Multiple Sclerosis: Tecfidera (BG-12), tBHQ, SFN and Protandim Compared

by nrf2 on February 14, 2013

In a previous post entitled, “Multiple Sclerosis, Oxidative Stress and NRF2: What you Need to Know!” The potential benefits of NRF2 activation on Multiple Sclerosis (MS) were examined.

This post updates the previous post to include findings from a paper (Nrf2 activators: a novel strategy to promote oligodendrocyte survival in multiple sclerosis?) presented to 5th Joint triennial congress of the European and Americas Committees for Treatment and Research in Multiple Sclerosis (Amsterdam, The Netherlands 2011)

The study by J. Lim, S. van der Pol, J. Drexhage, E. de Vries, J. van Horssen (Amsterdam, NL) investigates the potential that four different Nrf2 activators (BG-12, tBHQ, SFN and protandim) had to boost antioxidant enzyme expression in oligodendrocytes and protect them from reactive oxygen species (ROS)-mediated cell death. View the MS & NRF2 study summary (> http://registration.akm.ch/einsicht.php?XNABSTRACT_ID=137548&XNSPRACHE_ID=2 &XNKONGRESS_ID=150&XNMASKEN_ID

Here are the Results:
1. BG-12, tBHQ, SFN and protandim are well-tolerated and strongly induce Nrf2-driven antioxidant enzyme production in oligodendrocytes, with protandim showing the most potent induction.
2. Nrf2 activators are able to protect oligodendrocytes against ROS-induced cytotoxicity.

& Conclusions: Our findings indicate that several Nrf2 activators are able to significantly increase antioxidant enzyme production in oligodendrocytes.

Interestingly, protandim, a dietary supplement consisting of herbal ingredients, was the most potent inducer and therefore may be the most suited as a therapeutic strategy. Importantly, Nrf2-mediated antioxidant enzyme expression in oligodendrocytes resulted in enhanced oligodendrocyte survival during an oxidative attack.

Dr. J. van Horssen received research grants from BiogenIdec
MS & NRF2 study summary

5th Joint triennial congress of the European and Americas Committees for Treatment and Research in Multiple Sclerosis
Amsterdam, The Netherlands

Repairing mechanisms 2
Friday, October 21, 2011, 15:30 - 17:00

Nrf2 activators: a novel strategy to promote oligodendrocyte survival in multiple sclerosis?
J. Lim, S. van der Pol, J. Drevhage, E. de Vries, J. van Horssen (Amsterdam, NL)

Objectives: To investigate the potential of different Nrf2 activators to boost antioxidant enzyme expression in oligodendrocytes and protect them from reactive oxygen species (ROS)-mediated cell death.

Background: Oligodendrocyte damage and loss are key features of Multiple Sclerosis (MS) pathology and oligodendrocytes are particularly vulnerable to ROS-induced oxidative damage and cell death. Hence, a potential therapeutic strategy to protect these cells from ROS-mediated damage is urgently needed. To date, several compounds, including fumurate derivative BG-12, tet-Buthylhydroquinone (tBHQ), sulforaphane (SFN) and protandrin have potential anti-inflammatory and neuroprotective properties. These compounds are thought to exert their protective function via activation of the nuclear factor-E2-related factor 2 (Nrf2) transcriptional pathway, which is involved in the production of antioxidant enzymes necessary for oxidative stress defense. We postulate that distinct Nrf2 activators boost antioxidant enzyme production in oligodendrocytes and limit ROS-mediated oligodendrocyte cell death.

Methods: Primary rat oligodendrocytes and rat and human oligodendrocyte cell lines were treated with different concentrations of BG-12, tBHQ, SFN and protandrin. Next, we analyzed the expression of Nrf2-mediated antioxidant enzymes by PCR and Western blot techniques. To study the beneficial effects of the different Nrf2 activators, we first incubated the oligodendrocytes with Nrf2 activators and subsequently exposed them to various concentrations of hydrogen peroxide and measured oligodendrocyte cell survival.

Results:
1. BG-12, tBHQ, SFN and protandrin are well-tolerated and strongly induce Nrf2-driven antioxidant enzyme production in oligodendrocytes, with protandrin showing the most potent induction.
2. Nrf2 activators are able to protect oligodendrocytes against ROS-induced cytotoxicity.

Conclusions: Our findings indicate that several Nrf2 activators are able to significantly increase antioxidant enzyme production in oligodendrocytes. Interestingly, protandrin, a dietary supplement consisting of herbal ingredients, was the most potent inducer and therefore may be the most suited as a therapeutic strategy. Importantly, Nrf2-mediated antioxidant enzyme expression in oligodendrocytes resulted in enhanced oligodendrocyte survival during an oxidative attack.

Dr. J. van Horssen received research grants from BiogenIdec

..................
Repairing mechanisms 2
Friday, October 21, 2011, 15:30 - 17:00

Nrf2 activators: a novel strategy to promote oligodendrocyte survival in multiple sclerosis?

J. Lim, S. van der Pol, J. Drenthage, E. de Vries, J. van Horssen (Amsterdam, NL)

Objectives: To investigate the potential of different Nrf2 activators to boost antioxidant enzyme expression in oligodendrocytes and protect them from reactive oxygen species (ROS)-mediated cell death. Background: Oligodendrocyte damage and loss are key features of Multiple Sclerosis (MS) pathology and oligodendrocytes are particularly vulnerable to ROS-induced oxidative damage and cell death. Hence, a potential therapeutic strategy to protect these cells from ROS-mediated damage is urgently needed. To date, several compounds, including fumarate derivative BG-12, tert-butyldihydroquinone (tBHQ), sulforaphane (SFN) and protandim have potential anti-inflammatory and neuroprotective properties. These compounds are thought to exert their protective function via activation of the nuclear factor-E2-related factor-2 (NRF2) transcriptional pathway, which is involved in the production of antioxidant enzymes necessary for oxidative stress defense. We postulate that distinct Nrf2 activators boost antioxidant enzyme production in oligodendrocytes and limit ROS-mediated oligodendrocyte cell death.

Methods: Primary rat oligodendrocytes and rat and human oligodendrocyte cell lines were treated with different concentrations of BG-12, tBHQ, SFN and protandim. Next, we analyzed the expression of Nrf2-mediated antioxidant enzymes by PCR and Western blot techniques. To study the beneficial effects of the different Nrf2 activators, we first incubated the oligodendrocytes with Nrf2 activators and subsequently exposed them to various concentrations of hydrogen peroxide and measured oligodendrocyte cell survival.

Results:
1. BG-12, tBHQ, SFN and protandim are well tolerated and strongly induce Nrf2-driven antioxidant enzyme production in oligodendrocytes, with protandim showing the most potent induction.
2. Nrf2 activators are able to protect oligodendrocytes against ROS-induced cytotoxicity.

Conclusions: Our findings indicate that several Nrf2 activators are able to significantly increase antioxidant enzyme production in oligodendrocytes. Interestingly, protandim, a dietary supplement consisting of herbal ingredients, was the most potent inducer and therefore may be the most suited as a therapeutic strategy. Importantly, Nrf2-mediated antioxidant enzyme expression in oligodendrocytes resulted in enhanced oligodendrocyte survival during an oxidative attack.

Dr. J. van Horssen received research grants from Biogen Idec.