CLAIMS

[Claim 1] An intranasal dry vaccine powder formulation comprising:
a. one or more antigens;
b. one or more saccharides; and
c. microcrystalline cellulose, wherein said microcrystalline cellulose has a mean particle diameter of between 10 micro m and 100 micro m.

[Claim 2] The intranasal dry vaccine powder formulation of claim 1, wherein at least one of said one or more antigens is viral antigen.

[Claim 3] The intranasal dry vaccine powder formulation of claim 1, wherein at least one of said one or more antigens is influenza viral antigen.

[Claim 4] The intranasal dry vaccine powder formulation of claim 1, wherein at least one of said one or more antigens is live attenuated virus, whole inactivated virus, split virus, subunit antigen, virosome, or cold-adapted live influenza virus.

[Claim 5] The intranasal dry vaccine powder formulation of claim 1, wherein at least one of said one or more antigens is whole inactive virus.

[Claim 6] The intanasal dry vaccine powder formulation of claim 1, wherein at least one of said one or more antigens is split-inactive virus.

[Claim 7] The intanasal dry vaccine powder formulation of claim 1, wherein at least one of said one or more antigens is H1N1 influenza virus.

[Claim 8] The intanasal dry vaccine powder formulation of claim 1, wherein at least one of said one or more antigens is H5N1 influenza virus.

[Claim 9] The intranasal dry vaccine powder formulation of claim 1, wherein said one or more antigens comprises H1N1 influenza virus, H3N2 influenza virus, and Influenza B virus.

[Claim 10] The intranasal dry vaccine powder formulation of claim 1, wherein at least one of said one or more antigens is a bacterial antigen.

[Claim 11] The intanasal dry vaccine powder formulation of claim 1, wherein at least one of said one or more antigens is killed whole bacteria, attenuated bacteria, toxoids, purified surface protein, or purified recombinant surface protein.

[Claim 12] The intranasal dry vaccine powder formulation of claim 1, wherein at least one of said one or more antigens is tetanus toxoid.

[Claim 13] The intranasal dry vaccine powder formulation of claim 1, wherein at least one of said one or more antigens is diphtheria toxoid.

[Claim 14] The intranasal dry vaccine powder formulation of claim 1, wherein at least one of said one or more antigens is a protist antigen.

[Claim 15] The intranasal dry vaccine powder formulation of claim 1, wherein at least one of

said one or more antigens is a protein.

[Claim 16] The intranasal dry vaccine powder formulation of claim 1, wherein at least one of said one or more saccharides is trehalose, mannitol, or lactose.

[Claim 17] The intranasal dry vaccine powder formulation of claim 16, wherein at least one of said one or more saccharides is trehalose.

~~[Claim 18] The dry vaccine powder formulation of claim 1, wherein said microcrystalline cellulose has a mean particle diameter of between 10 micro m and 100 micro m.~~

[Claim 189] The intranasal dry vaccine powder formulation of claim 1, wherein said microcrystalline cellulose has a specific surface area between 1.3 m^2/g and 20 m^2/g.

[Claim ~~20~~19] The intranasal dry vaccine powder formulation of claim 1, wherein said microcrystalline cellulose has a bulk density between 0.1 g/cm^3 and 1.0 g/cm^3.

[Claim 20~~1~~] The intranasal dry vaccine powder formulation of claim 1, further comprising one or more buffers.

[Claim 21~~2~~] The intranasal dry vaccine powder formulation of claim 20~~21~~, wherein at least one of said one or more buffers is a phosphate buffer.

[Claim 22~~3~~] The intranasal vaccine powder formulation of claim 1, wherein said intranasal dry vaccine powder formulation is stable at room temperature and 60% relative humidity for at least 12 months.

[Claim 23~~4~~] A method for generating an intranasal dry vaccine powder formulation comprising:
a. preparing a liquid formulation comprising one or more antigens and one or more saccharides;
b. quick freezing said liquid formulation, wherein the quick freezing does not comprise spray freezing; and,
c. blending the freeze-dried sample with one or more excipients to generate the intranasal dry vaccine powder formulation.

[Claim 24~~5~~] The method of claim 23~~24~~, wherein at least one of said one or more antigens is viral antigen.

[Claim 25~~6~~] The method of claim 23~~24~~, wherein at least one of said one or more antigens is influenza virus.

[Claim 26~~7~~] The method of claim 23~~24~~, wherein at least one of said one or more antigens is H1N1 influenza virus.

[Claim 27~~8~~] The method of claim 23~~24~~, wherein at least one of said one or more antigens is H5N1 influenza virus.

[Claim 28~~9~~] The method of claim 23~~24~~, wherein said one or more antigens comprises H1N1 influenza virus, H3N2 influenza virus, and Influenza B virus.

[Claim 29~~30~~] The method of claim 23~~24~~, wherein at least one of said one or more

antigens is live attenuated virus, whole inactivated virus, split virus, subunit antigen, virosome, or cold-adapted live influenza virus.

[Claim 301] The method of claim 2324, wherein at least one of said one or more antigens is a bacterial antigen.

[Claim 312] The method of claim 2324, wherein at least one of said one or more antigens is killed whole bacteria, attenuated bacteria, toxoids, purified surface protein, or purified recombinant surface protein.

[Claim 323] The method of claim 2324, wherein at least one of said one or more antigens is tetanus toxoid.

[Claim 334] The method of claim 2324, wherein at least one of said one or more antigens is diphtheria toxoid.

[Claim 345] The method of claim 2324, wherein at least one of said one or more antigens is a protist antigen.

[Claim 356] The method of claim 2324, wherein at least one of said one or more antigens is a protein.

~~[Claim 37] The method of claim 24, wherein preparing said liquid formulation further comprises addition of one or more saccharides.~~

[Claim 368] The method of claim 2337, wherein at least one of said one or more saccharides is lactose.

[Claim 379] The method of claim 2337, wherein at least one of said one or more saccharides is trehalose.

[Claim 3840] The method of claim 2337, wherein at least one of said one or more saccharides is mannitol.

[Claim 3941] The method of claim 2324, wherein preparing said liquid formulation further comprises addition of one or more buffers.

[Claim 402] The method of claim 3941, wherein at least one of said one or more buffers is a phosphate buffer.

[Claim 413] The method of claim 2324, wherein said powder has a mean particle diameter between 10 micro m and 100 micro m.

[Claim 424] The method of claim 2324, wherein said powder is stable at room temperature and 60% relative humidity for at least 12 months.

[Claim 435] The method of claim 2324, wherein said one or more excipients comprise one or more nasal carriers.

[Claim 446] The method of claim 4345, wherein said one or more nasal carriers comprise microcrystalline cellulose or tribasic calcium phosphate (TCP).

[Claim 457] The method of claim 4446, wherein said nasal carrier has a mean particle diameter of between 10 micro m and 100 micro m.

[Claim 468] The method of claim 446, wherein said nasal carrier has a specific surface area between 1.3 m^2/g and 20 m^2/g.

[Claim 479] The method of claim 446, wherein said nasal carrier has a bulk density between 0.1 g/cm^3 and 1.0 g/cm^3.

[Claim 4850] The method of claim 2324, wherein said one or more excipients improves flowability.

[Claim 4951] The method of claim 2324, wherein said one or more excipients reduces hygroscopicity.

[Claim 5052] The method of claim 2324, wherein said vaccine powder formulation does not comprise adjuvant.

[Claim 513] The method of claim 2324, wherein said quick freezing comprises using liquid nitrogen.

[Claim 524] Use of an intranasal dry vaccine powder formulation in the manufacture of a medicament for stimulating an sIgA response in a subject, wherein the dry powder formulation comprises one or more antigens and wherein the dry powder formulation is generated by quick freezing a liquid vaccine formulation, wherein the quick freezing does not comprise spray-freezing.

[Claim 535] The use of claim 524, wherein an IgG response is also stimulated.

[Claim 546] The use of claim 524, wherein said vaccine dry powder formulation can induce sIgA production at a mucosal site other than the site of administration.

[Claim 557] The use of claim 524, wherein said administration is intranasal.

[Claim 568] The use of claim 524, wherein the vaccine powder formulation does not comprise adjuvant.

[Claim 579] The use of claim 524, wherein said quick freezing comprising using liquid nitrogen.

[Claim 5860] The use of claim 524, wherein at least one of said one or more antigens is viral antigen.

[Claim 5961] The use of claim 524, wherein at least one of said one or more antigens is live attenuated virus, whole inactivated virus, split virus, subunit antigen, virosome, or cold-adapted live influenza virus.

[Claim 602] The use of claim 524, wherein at least one of said one or more antigens is influenza virus.

[Claim 613] The use of claim 524, wherein at least one of said one or more antigens is H1N1 influenza virus.

[Claim 624] The use of claim 524, wherein at least one of said one or more antigens is H5N1 influenza virus.

[Claim 635] The use of claim 524, wherein said one or more antigens comprises H1N1 influenza virus, H3N2 influenza virus, and Influenza B virus.

[Claim 646] The use of claim 524, wherein at least one of said one or more antigens is a bacterial antigen.

[Claim 657] The use of claim 524, wherein at least one of said one or more antigens is killed whole bacteria, attenuated bacteria, toxoids, purified surface protein, or purified recombinant surface protein.

[Claim 668] The use of claim 524, wherein at least one of said one or more antigens is tetanus toxoid.

[Claim 679] The use of claim 524, wherein at least one of said one or more antigens is diphtheria toxoid.

[Claim 6870] The use of claim 524, wherein at least one of said one or more antigens is a protist antigen.

[Claim 6971] The use of claim 524, wherein at least one of said one or more antigens is a protein.

[Claim 7072] The use of claim 524, wherein said liquid formulation comprises one or more saccharides.

[Claim 713] The use of claim 702, wherein at least one of said one or more saccharides is lactose.

[Claim 724] The use of claim 702, wherein at least one of said one or more saccharides is trehalose.

[Claim 735] The use of claim 702, wherein at least one of said one or more saccharides is mannitol.

[Claim 746] The use of claim 524, wherein said liquid formulation comprises one or more buffers.

[Claim 757] The use of claim 746, wherein at least one of said one or more buffers is a phosphate buffer.

[Claim 768] The use of claim 524, wherein said powder has a mean particle diameter between 10 micro m and 100 micro m.

[Claim 779] The use of claim 524, wherein said powder is stable at room temperature and 60% relative humidity for at least 12 months.

[Claim 7880] The use of claim 524, wherein said dry vaccine powder formulation comprises one or more excipients.

[Claim 7981] The use of claim 7880, wherein said one or more excipients comprise one or more nasal carriers.

[Claim 8082] The use of claim 7880, wherein said one or more nasal carriers comprise microcrystalline cellulose or tribasic calcium phosphate (TCP).

Claim 813] The use of claim 802, wherein said nasal carrier has a mean particle diameter of between 10micro m and 100 micro m.

[Claim 824] The use of claim 802, wherein said nasal carrier has a specific surface area between 1.3 m^2/g and 20 m^2/g.

[Claim 835] The use of claim 802, wherein said nasal carrier has a bulk density between 0.1 g/cm^3 and 1.0 g/cm^3. ~~The method of claim 78, wherein said one or more excipients improves flowability.~~

[Claim 846] The use of claim 7880, wherein said one or more excipients reduces hygroscopicity.

[Claim 857] A device for administration of an intransal dry vaccine powder formulation comprising the vaccine powder formulation generated by the method of claim 24.

[Claim 868] The device of claim 857, wherein the device is configured for a single use.