Having described the invention, the following is claimed:

1. A method of determining the efficacy of interferon-beta (IFN-β) therapy in a subject with multiple sclerosis (MS), the method comprising the steps of:

~~obtaining a biological sample from the subject; and~~

~~———————~~determining the expression level of at least one interferon-regulated gene (IRG) and/or variant thereof from a biological sample from the subject after IFN-β is administered ~~administration~~, wherein the IRG is a gene selected from the genes shown in Table 3;

wherein increased or decreased expression of the at least one IRG and/or variant thereof as compared to a control indicates that the subject will respond poorly to IFN-β therapy.

2. The method of claim 1, the biological sample comprising whole blood.

3. The method of claim 2, further comprising isolating RNA from the whole blood sample.

~~4. The method of claim 1, further including administering a dose of IFN-β to the subject prior to obtaining the biological sample.~~

~~5~~4. The method of claim 4~~1~~, further including determining the expression level of at least one interferon-regulated gene (IRG) and/or variant thereof from the biological sample from the subject obtained ~~obtaining the biological sample~~ in less than about 12 hours after administration of the IFN-β dose.

~~6~~5. A method for screening an agent that can be used to treat MS, the method comprising the steps of:

providing a population of peripheral blood mononuclear cells (PBMCs) from a subject with MS that is a poor responder to IFN-β therapy;

administering an agent to the PBMCs after IFN-β administration; and

determining the expression level of at least one IRG and/or variant thereof in one or more of the PBMCs, wherein the IRG is a gene selected from the genes shown in Table 3.

~~7~~6. The method of claim ~~6~~5, wherein increased or decreased expression of the at least one IRG and/or variant thereof as compared to a control indicates that the agent is not a candidate for MS therapy.

~~8~~7. ~~A method of treating a subject with MS, the method comprising the steps of:~~Use of at least one MS therapeutic agent, besides IFN-β, in the manufacture of a medicament for treating a subject with MS,

~~obtaining a biological sample from the subject;~~

~~determining~~ wherein the subject has been selected after ex vivo measurement of the expression level of at least one IRG and/or variant thereof after IFN-β administration, wherein the IRG is a gene selected from the genes shown in Table 3 in a biological sample from the subject; and

~~administering to the subject a therapeutically effective amount of at least one agent, besides IFN-β, if expression of one or more of~~wherein a decrease or increase in the at one IRG and/or variant thereof expression ~~is increased or decreased~~ as compared to a control indicates that the subject is a candidate for treatment.

~~9~~8. The ~~method~~ use of claim ~~8~~7, the biological sample comprising whole blood.

~~10~~9. The ~~method~~ use of claim ~~9~~8, further comprising isolating RNA from the whole blood sample.

~~11. The method of claim 8, further including administering a dose of IFN-β to the subject prior to obtaining the biological sample.~~

~~12~~10. The ~~method~~ use of claim ~~11~~7, further including obtaining the biological sample in less than about 12 hours after administration of the IFN-β dose.

~~13. A method of treating a subject with MS, the method comprising the steps of:~~

~~obtaining a biological sample from the subject;~~

~~determining the expression level of at least one IRG and/or variant thereof; and~~

~~administering to the subject a therapeutically effective amount of natalizumab if expression of the at least one IRG and/or variant thereof is increased or decreased as compared to a control.~~

~~14. The method of claim 13, the biological sample comprising whole blood.~~

~~15. The method of claim 14, further comprising isolating RNA from the whole blood sample.~~

11. The use of claim 7, wherein the MS therapeutic agent is natalizumab.

12. The method of claim 1, wherein the expression level of at least four interferon-regulated genes (IRG) and/or variants thereof are determined after IFN-β administration.

13. The use of claim 7, wherein the expression level of at least four interferon-regulated genes (IRG) and/or variants thereof are determined after IFN-β administration.