

4037128 SIMI/M: MAJOR: MICROBIOLOGY; M.Sc. (MICROBIOLOGY)

KEY WORDS : SIDEROPHORES/ PYOVERDIN/ PYOCHELIN

SUMONRAT MEEJANPETCH: COMPARATIVE STUDY OF EFFECTIVENESS BETWEEN *PSEUDOMONAS AERUGINOSA* SIDEROPHORES AND DESFERAL IN IRON ACQUISITION. THESIS ADVISORS: SOMPORN SRIFUENGFUNG, Ph.D., KOVIT PATTANAPUNYASAT, Ph.D., MALULEE TUNTAWIRUN, M.S., 106 p. ISBN 974-663-845-9

Transfusion therapy of thalassemia major patients leads to progressive iron overload of vital organs. This ultimately fatal condition can only be treated by continuous chelating therapy with drugs, which increase the excretion of excess iron via the kidneys. From several hundred potential chelating agents tested only desferioxamine B ([®]Desferal) has proved to be safe and clinically effective. It is produced by fermentation using *Streptomyces pilosus* and is isolated by an elaborate and expensive recovery process. The objective of this study was to compare the effectiveness between siderophores produced from *Pseudomonas aeruginosa* and Desferal in iron acquisition in vitro.

Pyoverdin and pyochelin were extracted and purified from a culture of *P. aeruginosa* standard strain PAO1. The effectiveness in iron mobilization of the siderophores and Desferal were studied in Tris buffer pH 6.0, 6.5, 7.0 and 7.4 after 48 hours of incubation at 4 °C.

The results showed the siderophores and Desferal were capable of mobilizing ⁵⁹Fe from [⁵⁹Fe]-ferritin but ineffective in iron mobilization from [⁵⁹Fe]-transferrin.

The combination of pyoverdin and pyochelin at the concentration of 10 µg/ml each was effective in iron mobilization equal to that of pyoverdin alone. When compared with Desferal at equal molar ratio, Desferal was more effective than pyoverdin in iron mobilization from [⁵⁹Fe]-ferritin. On the other hand, pyochelin was the least effective siderophore. At various concentrations of pyoverdin and pyochelin tested in iron mobilization, the concentration of pyoverdin, which appeared to be effective in the test system, was more than 3 µg/ml and more than 5 µg/ml for pyochelin. The most effective concentrations of pyoverdin and pyochelin are 10 µg/ml. In growth assay, pyoverdin, pyochelin and Desferal were effective in promoting growth of *P. aeruginosa* standard strain PAO1 in glucose minimum medium (GMM) or in GMM containing 10% heat inactivated human serum.

The data of positive hemoculture of thalassemia patients was also studied. The positive hemoculture of thalassemia patients admitted to Siriraj Hospital during 1994-1998 was 14.84%.

The siderophore produced by *P. aeruginosa* i.e. pyoverdin might be used in place of Desferal in the future upon more advanced research. The development of this siderophore might allow an alternative therapeutic agent for thalassemia patients, who need red cell transfusions. Which can be given to thalassemia patients orally and mustn't be given only by intravenous or subcutaneous infusion as Desferal.