Introduction

The leading hypothesis for the cause of Alzheimer’s disease (AD) is chronically high levels of neuro-destructing B-amyloid (Aβ) peptide fragments in the brain. Recently, the relationship between AD and diabetes has been the focus of extensive investigation, where studies have shown how the risk of developing AD is increased 50% in patients with type 2 diabetes mellitus (T2DM) [1]. The results of this study showed that resveratrol (3,4’,5’-trihydroxystilbene) was initially thought to reduce AD generation and accumulation, but has since been shown to significantly increase the generation of glutathione and consequently AD [2]. Using reagent was added to the cells and fluorescence was measured at an excitation/emission wavelength of 490 nm. Data is corrected to % of control from viability assay. ** = p < 0.01 compared to the control.

Methods

Cell Culture

A neuro-vascular model was obtained as a gift from the University of Bergen. Cells were cultured in coated wells (60 µL) and seeded into a 4-well plate (60 µL) in a culture medium specifically depending on the assay (n=5). Cells were incubated for 4 hours and then treated with reagent as described in the Materials and Methods section. Cell Culture: (Figure 8) has a role in preventing memory loss.

Results & Discussion

Resveratrol was shown to cause a two-fold increase in Aβ production at 20 µM, whereas no significant effect was shown in controls treated with 3MA (Figure 4). This suggested that autophagy is a crucial mechanism of action of resveratrol and metformin (Figure 9). This is consistent with previous studies where the same effect as the control on p62 degradation, indicating no effect on autophagy. Bars are means +/− standard error of the mean. ** = p < 0.01 compared to the control.

Figure 1. The effect of Aβ42 ELISA to quantitatively measure Aβ, assess the mechanism by which metformin and resveratrol affect AD, and resolve cellular autophagy.

Figure 2. The effect of resveratrol on mito-superoxide production in N2a® cells treated with 3MA and metformin (control). Bars are means +/− standard error of the mean. ** = p < 0.01 compared to the control.

Figure 3. The effect of the combination treatment of resveratrol and metformin on mito-superoxide production in N2a® cells treated with 3MA and metformin (control). Bars are means +/− standard error of the mean. ** = p < 0.01 compared to the control.

Figure 4. The effect of resveratrol on the mitochondrial superoxide production in N2a® cells treated with 3MA and metformin (control). Bars are means +/− standard error of the mean. ** = p < 0.01 compared to the control.

Figure 5. The effect of resveratrol on cell viability and caspase 3/7 activity. Bars are means +/− standard error of the mean. ** = p < 0.01 compared to the control.

Figure 6. The effect of resveratrol and metformin on mitochondrial superoxide. Bars are means +/− standard error of the mean. ** = p < 0.01 compared to the control.

Figure 7. The effect of resveratrol and metformin on cell viability and caspase 3/7 activity. Bars are means +/− standard error of the mean. ** = p < 0.01 compared to the control.

Figure 8. The effect of resveratrol and metformin on mitochondrial superoxide in N2a® cells treated with 3MA and metformin (control). Bars are means +/− standard error of the mean. ** = p < 0.01 compared to the control.

Figure 9. The effect of resveratrol and metformin on the mitochondrial superoxide in N2a® cells treated with 3MA and metformin (control). Bars are means +/− standard error of the mean. ** = p < 0.01 compared to the control.

Figure 10. The effect of resveratrol and metformin on cell viability and caspase 3/7 activity. Bars are means +/− standard error of the mean. ** = p < 0.01 compared to the control.

References

[9] Bergen County Technical Schools Board of Education.
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Novel Mechanisms of Resveratrol and Metformin: Implications in Alzheimer’s Disease

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