

Thesis title	Comparative Study of Prednisolone Production from Cortexolone by Free and Immobilized Cells Using Mixed Culture Technique		
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Abstract

The objective of this experiment was to compare prednisolone production between free and immobilized cells using mixed culture technique.

A two-step bioconversion in one pot of cortexolone to its main metabolite, prednisolone, using fungal and bacterial cells (*Cunninghamella blakesleeana* ATCC 8688a-*Bacillus sphaericus* ATCC 13805, *Cunninghamella echinulata* SRP III-*Bacillus sphaericus* ATCC 13805, *Cunninghamella echinulata* SRP III-*Bacillus sphaericus* SRP III) via hydroxylation and dehydrogenation reactions was performed. Four mixed culture systems of free fungus-free bacteria, free fungus-immobilized bacteria, immobilized fungus-free bacteria and immobilized fungus-immobilized bacteria were performed by mixed and sequential culture technique.

The results indicated that 1) Both *C. blakesleeana* ATCC 8688a and *C. echinulata* SRP III in free form gave higher yield of hydrocortisone production than immobilized form.

2) The best culture conditions of *C. blakesleeana* ATCC 8688a giving maximum hydrocortisone yield of 75.5% was 6% of initial cells in free form (96 CFU/ml.), at 25°C, 72 hr.; whereas, *C. echinulata* SRP III with maximum hydrocortisone yield of 53.3 % was 8% of initial cells in free form (32 CFU/ml.), at 25 °C, 72 hr.

3) Both *B. sphaericus* ATCC 13805 and *B. sphaericus* SRP III in immobilized form had higher yield of prednisolone production than free form.

4) The best culture conditions of *B. sphaericus* ATCC 13805 giving maximum prednisolone yield of 98.8% was 25°C, 8% of initial cells in immobilized form (24×10^3 CFU/ ml.), at 25°C, 48 hr.; whereas, *B. sphaericus* SRP III with maximum prednisolone yield of 92.1% was 4% of initial cells in immobilized form (40×10^3 CFU/ ml.), at 25°C, 96 hr.

5) Prednisolone was successfully produced by the mixed culture of free fungus and immobilized bacteria of *C. blakesleeana* ATCC 8688a and *B. sphaericus* ATCC 13805. This system gave the highest transformation activity for both mix and sequential culture technique with the yield of 59.2% and 72.5% respectively.

6) The sequential steps of starting from hydroxylation and followed by dehydrogenation, was found to be more efficient in prednisolone production than the mixed culture in one step.

Note : This work is partially supported by the grant from the National Research Council of Thailand (NRCT) under the graduate student program.