

การประเมินผลของกวาวเครือขาว *Pueraria mirifica* และกวาวเครือแดง *Butea superba*
ในการป้องกันและต้านมะเร็งเต้านมในหนูที่เกิดจากการชักนำด้วย DMBA



นางสาวรัตนา ปานเรียนแสน

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรดุษฎีบัณฑิต

สาขาวิชาเทคโนโลยีชีวภาพ

คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

ปีการศึกษา 2548

ISBN 974-17-4811-6

ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

**EVALUATION OF PREVENTIVE AND ANTITUMOR ACTIVITIES OF
Pueraria mirifica AND *Butea superba* IN DMBA-INDUCED MAMMARY
CARCINOMA IN THE RAT**

Miss Rattana Panriansaen

**A Dissertation Submitted in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy Program in Biotechnology**

Faculty of Science

Chulalongkorn University

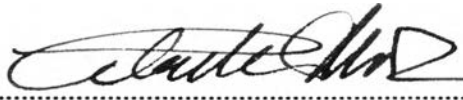
Academic Year 2005

ISBN 974-17-4811-6


481814

Thesis Title Evaluation of preventive and antitumor activities of
Pueraria mirifica and *Butea superba* in DMBA-induced
mammary carcinoma in the rat
By Miss Rattana Panriansaen
Field of Study Biotechnology
Thesis Advisor Associate Professor Wichai Cherdshewasart, D.Sc.
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Accepted by the Faculty of Science, Chulalongkorn University in
Partial Fulfillment of the Requirements for the Doctor' s Degree



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รัตนา ปานเรียนแสน: การประเมินผลของกวาวเครือขาว *Pueraria mirifica* และ กวาวเครือแดง *Butea superba* ในการป้องกันและต้านมะเร็งเต้านมในหนูที่เกิดจากการ ชักนำด้วย DMBA (Evaluation of preventive and antitumor activities of *Pueraria mirifica* and *Butea superba* in DMBA-induced mammary carcinoma in the rat) อ.ที่ปรึกษา: รศ.ดร.วิชัย เชิดชีวิตศาสตร์, อ.ที่ปรึกษาร่วม: รศ.นสพ.ปัญญา เต็มเจริญ จำนวนหน้า 184 หน้า ISBN 974-17-4811-6

ทำการป้อนสารแขวนลอยกวาวเครือขาวและกวาวเครือแดงที่ปริมาณ 0, 10, 100 และ 1000 มิลลิกรัม/กิโลกรัมน้ำหนักตัว เป็นเวลา 4 สัปดาห์ติดต่อกันในหนูอายุ 25 วัน จากนั้นชักนำให้เกิดก้อนเนื้อเต้านมด้วยการป้อน 7, 12-dimethylbenz (a) anthracene ปริมาณ 80 มิลลิกรัม/ กิโลกรัมน้ำหนักตัว ทำการวัดขนาดและติดตามผลการเกิดก้อนเนื้อในแต่ละสัปดาห์และทำการผ่าพิสูจน์ซากหนูในสัปดาห์ที่ 20 จากการศึกษาพบว่าหนูที่ได้รับกวาวเครือขาวขนาด 1000 มก.ต่อน้ำหนักตัวมีป้องกันการเกิดก้อนมะเร็งโดยมีผลลดขนาดและจำนวนก้อนเนื้อมะเร็งต่อตัวต่ำกว่ากลุ่มควบคุมอย่างมีนัยสำคัญที่ $p < 0.05$ อัตราการอยู่รอดสูงกว่ากลุ่มควบคุม หนูที่ได้รับกวาวเครือขาวทุกกลุ่มมีการยืดเวลาของการพบก้อนเนื้อ ส่วนกวาวเครือแดงให้ผลป้องกันมะเร็งเต้านมโดยการลดการเจริญเติบโตของก้อนเนื้อในกลุ่มที่ได้รับกวาวเครือแดงขนาด 1000 มิลลิกรัม/กิโลกรัมน้ำหนักตัว อย่างไรก็ตามพบว่าขนาดของก้อนเนื้อในกลุ่มที่ได้รับกวาวเครือแดงขนาด 100 มิลลิกรัม/กิโลกรัมน้ำหนักตัวสูงกว่ากลุ่มควบคุม ทำการชักนำหนูอายุ 50 วันด้วยการป้อน 7, 12-dimethylbenz (a) anthracene ปริมาณ 80 มิลลิกรัม/กิโลกรัมน้ำหนักตัว ภายหลังจากคลำพบก้อนเนื้อขนาดเส้นผ่าศูนย์กลาง 0.1 เซนติเมตร จากนั้นป้อนสารแขวนลอยกวาวเครือขาวและกวาวเครือแดงที่ปริมาณ 0, 10, 100 และ 1000 มิลลิกรัม/กิโลกรัมน้ำหนักตัว เป็นเวลา 4 สัปดาห์ติดต่อกัน ทำการวัดขนาดและจำนวนของก้อนเนื้อในแต่ละสัปดาห์ก่อนทำการผ่าพิสูจน์ซากหนูในสัปดาห์ที่ 20 หลังการชักนำให้เกิดก้อนเนื้อ จากการศึกษาพบว่าหนูที่ได้รับกวาวเครือขาวปริมาณ 1000 มก.ต่อน้ำหนักตัวมีจำนวนก้อนเนื้อต่อตัวต่ำกว่ากลุ่มควบคุมอย่างมีนัยสำคัญที่ $p < 0.05$ กลุ่มที่ได้รับกวาวเครือแดงไม่มีผลในการต้านมะเร็งเต้านมแต่มีผลขนาดเส้นผ่านศูนย์กลางของก้อนเนื้อในกลุ่มที่ได้รับกวาวเครือแดง 10 มิลลิกรัม/กิโลกรัมน้ำหนักตัวมากกว่ากลุ่มควบคุม ปริมาณอย่างไรก็ตามน้ำหนักของก้อนเนื้อและปริมาตรก้อนเนื้อทุกกลุ่ม การทดลองไม่มีความแตกต่างทางสถิติเมื่อเปรียบเทียบกับกลุ่มควบคุม จากการศึกษาตรวจสอบเปอร์เซ็นต์ของตัวรับเอสโตรเจนชนิดแอลฟาและเบตาในก้อนเนื้อมะเร็ง พบว่าสัดส่วนของตัวรับทั้งสองชนิดลดลงในกลุ่มที่ได้รับกวาวเครือขาวที่ปริมาณ 1000 มิลลิกรัม/กิโลกรัมน้ำหนักตัว นอกจากนี้ได้ทำการวิเคราะห์หาปริมาณไอโซฟลาโวนอยด์ในกวาวเครือขาว กวาวเครือแดงและอาหารหนู โดยใช้สารมาตรฐาน ฟิวราริน ไคด์ซิน เจนิสติน ไคด์เซอิน และเจนิสเทอิน พบว่าในกวาวเครือขาวประกอบด้วยไอโซฟลาโวนอยด์ทั้ง 5 ชนิด พบเจนิสตินในกวาวเครือแดงและในอาหารหนูพบเจนิสอิน ไคด์เซอินและเจนิเดอิน

สาขาวิชา..... เทคโนโลยีชีวภาพ..... ลายมือชื่อนิสิต รัตนา ปานเรียนแสน.....

ปีการศึกษา..... 2548.....

ลายมือชื่ออาจารย์ที่ปรึกษา.....

ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

4373876923: MAJOR BIOTECHNOLOGY

KEYWORD: *Pueraria mirifica*/ *Butea superba*/ MAMMARY CARCINOMA/
PHYTOESTROGEN

RATTANA PANRIANSAEN: EVALUATION OF PREVENTIVE AND ANTITUMOR ACTIVITIES OF *Pueraria mirifica* AND *Butea superba* IN DMBA-INDUCED MAMMARY CARCINOMA IN THE RAT. THESIS ADVISOR: ASSOC. PROF. WICHAI CHERDSHEWASART, D.Sc., THESIS COADVISOR: ASSOC. PROF. PUNYA TEMCHAROEN, D.V.M. 184 pp. ISBN 974-17-4811-6

The 25-day-old female Sprague-Dawley rats were pretreated with *P. mirifica* and *B. superba* powder suspension in a dosage of 0, 10, 100 and 1000 mg/kg BW, for 4 consecutive weeks. Mammary tumors were induced by the administration of 7, 12-dimethylbenz (a) anthracene, 80 mg/kg body weight. The rats were subsequently palpated for size and multiplicity of mammary tumors. Necropsy of the animals was done at the end of the twentieth week after tumor induction. It was found that 1000 mg/kg body weight *P. mirifica* treated group was exhibited significantly lower in number and size than in the control ($P < 0.05$). The survival rate was also higher than the control. All *P. mirifica* doses could result in extending the latency period of tumor development. Pretreatment with *B. superba* at the dose of 10 mg/kg body weight showed a reduction of tumor size. However, the tumor diameter of the dose of 100 mg/kg body weight of *B. superba* was higher than the control. The 50-day-old female Sprague-Dawley rats were administered with 7, 12-dimethylbenz(a)anthracene, 80 mg/kg body weight and followed the occurrence of the first palpable nodules. *P. mirifica* and *B. superba* powder suspension was administered in a dosage of 0, 10, 100, 1000 mg/kg BW, for 4 consecutive weeks. Necropsy of the animals was done at the end of the twentieth week after tumor induction. It was revealed that the weekly and total multiplicity of mammary tumors in the dose of 1000 mg/kg body weight of *P. mirifica* rats were found to be significantly lower in number than in the control ($P < 0.05$). *B. superba* treated group was not affected on anti-tumor but the tumor diameters of 10 mg/kg body weight was higher than the control. Nevertheless, tumor weight and volumes in all groups were not different from the control. Both pretreatment and therapeutic treatment of *P. mirifica* exhibited an alternative profile of ER α and ER β as well as ER α /ER β in the tumor tissues. Besides, *P. mirifica* powder, *B. superba* powder and rat food were analyzed for isoflavonoid contents by using the standard of puerarin, daidzin, genistin, daidzein and genistein. *P. mirifica* powder contained five isoflavonoids. Genistin was only found in *B. superba* powder. Genitin, daidzein and genistein were found in rat food.

Field of study Biotechnology

Student's signature

Academic year 2005

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ACKNOWLEDGEMENTS

I would like to express my deepest appreciation and grateful thanks to my advisor, Associate Professor Dr. Wichai Cherdshewasart for his helpful guidance, suggestions, continual encouragement and keen interest throughout this study. Especially I would like to really thank Associate Professor Punya Temcharoen with his kindness guidance, Professor Dr. Siriwat Wongsiri, Assistant Professor Thaithaworn Lirdwitayaprasit and Dr. Pornthipa Picha for their valuable comments and all suggestions.

Special thanks for Department of Biology for laboratory facilities, Program of Biotechnology, Faculty of Science, Chulalongkorn University for access to use the necessary instruments for my thesis.

I am indebted to Mrs. Sunan Limthiancharoen (P'Noi) and her colleague to excellent assistance for my study. Sincere thanks for Mrs. Subongkoch Sabtang, Boue, Nong, Gade, Bai Tong and the members of Kwao Krua Laboratory for their generous help. Thanks for Ms. Artchareeya Chaiyarat for her warm assistance. Special thanks for Yim and Assistance Professor Dr. Orwan Sathayalai for immunohistochemistry stuffs.

I really express my whole-heartedly appreciation to my parents, my family members and all of friends; A, Tum, P'Noi, P'Krai and P'Phum who have never left me alone.

This work was supported by a Ph.D. research grant from the Ministry of University Affairs and the Graduate School, Chulalongkorn University.

Finally, I would like to dedicate all worth of this research to all life of rats.

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LIST OF ABBREVIATIONS

BW	Body weight
°C	Degree Celsius
E ₂	17β-Estradiol
ER	Estrogen Receptor
ER _α	Estrogen Receptor Alpha
ER _β	Estrogen Receptor Beta
g	Gram
ED ₅₀	Median Effective Dose
IC ₅₀	Median Inhibitory Concentration
L	Liter
h	Hour
μg	Microgram
μL	Microliter
μM	Micromolar
ml	Mililiter
Mm	Milimeter
M	Molar
ppm	Part Per Million
rpm	round per minute
S.E.	Standard error
UV	Ultraviolet
wt/vol	weight/volume
AU	Absorbance Unit
cm.	Centimeter
Kg/BW	Kilogram/Body weight
nm	Nanometer