

**STUDY OF THAI SHALLOT (*ALLIUM ASCALONICUM* L.) EXTRACTS
ON GLUTATHIONE SYNTHESIS AND DEGRADATION UNDER
OXIDATIVE STRESS AND INFLAMMATION IN
HUMAN MONOCYTIC CELL LINE (U937)**

NUTTAKAAN LEELARUNGRAYUB

**DOCTOR OF PHILOSOPHY
IN BIOCHEMISTRY**

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

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**THE GRADUATE SCHOOL
CHIANG MAI UNIVERSITY**

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**A THESIS SUMMITTED TO THE GRADUATE SCHOOL IN
PARTIAL FULFILMENT OF THE REQUIREMENTS
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After I got a scholarship from Chiang Mai University to study in Master and continue on Ph.D program for five years. I have had a good chance on biochemistry researching related to physical therapy as in Master program “chest physical therapy and biochemical marker in pediatric patients with pneumonia”

In Ph.D program, I have been learnt in advanced studying or new researches. I were a good opportunity from external funding; NSDTA (Northern), and S.M pharmaceutical. Co.Ltd. (Thailand) to gain and had an excellent practice at the “Free Radical and Biochemistry Laboratory, Macquarie University, Australia” with Assoc. Prof.Dr. Gebicki JM and his co-workers. Moreover, during in Thailand, most of all working, I have been done my work continuously at Department of Clinical Chemistry, Faculty of Associated Medical Sciences, Chiang Mai University until the end. I also appreciated to staff in Department of Clinical Chemistry helping and donation some chemicals or materials.

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Nuttakaan Leelarungrayub