

## SUMMARY AND CONCLUSION

- 1) 25-hydroxycholecalciferol was found to inhibit state 3 and uncoupled respiration and to stimulate state 4 respiration and latent adenosine triphosphatase activity by rat liver mitochondria.
- 2) 25-hydroxycholecalciferol was about six times more active than the parent vitamins in inhibiting oxidative phosphorylation of rat liver mitochondria.
- 3) The adenosine triphosphatase activity induced by 25-hydroxycholecalciferol was inhibited by oligomycin ; however, rotenone and atractyloside did not inhibit but further enhanced the enzyme activity.
- 4) Vitamin D<sub>2</sub> and D<sub>3</sub> inhibited state 3 and uncoupled respiration but stimulated state 4 respiration by rat kidney mitochondria. The vitamins also inhibited calcium-stimulated respiration and activated latent adenosine triphosphatase activity of these mitochondria. Dihydrotachysterol<sub>2</sub> was less active than the D vitamins on these mitochondrial reactions.
- 5) The vitamin D-stimulated adenosine triphosphatase activity of rat kidney mitochondria was sensitive to oligomycin.
- 6) The degree of inhibition on oxidative phosphorylation of rat kidney mitochondria produced by the D vitamins can be enhanced if the mitochondria were pre-loaded with calcium chloride before the vitamins were added.
- 7) Hydrocortisone and cholic acid produced some inhibition of

mitochondrial oxidative phosphorylation with both liver and kidney mitochondria from the rats ; but they were less effective than 25-hydroxycholecalciferol and the parent vitamins. Cholesterol was almost inactive when used at the same doses.

- 8) Hydrocortisone, cholic acid and cholesterol had very small or no stimulating action on mitochondrial adenosine triphosphatase activity at the doses which 25-hydroxycholecalciferol and the parent sterol caused substantial activation of the enzyme.
- 9) The findings that 25-hydroxycholecalciferol was active than the parent sterols on mitochondrial metabolism and that mitochondria from kidney were also responsive to vitamin D lend further support to the proposal that mitochondria are intimately involved in the biological functions of vitamin D.
- 10) It was concluded that vitamin D or its metabolites enhances mitochondrial calcium efflux by reducing the level of ATP inside the cells or at least around the mitochondrial vicinity. This effect will raise the cytoplasmic calcium activity which leads to the increase in calcium efflux and, therefore, transcellular calcium movement.

# BIOGRAPHY

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