i.e. when an interaction between the virus and the host cell is about to occur. Sulphated polysaccharides including carrageenans and fucoidan have been known for their antiviral efficacy for decades. In a most interesting review, Gonzalez M.E. et al. (1987, Antimicrob. Agents Chemother. 31, 1388-1393) report an antiviral efficacy of different sulphated polysaccharides including iota-carrageenan against several animal viruses. Iota-carrageenan showed antiviral activity against the enveloped viruses HSV-1, HSV-2, Semliki Forest virus (SFV), vaccinia virus and African swine fever virus (ASF) and against the naked encephalomyocarditis (EMC) virus. Iota-carrageenan had no effect on the enveloped viruses vesicular stomatitis virus (VSV) and measles virus and on the naked viruses polio virus type 1 and adenovirus type 5.

In view of differing experiences made and further in view of sometimes even contradictory results obtained by researches in their attempts of antiviral treatment of varying viral species with carrageenan the authors of US 5,658,893 summarized at column 2, last paragraph bridging over to col. 3, that "*in view of the different responses by different viruses to sulphated polysaccharides, it is clear that the response of a particular virus to carrageenan cannot be predicted with certainty without experimentation. The mechanism by which sulphated polysaccharides, particularly the carrageenans, inhibit viral replication and infectivity may not be uniform as different investigators reported contradictory findings when working with different viruses and cell types. It would* ***not*** *be obvious to one skilled in the art that a substance such as a sulphated polysaccharide that is an effective inhibitor of one virus would demonstrate similar efficacy against another virus.*"

This situation has not changed over the years and is still applicable.

SUMMARY

In one aspect, there is provided use of a sulphated polysaccharide selected from the group consisting of iota-carrageenan, kappa-carrageenan, lambda-carrageenan, cellulose sulphate, and dextran sulphate, as an antiviral active ingredient in the manufacture of a pharmaceutical composition or a medicament for the prophylaxis or treatment against a SARS-CoV-2 infection in a mammal, especially in a human individual, wherein a) said composition or medicament is in the form of a liquid, a foam, or a semi-solid preparation, and the antiviral active ingredient is present therein in a concentration of at least 10 ug/ml, at least 100 ug/ml, or at least 400 ug/ml; or else, wherein b) said composition or medicament is in the form of a solid dosage unit, and the antiviral active ingredient is present therein in an amount of at least 0.5 mg, at least 2 mg, at least 5 mg, at least 10 mg, or at least 20 mg per dosage unit.

In another aspect, there is provided use of at least one sulphated polysaccharide selected from the group consisting of iota-carrageenan, kappa-carrageenan, lambda-carrageenan, cellulose sulphate, and dextran sulphate, as an antiviral active ingredient in the manufacture of a pharmaceutical composition or a medicament for the prophylaxis or treatment against a SARS-CoV-2 infection in a human individual or non-human animal, wherein a) said composition or medicament is in the form of a liquid, a foam or a semi-solid preparation and the antiviral active ingredient is present therein in a concentration of at least 10 ug/ml, at least 100 ug/ml, or at least 400 ug/ml; or else, wherein b) said composition or medicament is in the form of a solid dosage unit and the sulphated polymer is present therein in an antiviral effective amount of at least 0.5 mg, at least 2 mg, at least 5 mg, at least 10 mg, or at least 20 mg, per dosage unit.

BRIEF DESCRIPTION OF THE INVENTION

The challenging worldwide spreading pandemic coronavirus disease 2019 (COVID-19) is caused by a virus that has been denominated Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). Before entering the cell the virus attaches to the host cell surface. It has been found that the viral spike protein recognizes and attaches to the ACE2-receptor (Angiotensin-Converting Enzyme 2 receptor) located on the surface of type I and II pneumocytes, endothelial cells, and ciliated bronchial epithelial cells. It is

CLAIMS

What is claimed:

1. Use of ~~A~~a sulphated polysaccharide selected from the group consisting of iota-carrageenan, kappa-carrageenan, lambda-carrageenan, cellulose sulphate, and dextran sulphate, ~~for use~~ as an antiviral active ingredient in the manufacture of a pharmaceutical composition or a medicament for the ~~prophylactic~~ prophylaxis or ~~therapeutic application~~treatment against a SARS-CoV-2 infection in a mammal, especially in a human individual, wherein

a) said composition or medicament is in the form of a liquid, a foam, or a semi-solid preparation, and the antiviral active ingredient is present therein in a concentration of at least 10 ug/ml, at least 100 ug/ml, or at least 400 ug/ml;
or else, wherein

b) said composition or medicament is in the form of a solid dosage unit, and the antiviral active ingredient is present therein in an amount of at least 0.5 mg, at least 2 mg, at least 5 mg, at least 10 mg, or at least 20 mg per dosage unit.

2. The ~~sulphated polysaccharide of~~use according to claim 1, wherein the antiviral active ingredient comprises at least one, optionally a mixture of at least two of said sulphated polysaccharides.

3. The ~~sulphated polysaccharide of~~use according to claim 1 or 2, wherein

- said liquid or semi-solid composition is selected from the group consisting of a skin lotion, an aqueous solution for disinfection, an aqueous solution for inhalation, a spray or sprayable solution, liquid drops, and a gargle solution;
- said semi-solid composition is selected from the group consisting of a gel, a cream, and an ointment; and
- said solid dosage unit is selected from the group consisting of a tablet, a lozenge, a dragée, a capsule, and a chewing gum.

4. Use of ~~A pharmaceutical composition or medicament comprising~~ at least one sulphated polysaccharide selected from the group consisting of iota-carrageenan, kappa-carrageenan, lambda-carrageenan, cellulose sulphate, and dextran sulphate, as an antiviral active ingredient ~~for use~~ in the manufacture of a pharmaceutical composition or a medicament for the ~~prophylactic~~ prophylaxis or ~~therapeutic~~

~~application~~treatment against a SARS-CoV-2 infection in a human individual or non-human animal, wherein

a) said composition or medicament is in the form of a liquid, a foam or a semi-solid preparation and the antiviral active ingredient is present therein in a concentration of at least 10 ug/ml, at least 100 ug/ml, or at least 400 ug/ml;
or else, wherein

b) said composition or medicament is in the form of a solid dosage unit and the sulphated polymer is present therein in an antiviral effective amount of at least 0.5 mg, at least 2 mg, at least 5 mg, at least 10 mg, or at least 20 mg, per dosage unit.

5. The ~~pharmaceutical composition or medicament~~use according to claim 4, wherein
said liquid or semi-solid composition is selected from the group consisting of a skin lotion, an aqueous solution for disinfection, an aqueous solution for inhalation, a spray or sprayable solution, liquid drops, and a gargle solution;
wherein said semi-solid composition is selected from the group consisting of a gel, a cream, and an ointment; and
wherein said solid dosage unit is selected from the group consisting of a tablet, a lozenge, a dragée, a capsule, and a chewing gum.

6. The ~~pharmaceutical composition or medicament~~use according to claim 4 or 5, which comprises a carrageenan component in an antiviral effective amount, wherein said carrageenan component is either iota-, kappa- or lambda-carrageenan, or a mixture of at least two of iota-, kappa- and lambda-.

7. The ~~pharmaceutical composition or medicament~~use according to any one of claims 4 to 6, wherein the lambda-carrageenan is purified to comprise at least 30 mol%, preferably 45 to 55 mol% of lambda-type repeating disaccharide subunits, relative to the total of iota-, kappa-, lambda-, mu- and nu-type repeating disaccharide subunits present in the lambda-carrageenan material.

8. The ~~pharmaceutical composition or medicament~~use according to any one of claims 4 to 7, wherein said composition or medicament comprises at least one pharmaceutically acceptable carrier and/or additive, said additive preferably selected from sodium and potassium chloride and being present in the composition in an amount of 1.5 %wt or less, or of 1.0 %wt or less, or of 0.6 % or less.

9. The ~~pharmaceutical composition or medicament~~use according to any one of claims 4 - 8, wherein the composition in a liquid form is attached by either coating or impregnation to a solid surface of a hygiene or sanitary item.

10. The ~~pharmaceutical composition or medicament~~use according to claim 9, wherein said hyiene or sanitary item is selected from the group consisting of a hygiene or sanitary glove, a hygiene or sanitary tissue or paper, a cotton swab, a dust mask, a sanitary facial mask, and a medical facial mask.

11. The ~~pharmaceutical composition or medicament~~use according to claim 4, wherein said human individual is a high-risk patient selected from the group consisting of a COPD-patient, an asthma patient, a person with allergies, a person with impaired immune, cardiac, or pulmonary system, and a transplantation patient, or wherein said human individual is a member of healthcare personell in hospitals, pharmacies and doctor's offices, or a person who occupationally gets into close contact with infected or potentially infected human individuals or non-human animals.