

การศึกษาเปรียบเทียบประสิทธิผลในการลดไขมันต้นขา ระหว่างการฉีดไฮยาลูโรนเดสรวมกับการใช้เครื่องกระชับ  
สัดส่วนโดยอัลตราซาวด์แบบไม่ต้องผ่าตัดเทียบกับการใช้เครื่องเพียงอย่างเดียว

COMPARISON OF HYALURONIDASE INJECTION IN COMBINATION WITH NON-INVASIVE  
FOCUSED ULTRASOUND VERSUS ULTRASOUND ALONE FOR THIGH FAT REDUCTION

Thitikarn Teerapancharoen

พญ.จิตติกาญจน์ ธีระพันธ์เจริญ<sup>1</sup>, นพ.ไพศาล รัชนีษฐ์<sup>2</sup>

<sup>1</sup>นิสิตระดับปริญญาโท, <sup>2</sup>อาจารย์

นิสิตระดับปริญญาโท สาขาวิชาตจวิทยา มหาวิทยาลัยแม่ฟ้าหลวง

Master of Science in Dermatology

School of Anti-Aging and Regenerative Medicine

Mae Fah Luang University

## บทคัดย่อ

การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาประสิทธิภาพในการลดไขมันสะสมบริเวณต้นขาโดยเทคนิคการฉีดไฮยาลูโรนเดสรวมกับการใช้เครื่องกระชับสัดส่วนโดยอัลตราซาวด์แบบไม่ต้องผ่าตัด ซึ่งเครื่องจะช่วยสลายไขมัน และจะช่วยในการระบายไขมันออกทางระบบหลอดเลือดและน้ำเหลือง เป็นทางเลือกใหม่ในการแก้ไขปัญหาไขมันสะสมบริเวณต้นขา วิธีนี้จะช่วยเพิ่มประสิทธิภาพในการรักษา โดยไม่เกิดภาวะแทรกซ้อนรุนแรง เมื่อเทียบกับการรักษาที่มีอยู่ในปัจจุบัน

**วิธีการศึกษา** ผู้เข้าร่วมโครงการวิจัยที่มีปัญหาไขมันสะสมบริเวณต้นขาจำนวน 18 คน ได้รับการรักษาโดยฉีดไฮยาลูโรนเดสรวมกับการใช้เครื่องกระชับสัดส่วนโดยอัลตราซาวด์แบบไม่ต้องผ่าตัด และใช้เครื่องเพียงอย่างเดียวที่ต้นขาแต่ละด้านอย่างต่อเนื่อง ซึ่งจะทำการรักษาทั้งหมด 3 ครั้ง แต่ละครั้งห่างกัน 1 เดือน และติดตามผลการรักษาโดยประเมินจากการวัดความหนาของชั้นไขมันด้วยเครื่องอัลตราซาวด์ และวัดเส้นรอบวงของต้นขาด้วยสายวัดมาตรฐาน เปรียบเทียบก่อนการรักษา และหลังสิ้นสุดการรักษา 1 เดือน และ 3 เดือน

**ผลการศึกษา** พบว่าการฉีดไฮยาลูโรนเดสรวมกับการใช้เครื่องกระชับสัดส่วนโดยอัลตราซาวด์แบบไม่ต้องผ่าตัดมีประสิทธิภาพในการลดไขมันสะสมบริเวณต้นขามากกว่าการใช้เครื่องเพียงอย่างเดียวอย่างมีนัยสำคัญที่ 1 และ 3 เดือน ทั้งจากการวัดความหนาของชั้นไขมัน และจากการวัดเส้นรอบวงของต้นขา พบอาการข้างเคียงจากการรักษาเพียงเล็กน้อย และผู้เข้าร่วมวิจัยส่วนมากประเมินว่าพึงพอใจในวิธีการรักษา

**สรุปผล** การฉีดไฮยาลูโรนเดสรวมกับการใช้เครื่องกระชับสัดส่วนโดยอัลตราซาวด์แบบไม่ต้องผ่าตัดสามารถลดไขมันสะสมบริเวณต้นขามากกว่าการใช้เครื่องเพียงอย่างเดียวอย่างมีนัยสำคัญทางสถิติ และพบอาการข้างเคียงเป็นเล็กน้อย จึงอาจเป็นอีกแนวทางหนึ่งสำหรับการลดไขมันเฉพาะที่

**คำสำคัญ** : ไขมันสะสมบริเวณต้นขา, ไฮยาลูโรนเดส, เครื่องกระชับสัดส่วนโดยอัลตราซาวด์

## **Abstract**

This research has the purpose of studying the efficacy in the reduction of thigh fat deposit by using hyaluronidase injection in combination with non-invasive focused ultrasound which will help break down fat. Moreover, hyaluronidase helps to drain fat out through the vascular and lymphatic systems. This method will help increase the efficacy of treatment without any serious complications by comparison with the existing treatment.

**Materials and Methods:** After recruited 18 patients who had fat deposit at both thighs, treatment options were randomly assign for each side of thigh. Ipsilateral hyaluronidase injection in combination with non-invasive focused ultrasound and contralateral ultrasound alone were performed in the same patient. The treatment was performed 3 treatment sessions, with a one-month interval between each treatment. The efficacy of fat reduction was measurement by compared the mean reduction in subcutaneous fat thickness around thighs by portable ultrasound and thigh circumference measured by standard measuring tape between before treatment, 1 month and 3 months after completing 3 treatment sessions

**Results:** show that hyaluronidase injection in combination with non-invasive focused ultrasound is more effective in reducing thigh fat accumulation than the use of ultrasound alone significantly at one and 3 months from both the measurement of fat thickness and the measurement of thigh circumference. It was found that the side effects caused by treatment are just minor. According to the assessment, most participants in the research have been also satisfied with the treatment method.

**Conclusion:** hyaluronidase injection in combination with non-invasive focused ultrasound can reduce thigh fat accumulation at a level greater than the use of ultrasound alone with statistical significance. It was found that the side effects are just minimal. Therefore, it may be another alternative of localized fat reduction.

**Key words:** thigh fat, hyaluronidase, non-invasive focus ultrasound.

---

## **Introduction**

Excess body fat is a major problem commonly found in today's society. The combination of too high caloric intake and lack of exercise causes many people to suffer from localized fat deposit. The areas most frequently requested for loss of volume are abdomen, saddle bags, flank, love handles, inner and outer thighs, and inner knees (Voss, Siebrecht, Gesunde, 2005). Fatty deposits on the inner and outer thighs are especially resistant to diet and exercise.

In the past, the only way to improve body contouring was the removal of local fat deposits through liposuction or other surgical procedures. Despite many advances in liposuction technique, risk and discomfort remains by its invasive nature such as pain, bruising, swelling, hematoma, wound infection etc. (Grazer & Jong,

2000; Commons, Halperin, Chang, 2001; Matarasso, Swift, Rankin, 2006; KleinJA, 1995). And post procedure recovery may require extensive downtime and compressing garments.

Therefore, a new device has been developed that used focused ultrasound to reduced adipose tissue in a non invasive manner. The system was designed to use mechanical (non-thermal) energy to disrupt fat cells and without damaging neighboring structures such as skin, blood vessels, lymph vessels, muscle, and nerves.

Today, it has been shown that area with density of subcutaneous fat will decrease blood flows and change fibrosis and increase hyaluronic acid 8 times. It makes fat accumulated. The invention of hyaluronidase injection to reduce fat by modifying the permeability of connective tissue through the hydrolysis of hyaluronic acid and decompose material including fiber in hypodermic tissue and helps circulation of adipose tissue by promoting circulation of lymphatic drainage.

The researcher is interested in study the injection of hyaluronidase in combination with non-invasive focused ultrasound to increase efficacy of thigh fat reduction. Including, satisfaction of the patients and side effects of treatments.

### **Objective**

To compare the clinical efficacy of the hyaluronidase injection in combination with non-invasive focused ultrasound when compared with ultrasound alone in treatment of thigh fat reduction

### **Materials and Methods**

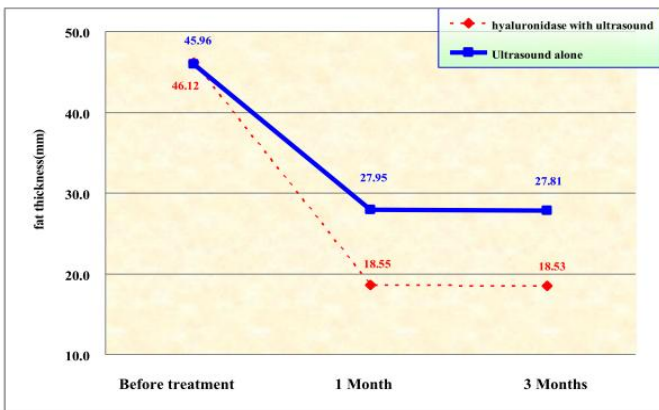
18 patients who had fat deposit at both thighs, treatment options were randomly assign for each side of thigh. Ipsilateral hyaluronidase injection(1cc/point for 4 points) in combination with non-invasive focused ultrasound and contralateral ultrasound alone were performed in the same patient. The treatment was performed 3 treatment sessions, with a one-month interval between each treatment. The efficacy of fat reduction was measurement by compared the mean reduction in subcutaneous fat thickness around thighs by portable ultrasound and thigh circumference measured by standard measuring tape between before treatment , 1 month and 3 months after completing 3 treatment sessions. Pain scores and side effects were evaluated at each treatment. At the end of the study, patients were evaluated their satisfaction with the treatments.

### **Statistics Analysis**

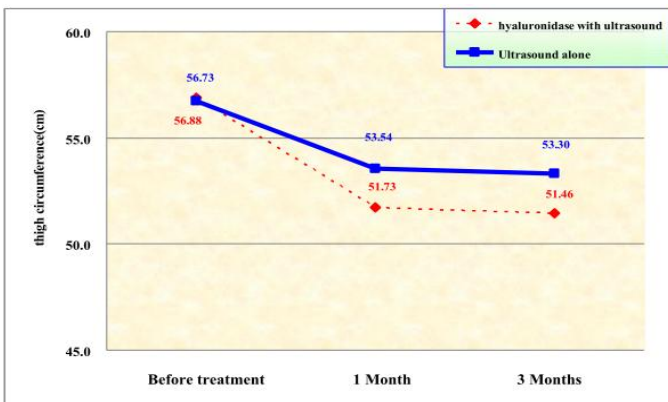
Comparison of the mean of fat thickness (mm) and the mean of thigh circumference (cm) before treatment, 1st and 3<sup>rd</sup> months after completed 3 treatment sessions of each methods by Repeated Messure ANOVA statistics . Comparison of the mean reduction in the 1st month and the 3<sup>rd</sup> monthof fat thickness and thigh circumference between the thigh on the side treated with the method of hyaluronidase injection in combination with non-invasive focused ultrasound versus the thigh side treated with the use of ultrasound alone for fat reduction by paired t-test statistics. Comparison of average satisfaction score between the thigh treated with each methods by Wilcoxon sign rank test statistics. At level of significant 95%

## Results

After complete 3 treatment sessions at 1<sup>st</sup> month and 3<sup>rd</sup> month, it has been found that the reduction of thigh fat accumulation by hyaluronidase injection in combination with non-invasive focused ultrasound versus the use of ultrasound alone can reduce fat thickness and thigh circumference of volunteers with statistical significance. Hyaluronidase injection in combination with non-invasive focused ultrasound is more effective in reducing thigh fat accumulation than the use of ultrasound alone significantly at one and 3 months from both the measurement of fat thickness (p-value < 0.001) and the measurement of thigh circumference (p-value = 0.006). It was found that the side effects caused by treatment are just minor. According to the assessment, patients satisfied in the thigh treated with Hyaluronidase with ultrasound higher than the thigh treated with ultrasound alone with statistically significant with p < 0.001.

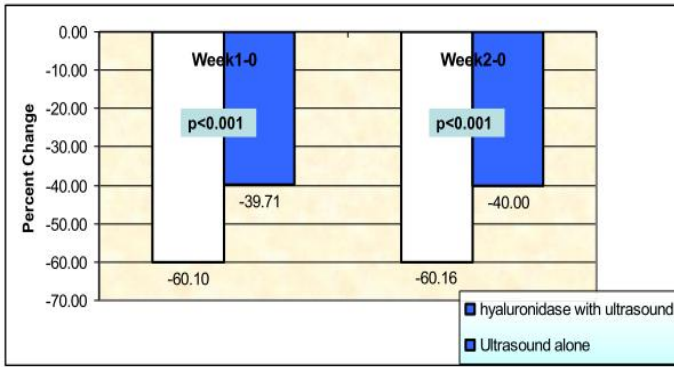


Graph 1 compares the mean of fat thickness before treatment, 1 and 3 months after complete 3 treatment sessions between the thigh treated with hyaluronidase injection in combination with non-invasive focused ultrasound versus ultrasound alone for fat reduction.

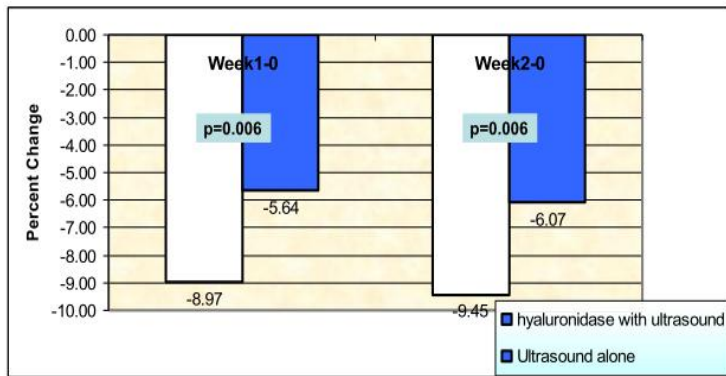


Graph 2 compares the mean of thigh circumference before treatment, 1 and 3 months after complete 3 treatment sessions between the thigh treated with hyaluronidase injection in combination with non-invasive focused ultrasound versus ultrasound alone for fat reduction.

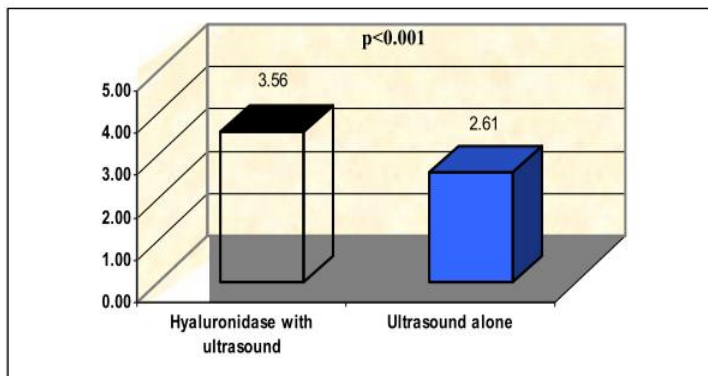
Graph 3 compares the mean reduction of fat thickness in 1 and 3 months with the period before treatment



between hyaluronidase injection in combination with non-invasive focused ultrasound versus ultrasound alone.



Graph 3 compares the mean reduction of thigh circumference in 1 and 3 months with the period before treatment between hyaluronidase injection in combination with non-invasive focused ultrasound versus ultrasound alone.



graph 6 comparison of satisfaction between the treated with hyaluronidase injection in combination with non-invasive focused ultrasound versus the thigh treated with ultrasound alone for fat reduction

## Discussion

From the study the comparison of Hyaluronidase injection in combination with non-invasive focused ultrasound versus ultrasound alone for Thigh Fat Reduction, found that both treatment methods can reduce thigh fat significantly, but the treatment by hyaluronidase injection in combination with non-invasive focused

ultrasound more effectiveness in reducing fat than ultrasound alone. The efficacy of Non-invasive focused ultrasound is to destroy fat cells, so it can reduce localized fat deposition, as the research in the past (Moreno et al, 2007) using Ultrashape for reduction of fat accumulation in different areas of the body. The efficacy of Hyaluronidase is to drain fat out through the vascular and lymphatic systems, as the reseach (Yang and Kim, 2011) using hyaluronidase injection can reduced abdominal circumference. At 1 month and 3 month after complete 3 treatment sessions compare with before treatment, fat thickness and thigh circumference reduced significantly, but 3 month compare with 1 months, no difference in fat thickness and thigh circumferences. Moreover, Hyaluronidase injection with focused ultrasound has more side effects and pain score, due to needle injection, but all side effects occur only mild symptom and can resolve naturally. The patients satisfaction at the end of the study, found that participants in the research were satisfied with the thigh treated with hyaluronidase injection in combination with non-invasive focused ultrasound more than the thigh treated with ultrasound alone with statistical significance.

### **Conclusion**

The reduction of thigh fat accumulation by hyaluronidase injection in combination with non-invasive focused ultrasound is more effective than using ultrasound alone, and also more patient satisfaction. Nevertheless, Hyaluronidase with non-invasive focused ultrasound has more side effects and pain scores than ultrasound alone, but only mild symptom.

### **References**

- Cheong Dr. K. C. (2011). Changes in abdominal circumference after LLD therapy. Korea: Hana Hospital, Seoul.
- Commons GW, Halperin B, Chang CC. (2001). Large volumes 552. liposuction: Review of 631 consecutive cases over 12 years. *Plast Reconstr Surg*, 108, 1753–1763.
- Grazer FM, Jong RH. (2000). Fatal outcome from liposuction: Census survey of cosmetic surgeons. *Plast Reconstr Surg*, 105, 436 – 446.
- KleinJA. (1995). Tumescent liposuction and improved postoperative care using tumescent liposuction garments. *Dermatol Clin*, 13, 329 – 338.
- Klein JA. (1993). Tumescent technique for local anesthesia improves safety in large-volume liposuction. *Plast Reconstr Surg*, 92, 1085-1098.

Matarasso A, Swift RW, Rankin M. (2006). Abdominoplasty and, abdominal contour surgery: A national plastic surgery survey. *Plast Reconstr Surg*, 117, 1797–1808.

Moreno-Moraga J, Valero-Altés T, Riquelme AM, et al. (2007). Body contouring by non-invasive transdermal focused ultrasound. *Lasers Surg Med*, 39, 315-323.

Voss W, Siebrecht S. *Gesunde Haut*. (2005). 1st ed. Trias Verlag, 101–106.

Yang Dr. D. H., Kim Dr. D. H. (2011). Influences on decrease in abdominal circumference by Hyaluronidase. Korea: Hansarang Hospital, Seoul.