxide dismutase), and thus a free radical neutralizing protein, which helps to avoid or inhibit free radicals. reduces oxidative damage to the body caused by reactive oxygen species. [Jablecka et al. 2012]

Research has shown that increased nitric oxide levels support the body's immune response. Nitric oxide can stimulate the immune system to fight harmful pathogens. Increasing the level of nitric oxide in the body improves immune responses against unwanted bacteria and viruses. [Popovic et al.2007].

Recent results suggest that increased metabolism of L-arginine in myeloid cells may lead to impaired lymphocyte responses to the antigen during tumor growth and tumor growth. Two enzymes that compete for L-arginine as substrates – arginase and nitric oxide synthase – are critical components of this

lymphocyte suppression pathway, and the metabolic products of these enzymes are important moderators of T cell function. An article by Bronte and Zanovello (2005) focuses on the relevance of L-arginine metabolism in myeloid cells under physiological and pathological conditions.

Tan et al. (2009) conducted experiments to test the hypothesis that dietary L-arginine supplementation enhances immunity in early weaned piglets. Based on their results, a dietary supplement made with L-arginine enhanced the cellular and humoral immunity of piglets by modulating the production of leukocytes, cytokines, and antibodies. These results indicate that increasing the amount of L-arginine has a beneficial effect on the optimal immune responses of young pigs and may also have important implications for the development of an improved recipe developed for human infants.

Arginine is an important modulator of immune activation, often found in immunotherapeutic systems. However, the mechanism by which arginine may have a positive effect in immunotherapy is unknown. A study by Bansal and Ochoa (2003) details the importance of arginine, its metabolism, and finally its physiological role in critically ill and immunodeficient patients. It has been found that the availability of arginine in critical disease can be regulated by arginase activity, so arginase expression appears to be essential in the regulation of the cellular immune response and the inflammatory process. Arginase plays an important role in the production of precursors of ornithine, proline, and polyamine, all of which are required for cell proliferation and wound healing.

The components of the formulation containing choline, L-ascorbic acid and L-arginine are potentially useful compounds in the cell transmethylation cycle. Transmethylation (Williams, 1966) can modify the level of methylation of metabolites and macromolecules (proteins, RNA, DNA) that are

part of the cycle through rearrangement of the methyl groups of the cell (Paik et al., 1980; Park and Paik, 1990; Darnell et al., 1986; Khan et al, 1978; Philips, 2008). Transmethylation plays a role in eliminating the effects of abiotic and biotic stress (Horváth and van Hasselt, 1985; Sárdi and Tyihák, 1998; László et al., 1998; Lin and Pearce, 1990; Mullet and Whitsitt, 1996; Tyihák et al., 1989; Németh et al. 1998; Albert et al, 1998). Cellular stress responses are reflected in the changes in the amounts of different methyl acceptor and donor metabolites and macromolecules over time (Sárdi, 1996).

Upon heat shock, cells synthesize heat shock proteins with methylated properties (Wang et al, 1981). Methylation of the protective proteins of the genes (histones) and the nucleic acid bases themselves (Paik and Kim, 1967; DeLange et al., 1969; Samson and Cairs, 1977; Karran and Lindahl, 1979; Duerre and Lee, 1974; Tidwell et al., 1968; Lee and Paik, 1972; Paik and Kim, 1968; Dixon, et al., 1975; Honda et al., 1975; DeLange et al., 1973; Hooper et al., 1973; Duerre and Buttz, 1990; Coppard et al., 1983). . The methylation of proteins is able to modify and influence the biological activity in the range of more than 100,000 times the scale.

The choline (chemical name) component of the composition contains three methyl groups attached to a nitrogen atom. Choline is a methyl donor in transmethylation (Michal, 1993; Hanson et al., 2000; Tyihák et al., 1998). Deterministic changes in choline for the treatment of various stress effects have been demonstrated (Sárdi, 2006).

III. Solution leading to the subject matter of the invention

L-arginine (chemical name) can efficiently take up the methyl groups of a methyl donor through its guanidino-functional

group (Le and Fujimori, 2012), and the double-bonded carbon pair of L-ascorbic acid has this chemical property. L-arginine and L-ascorbic acid function as methyl acceptors during transmethylation. Methyl acceptors help to regroup methyl groups stored in strong chemical bonds into weaker chemical bonding forms that the cell can rapidly utilize through targeted methylation to eliminate various stress events.

During the oxidative demethylation of donor metabolites, arginine and L-ascorbic acid can take up oxidized methyl groups (hydroxymethyl groups) temporarily formed from methyl groups as acceptors in a reaction without enzyme catalysis. L-arginine binds oxidized methyl groups at a rate 3-5 times higher than L-ascorbic acid. The ability of these two acceptors to capture oxidized carbon was studied based on their analogous reactions with formaldehyde and examined by FT-IR spectrometry (Fig. 1).

The two graphs in Figure 1 show a model study of the ability of methyl acceptors (L-arginine, L-ascorbic acid) to capture the oxidized methyl group based on FT-IR spectrometric tracing of methyl acceptors with formaldehyde (1.a. Kinetics of Arginine + HCHO reaction; 1.b. K-kinetics of L-ascorbic acid + HCHO reaction).

Due to the longer reaction time, the L-arginine content of the formulation induces a decrease in the stock of oxidized methyl groups in the cell, compensated by the regulation of transmethylation by intensifying the enzymatic demethylation. In vivo intervention of methyl acceptor dimedone in tissue structure (Sárdi 1996; 1998; László et al., 1998; Németh, 2002) was able to increase the amount of oxidized methyl groups in tissues by almost 100%. Elevated levels of the arginine-induced demethylation process of transmethylation fmetabolism are expected to be stabilized by the slow "stealing" role of L-ascorbic acid. The elevated set of oxidized methyl groups provides extra protective capacity

against, among other things, foreign protein-type agents (e.g., viral protein). The inhibitory effect of the oxidized methyl-binding L-ascorbic acid derivative on SARS-COV-2 and IBV coronaviruses on Vero E6 cell line was also observed in an anonymous, non-accredited cell line experiment (Figures 2 and 3).

Figure 2 shows the inhibitory effect of oxidized methyl-containing ascorbic acid (code Z) on SARS-COV-2 virus growth using a 1: 4000 dilution of the stock solution in a Vero E6 cell line. Virus density on test plates. (Research report, University of Pécs, Szentágothai János Research Center, 2020; report extract).

Figure 3 shows the effect of ascorbic acid derivative (Z) with three (E) and two (H) components and an oxidized methyl group on IBV crown virus in the Vero E6 cell line. (Virological test: Neutralization test with coronavirus, NÉBIH, Institute of Veterinary Medicine, 2020; extract from minutes)

Of the three components in the formulation, choline is intended to increase the potency of the rapidly donating methyl donor source in the cells. Arginine and L-ascorbic acid, in turn, stimulate the transient accumulation of oxidized methyl groups stored in the weaker bond within the cell's methyl donor pool compared to the more strongly bound ones. The additional exogenous excess of the three components enhances the activity of defense through transmethylation in cellular metabolism. Their synergistic effect promotes the targeted modification and improvement of the physiological state of the cell associated with the activated methyl group, and the increase of the defense capacity associated with the increase of the transmethylation intensity. The beneficial effect outlined is generated by the simultaneous presence of the three components.

The process of cell transmethylation may play a direct, experimentally unproven role in reducing the activity and

function of foreign proteins. In an "in vitro" cell line study performed under the name anonymous, the effect of the composition on reducing viral proliferation indirectly supports the outlined concept.

The characteristic properties and composition of the most preferred ingredients of the formulation are shown in Tables 1 and 2 (Figure 4).

IV. Summary

The essence and advantages of the invention are summarized below.

1. The importance of the composition according to the invention lies in the fact that, in the knowledge of the connections between the defects of endogenous transmethylation (methylation, demethylation, remethylation) and the development of various diseases, the body "makes available" exogenous intake of the product may be affected and possibly normalized.
2. The composition of the present invention comprises methyl donor and methyl acceptor compounds in accordance with the endogenous transmethylation cycle, thereby presumably enabling the body to restore its destabilized internal balance to suit the individual situation. This can be especially important when used for prevention.
3. The use of the preparation is therefore not only intended to compensate for the methylation deficiency, but also means a cycle for the maintenance, treatment and automatic restoration of the body and maintenance of the equilibrium according to the laws characteristic of equilibrium reactions according to the needs of the body.
4. The present invention is applicable to the control of COVID-19 coronavirus infection, which became worldwide in 2020.

V. Formulation process, Example

The invention is further illustrated by the following non-limiting examples.

The example is also a description of the formulation process according to the present invention.

	weight percentage (w/w %)	X mg in 1 g composition
Choline bitartrate	35	350
L-ascorbic acid	40	420
L-arginine	25	250

To obtain the most preferred three-component composition according to the version of the invention given in the chart above, it is necessary to achieve the chemical purity and exceed 90% purity of the raw materials of the edible ingredients separately. The moisture content of the raw materials must not exceed 5%. The particle size of the raw materials must be set in the range of 100-200 μm. In the first step of the formulation, the active ingredients 350 mg of choline bitartrate and 250 mg of L-arginine are mixed and homogenized.

Finally, 420 mg of L-ascorbic acid in the form of a solid powder was added to the two-component homogenized powder mixture, and the mixture was homogenized.

The second phase of mixing provides a three-component homogeneous composition.

The mixing of the ingredients must be carried out in a room with an atmosphere of not more than 40% relative humidity. A primer composition with a moisture content of not more than 5%

does not require the use of an aid to reduce the moisture content. After mixing, the product should be stored airtight (e.g., in a plastic bag or barrel) until reconstitution (tableting, encapsulation).

The active ingredient content of the tablets and capsules of the preparation should be adjusted to 1 g of useful ingredient per unit weight.

In the capsule formulation, the homogenized solid mixture is filled into capsules.

For tableting, the homogenized mixture of excipients and active ingredients is tableted under pressure after the addition of a customary formulation carrier and / or excipient.

The and/or related carriers and excipients required for the formulation are the following: starch, gelatinized starch, cellulose, microcrystalline cellulose or cellulose derivatives, lactose, lactose monohydrate, talc, mannitol, sodium chloride, sodium carbonate, sucrose, maltose, calcium carbonate, colloidal anhydrous silica, stearic acid, magnesium stearate and / or isomalt.

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CLAIMS

1. A multi-component, food supplement or medicinal or pharmaceutical composition comprising easy mobilizable methyl groups for use in reducing virus infection advantageously infection of SARS-COV-2 and IBV coronaviruses by changing the "set" of methyl groups of the body and the methylation level of cells by the modification of methylation level of metabolites, macromolecules, proteins, RNA, DNA in the transmethylation cycle of the cells, *characterized in* comprising at least one methyl donor in such a way that the quotient of molar ratio of the methyl donors and methyl acceptors is higher than "one "and is in 4:1,5 range of molar ratio.

2. Composition according to claim 1 *characterized in*, that the composition is two or three component composition, and the quotient of molar ratio of the methyl donors and methyl acceptors is 3:2.

3. Composition according to any one of claims 1 and 2 *characterized in*, that methyl donors are following and/or related compounds:

Choline bitartrate	87-67-2
Formalin	50-00-0
Trimethyl lysine	19253-88-4
Glycine betaine	10743-7
Trigonelline	535-83-1
L-carnitine	541-15-1

4. Composition according to any one of claims 1 and 2 *characterized in*, that methyl acceptors are following and/or related compounds:

L-ascorbic acid	50-81-7
L-arginine	74-79-3
L-homocysteine	6027-13-0
Curcumin	458-37-7
Resveratrol	501-36-0
Gingerol	23513-15-7
Nicotinic acid	59-67-6
Guanidine	113-00-8
Histamine	51-45-6
Glutathione	70-18-8
Carbamide	57-13-6

5. Composition according to any one of claims 1 to 4 *characterized in* comprising choline bitartrate as methyl donor and L-ascorbic acid and L-arginine as methyl acceptors and the quotient of molar ratio of the methyl donors and methyl acceptors is 3:2.

6. Composition according to any one of claims 1 to 5 *characterized in,* that the composition is tablet, inhalation powder, capsule, cone, or injection solution.

7. Composition according to any one of claims 1 to 6 *characterized in,* that it can be administered orally or buccally or sublingually or rectally or by inhalation or parenterally or intravenously.

8. Oral composition according to any one of claims 1 to 5 *characterized in,* that it is solid, comprising the methyl donors and methyl acceptors according to any one of claims 1 to 5 and it is formulated in capsules.

9. Oral composition according to any one of claims 1 to 5 *characterized in,* that it is solid, comprising the methyl

donors and methyl acceptors according to any one of claims 1 to 5, it is formulated in tablets, comprising pharmaceutically acceptable inert, solid carrier and/or excipient.

10. Oral composition according to claim 9 *characterized in,* that it is tablet, comprising following pharmaceutically acceptable carriers and/or excipients for use in formulation: starch, gelatinized starch, cellulose, microcrystalline cellulose or cellulose derivatives, lactose, lactose monohydrate, talc, mannitol, sodium chloride, sodium carbonate, sucrose, maltose, calcium carbonate, colloidal anhydrous silica, stearic acid, magnesium stearate and / or isomalt.

11. Formulation process for preparation of composition according to any one of claims 1 to 10 *characterized in,* that the active ingredients and the pharmaceutically acceptable inert solid or liquid carriers and excipients are mixed in a proper ratio and afterwards formulated to the food supplement or medicinal or pharmaceutical composition according to any one of claims 1 to 10 by using the standard formulation methods.

12. Formulation process for preparation of solid, oral composition according to any one of claims 6 to 11 *characterized in* as given below:

	weight percentage (w/w %)	X mg in 1 g composition
Choline bitartrate	35	350
L-ascorbic	40	420

acid		
L-arginine	25	250

To obtain the most preferred three-component composition according to the version of the invention given in the chart above, it is necessary to achieve the chemical purity and exceed 90% purity of the raw materials of the edible ingredients separately. The moisture content of the raw materials must not exceed 5%. The particle size of the raw materials must be set in the range of 100-200 μm. In the first step of the formulation, the active ingredients 350 mg of choline bitartrate and 250 mg of L-arginine are mixed and homogenized.

Finally, 420 mg of L-ascorbic acid in the form of a solid powder was added to the two-component homogenized powder mixture, and the mixture was homogenized.

The second phase of mixing provides a three-component homogeneous composition.

The mixing of the ingredients must be carried out in a room with an atmosphere of not more than 40% relative humidity. A primer composition with a moisture content of not more than 5% does not require the use of an aid to reduce the moisture content. After mixing, the product should be stored airtight (e.g., in a plastic bag or barrel) until reconstitution (tableting, encapsulation).

The active ingredient content of the tablets and capsules of the preparation should be adjusted to 1 g of useful ingredient per unit weight.

In the capsule formulation, the homogenized solid mixture is filled into capsules.

For tableting, the homogenized mixture of excipients and active ingredients is tableted under pressure after the

addition of a customary formulation carrier and / or excipient.

The and/or related carriers and excipients required for the formulation are the following: starch, gelatinized starch, cellulose, microcrystalline cellulose or cellulose derivatives, lactose, lactose monohydrate, talc, mannitol, sodium chloride, sodium carbonate, sucrose, maltose, calcium carbonate, colloidal anhydrous silica, stearic acid, magnesium stearate and / or isomalt.

13. Composition according to any one of claims 1 to 12 *characterized in,* that it is for use in reducing virus infection.

14. Composition according to claim 13 *characterized in,* that it is for use in reducing Covid-19 virus infection caused by the SARS-COV-2 coronavirus.

15. Composition according to claim 13 *characterized in,* that it is for use in reducing bird flu virus infection caused by the IBV coronavirus.

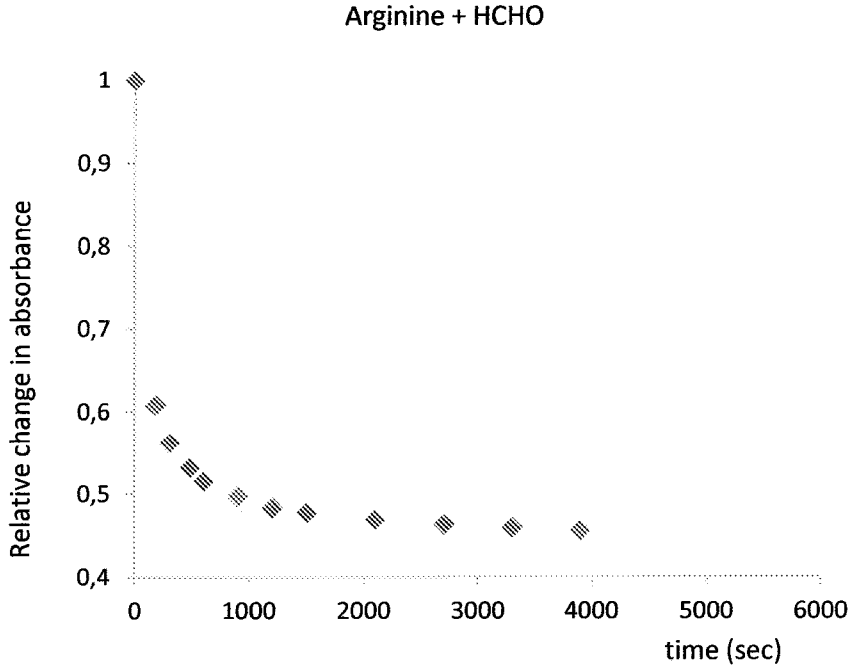

Figure 1. a.

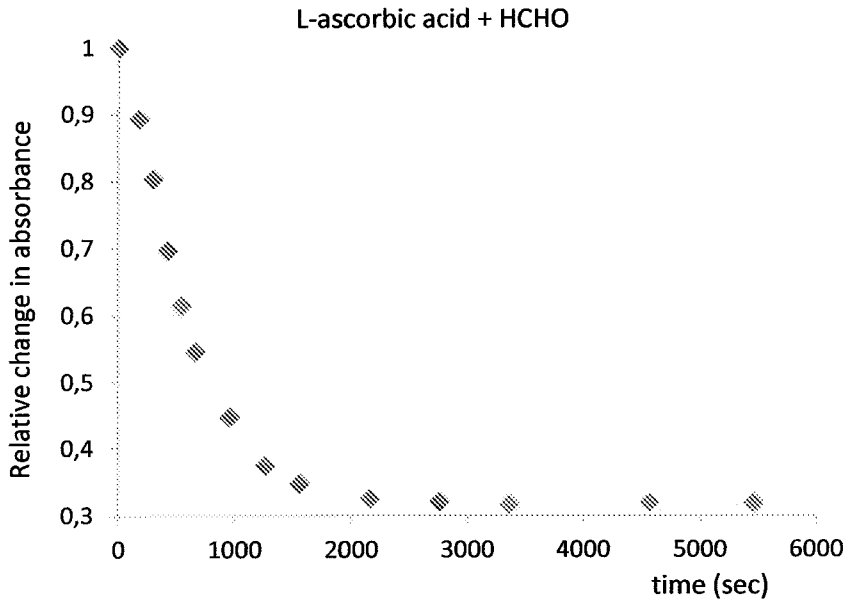

Figure 2. b.

Figure 1.

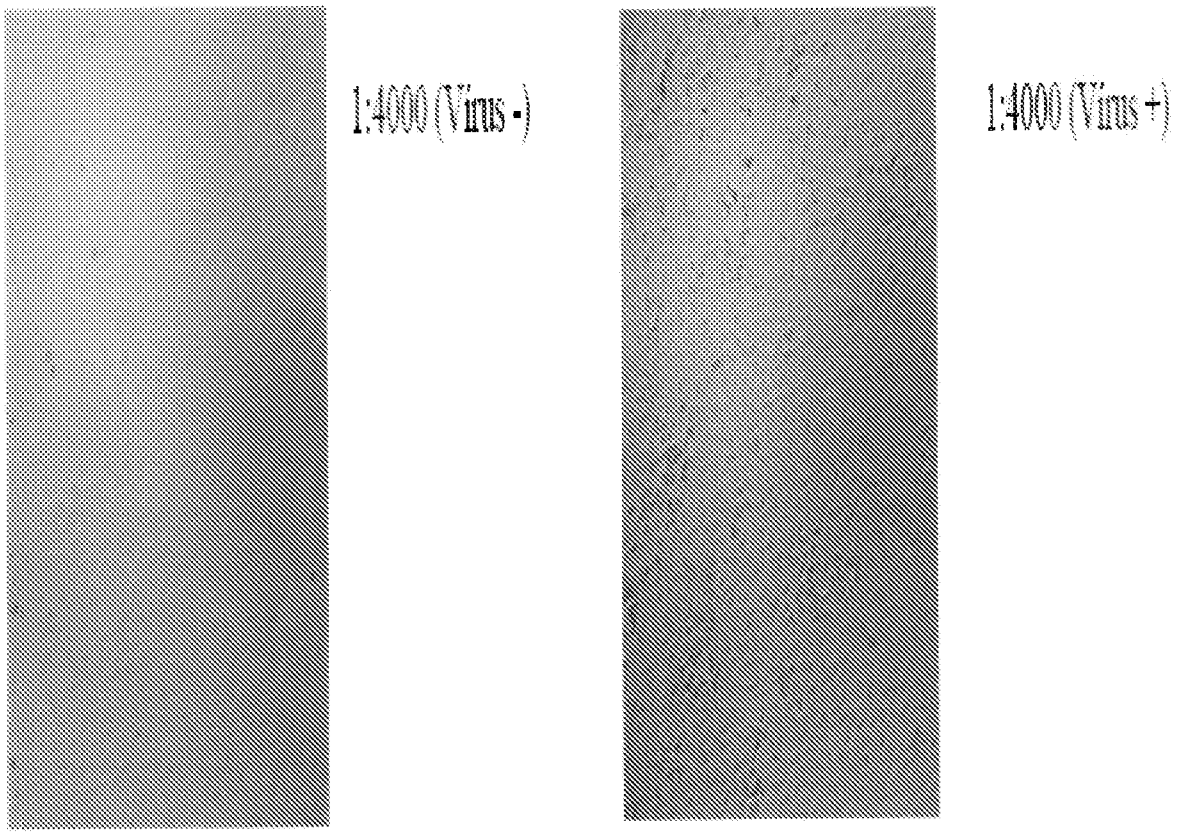

Figure 2

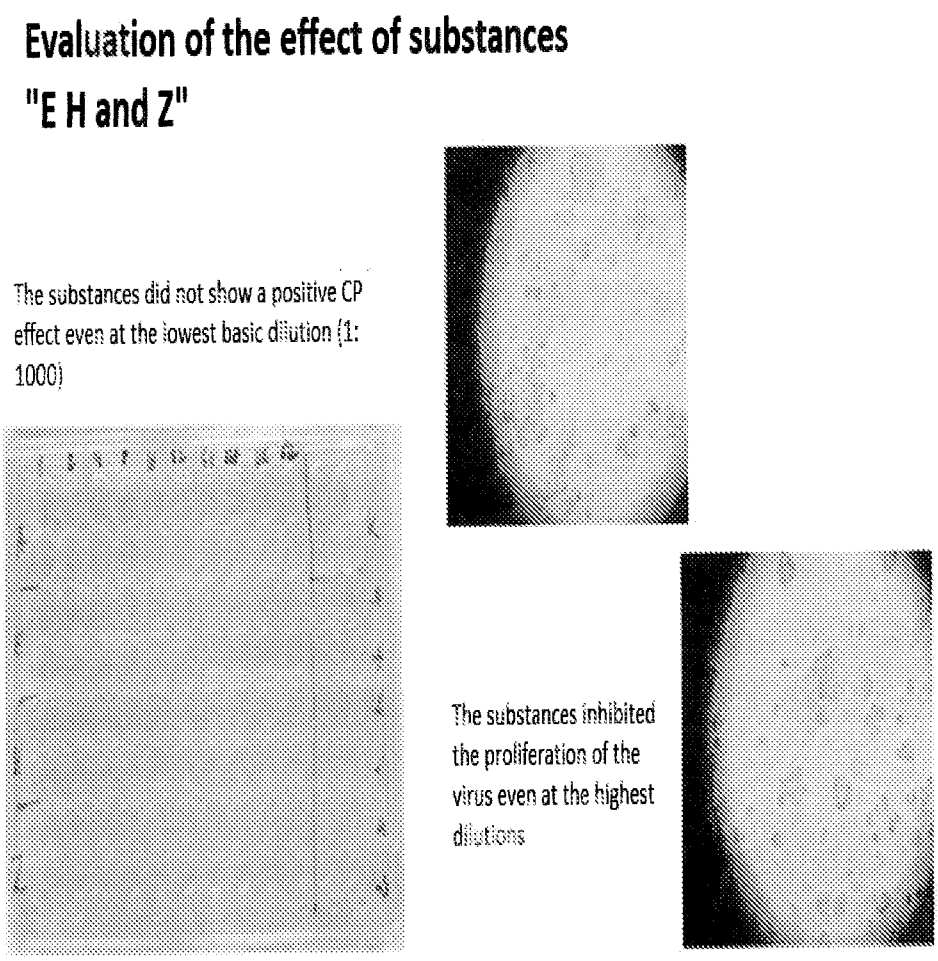
Evaluation of the effect of substances
"E H and Z"
The substances did not show a positive CP effect even at the lowest basic dilution (1: 1000)
The substances inhibited the proliferation of the virus even at the highest dilutions

FIGURE 3

	Choline bitartrate	L-ascorbic acid	L-arginine
IUPAC name	2-hydroxyethyl (trimethyl) azaniumyl (2R, 3R) -2,3,4-trihydroxy-4-oxobutanoate	(R) -3,4-dihydroxy-5 -((S) -1,2-dihydroxyethyl) furan-2 (5H) -one	(S) -2-Amino-5-guanidinopentanoic acid
CAS	87-67-2	50-81-7	74-79-3
PubChem	6900	54670067	6322
Sum Formula	$C_9H_{19}NO_7$	$C_6H_8O_6$	$C_6H_{14}N_4O_2$
Molecular weight (g/mol)	253.25	176.12	174.20
Physical state, solubility	solid, water soluble, hygroscopic	solid, water soluble, hygroscopic	solid, water soluble, hygroscopic
Daily exogenous requirement (human; mg / day)	200-400 (choline equivalent)	70-100	appr. 3000
Toxicity (LD50, mg / kg; oral; rat)	3400	11900	> 2500

Chart 1.

	weight percentage (w/w %)	X mg in 1 g composition
Choline bitartrate	34-37 (optimal:35)	340-370 (optimal:350)
L-ascorbic acid	38-42 (optimal.:40)	380-420 (optimal:400)
L-arginine	21-28 (optimal: 25)	210-280 (optimal:250)

Chart 2

Figure 4