

CLAIMS

1. A method of evaluating a subject for presence of JC virus antibodies, said method comprising:
 - a. contacting a biological sample obtained from a subject with highly purified VP1 particles (HPVLPs) in solution under conditions suitable for binding of a JC Virus (JCV) antibody in the sample to an HPVLP, thereby providing a pre-incubated sample;
 - b. contacting the pre-incubated sample with HPVLPs immobilized on a solid substrate under conditions suitable for binding of a JCV antibody in the sample to an HPVLP;
 - c. detecting the level of JCV antibody in the pre-incubated sample binding to the immobilized HPVLPs; and
 - d. comparing the detected level of JCV antibody in the pre-incubated sample binding to the immobilized HPVLPs to a reference value, which corresponds to a detected level of JCV antibody in a pre-incubated control sample, wherein the pre-incubated control sample was pre-incubated in the absence of HPVLPs in solution, thereby providing a pre-incubated control sample, and wherein the pre-incubated control sample was contacted with HPVLPs immobilized on a solid substrate under conditions suitable for binding of a JCV antibody in the sample to an HPVLP, thereby evaluating the subject for presence of JC virus antibodies.
2. The method of claim 1, wherein the biological sample obtained from the subject is classified as positive for JCV antibody when the level of JCV antibody in the pre-incubated biological sample binding to the immobilized HPVLPs is lower than the reference value by more than a predetermined amount; and wherein the biological sample obtained from the subject is classified as negative for JCV antibody when the level of JCV antibody in the pre-incubated biological sample binding to the immobilized HPVLPs is lower than the reference value by less than a predetermined amount.
3. The method of claim 1, wherein the method further comprises obtaining the biological sample from the subject.
4. The method of claim 1, wherein the contacting the biological sample with HPVLPs in solution is for a period of time selected from 30 minutes, one hour, or overnight.
5. The method of claim 2, wherein the predetermined amount is 40%.
6. The method of claim 2, wherein the biological sample obtained from the subject is classified as negative for JCV antibody when the level of JCV antibody in the pre-incubated biological sample binding to the immobilized HPVLPs is approximately the same as the reference level.
7. The method of claim 1, wherein each HPVLP is composed of more than 1, at least 5, 10, 20, 30, 40, 50, 60, 70 or 72 VP1 pentamers.
8. The method of claim 1, wherein each HPVLP is composed of more than 5, at least 50, 150 or 360 VP1 polypeptides.
9. The method of claim 1, wherein at least 20% of the HPVLPs comprise more than five VP1 polypeptides in an HPVLP.

10. The method of claim 1, wherein an HPVLP consists essentially of VP1 polypeptides.
11. The method of claim 1, wherein an HPVLP further comprises at least one of a VP2, or a VP3.
12. The method of claim 1, wherein at least one VP1 in the HPVLP is a mutant VP1.
13. The method of claim 1, wherein the biological sample is serum.
14. The method of claim 1, wherein the sample is from a subject prescribed an immunomodulator, a subject considering taking an immunomodulator, or a subject suspected of having Progressive Multifocal Leukoencephalopathy (PML).
15. The method of claim 2, wherein if the biological sample is positive for JCV antibody then the subject is at an increased risk of PML as compared to a subject who is negative for a JCV antibody.
16. The method of claim 2, wherein if the biological sample is positive for JCV antibody then the subject is not a candidate to receive treatment with an immunomodulator.
17. The method of claim 2, wherein if the biological sample is negative for JCV antibody then the subject is a candidate to receive treatment with an immunomodulator.
18. The method of claim 1, wherein the method is validated for use in multiple sclerosis (MS) and Crohn's Disease (CD) patients.
19. The method of claim 2, wherein the subject is a candidate to receive treatment with an immunomodulator on a first date, and wherein the method further comprises monitoring PML risk in the subject on a second date, the method comprising: determining whether a biological sample obtained from the subject on the second date is positive or negative for JCV antibody wherein if the biological sample obtained from the subject on the second date is positive for JCV antibody then the subject is at an increased risk of PML as compared to a subject who is negative for a JCV antibody; and if the biological sample obtained from the subject on the second date is negative for a JCV antibody then the subject continues to be a candidate to receive treatment with an immunomodulator.