# Systematic Bioinformatics Review and *In Silico* Analysis of REDOXX®


## ABSTRACT

The systematic bioinformatics review and in silico analysis of REDOXX® was performed to integrate over 3,500 *in vitro* and *in vivo* laboratory experiments recorded in 97 studies that were conducted across 83 institutions over the past 29 years. The analysis reveals two (2) mechanisms of action involved in energy at the molecular systems level in humans. The *in silico* results reveal that five (5) active ingredients in REDOXX were synergistically efficacious in affecting two (2) biomarkers associated with energy.


## KEY FINDINGS

1. CytoSolve® analysis *in silico* analysis identified and computationally modeled two (2) major physiological processes governing energy:
    a. Glycolysis pathway
    b. TCA Cycle

2. Bioactive compounds in REDOXX were found to have a positive synergistic effect on all two (2) physiological processes involved in enhancing energy.

3. REDOXX improved energy production by upregulating glycolysis and TCA cycle.

4. The combination of ingredients in REDOXX affect two (2) biomarkers of energy, NADH and pyruvate, as follows:
    a. **Thiamine**, a co-enzyme for pyruvate dehydrogenase and α-ketoglutarate dehydrogenase enzymes, help upregulate synthesis of NADH, a precursor biomarker for energy production, via TCA cycle.
    b. **Leucine** upregulates the production of NADH, a precursor biomarker for energy production, via TCA cycle.
    c. **Magnesium**, a co-factor for pyruvate dehydrogenase, α-ketoglutarate dehydrogenase and isocitrate dehydrogenase, upregulates synthesis of NADH, a precursor biomarker for energy production, via TCA cycle.
    d. **N-acetylcysteine (NAC)** upregulates synthesis of pyruvate, a precursor biomarker for energy production, in glycolysis pathway.
    e. **Eleutheroside E** from the eleuthero root powder enhances the production of pyruvate, a precursor biomarker for energy production, in glycolysis pathway.


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