

出國報告(出國類別:參加國際學術會議)

歐洲生殖醫學會 2008 年年會

服務機關:三軍總醫院婦產部及國防醫學院

姓名職稱:陳啓煌 中校軍醫專任助理教授

派赴國家:西班牙

報告日期:97.08.10

出國時間:97.07.04~97.07.11

壹.會議摘要

- 1.此學術會議為生殖醫學領域最重要的年會。
- 2.臨床方面以強調改善不孕症的治療如精、卵、胚胎。排卵藥物的進步為主的改善人工生殖如試管嬰兒技術的主題。
- 3.基礎方面以疾病機率、基因附基因調控以及幹細胞方面的研究近況。
- 4.發表個人主持 96 年國科會研究計劃「有效建立性腺冷凍保存與移植的動物模式」。
- 5.擴大國際學術視野、改善人工生殖技術、發表研究成果、提昇學術競爭力為本次議程最重要摘要。

參加 2008 年歐洲生殖醫學會年會

目錄

壹:會議摘要-----	2
貳:參加目的-----	4
參:會議過程-----	5
肆:會議心得-----	6-7
伍:回單位後報告情形-----	8
陸:建議事項-----	9
柒:參加此次會議對單位之貢獻-----	10
捌:附錄	
接受函(含論文摘要及出國會議議程表)-----	11-20

貳.參加目的

本實驗室及個人研究興趣乃從事冷凍卵巢及移植的醫學應用。根據本人自 2003 年迄今，獲得國科會研究計劃連續研究的心得成果，以創新的基因轉殖鼠表現生物冷光基因的活體追蹤，獲得大會評分前 1/3 得以接受發表 96 年正在執行的國科會研究計劃「建立有效的性腺保存與移植的動物模式」。此外，歐洲生殖醫學會為生殖方面有關臨床與基礎最權威與高水準的國際會議，對我個人的臨床專長如試管嬰兒、精卵胚胎、基因診斷及冷凍卵巢與睪丸均有最新的研究探討。其它如幹細胞、附基因及基因晶片均有精闢的專題演講，在激烈的國際學術研究競爭下，對研究成果與構思均有豐碩的學術交流，對於年輕的醫師從事研究基礎與臨床醫療均能更激發治療技術與提昇國際學術的視野與能見度。

參.會議過程

ESHRE(European Society of Human Reproduction and Embryology)2008 年的年會於 7 月 6 日至 7 月 9 日在西班牙的巴塞隆納舉行。於 7 月 4 日起程赴巴塞隆納，於 7 月 6 日參加大會舉行一整月的課程。我選擇參加第 13 課程，由美國生殖醫學會的專家介紹如何規範生殖醫學的技術與操作，以及以證據為基礎來評估文獻報告的數據判讀。於 7 月 7 日至 9 日則參加會議舉行的大型演講。各國傑出論文的口頭報告及海報發表，每日參與每場精彩的演講則是於精卵性腺保存及著床前基因醫學的創新發展及幹細胞的研究方向。

肆.會議心得

7月6日:因美國生殖醫學會提供實施生殖醫學治療運用的規範及準則。比較現今美國在生殖醫學的發展及規範，並且比較其它國家，讓我們對很多常見的疾病如子宮內膜異位病症、青春期異常出血、不孕症手術人工輔助生殖、決定胚胎植入數量、更年期以及臨床及實驗室觀點的男性不孕症均建立在 Evidence-based 的文獻分析的資料。這點讓我們不會受一兩篇論文的結論所影響，而是用更客觀理性的方式來再認識這些生殖醫學的新知與規範。

7月7日:本日的會議開幕的第一場演講 08:30~09:30 由新新格蘭醫學雜誌的前主編之一 Dr. Demie 精闢的演說關於醫學期刊的人性考驗，如造假不負責任及不相關的作者責任以及私人或圖利的利益導向的學術黑暗為題

「Healing the sick literature」實在震撼。其次在 10:00 和 10:30 參與了康乃爾大學為題「Doplasmic factor is not solely responsible for male genome coss of methylation」這是大會最好一篇研究之一。以配子去核後重建卵子及配子過的孤雌生殖的胚胎或正常受精的胚胎其去基比的調控是受卵的細胞核所調控。這篇論文已上自然雜誌刊登，但其中研究方法非常有創意與驚人值得學習。10:45~11:30 聽到 Lolorado 的著各學者 David Gardner 以及耶魯大學的 Dr. Seei 分別介紹胚胎培養液內的阿摩尼亞的胺基酸代謝物如何影響胚胎的基因層級。以基因晶片的規格，研究對胚胎 2 萬個基因的影響，令人佩服不已。所以胚胎培養液的勤換是不二法門。此外 Dr. Seei 也用質譜儀來分析胚胎培養的小滴液中胚胎代謝的成分來決定健康胚胎與否，啟發甚深。其後 11:45~12:45 首次聽到了黃體素受體調節劑在離子及動物實驗的上市前的證據，又將是一全新的性腺荷爾蒙的藥物將登場的時代。可用於治療經血過多或女性避孕；

14:00~15:00 接受 Ferring 公司的專題演講，提供與會的專家及醫師如何改善卵子的選擇及胚胎品質以促進懷孕率。此外也比較了高純化的性腺荷爾蒙及腦下垂體釋放素的拮抗劑的使用與比較有助我們臨床運用的實務經驗。下午 14:00~15:00 參加為題「prepatterning in mammalian preimplantation embryo development」的深奧主題，介紹胚胎發育由 2 細胞開始的極性變化，由牛津大學動物系 R.Gardner 來介紹這個發育生物學上的最根本的源頭的基礎實驗。下午 15:15~16:30 聽了四場演講，分別為體外卵子成熟週期如何利用最大濾泡的大小決定取卵的時機，以及 Amn 賀爾蒙來評估癌症病人接受冷凍卵子前的卵巢反應評估以及試管嬰兒胚胎同一病人第與第 5 連續植入以及超音波輔助植入的成效此外 indomaphacr 的使用如何改善試管嬰兒週期的效率自 15:15~16:30 起，連續 5 場演講介紹冷凍卵子的各種方法成效以及次結構受到冷凍傷

害的變化。17:00~18:00 連續介紹子宮幹細胞及血管新生等主題的創新研究。第一天的演講精銳盡出，從基礎知識到臨床實務，對我從事研究及臨床工作幫助與啟發太深了。

7 月 8 日:08:30~09:30 本次會議的一個重點就是冷凍技術運用於冷凍卵子及卵巢的運用。我多年來研究冷凍卵巢及卵巢與移植的實驗主題於 2003 年獲國科會計劃並且於 2006 年發表於 *Fetieiry and stwility* 有關兔子全卵巢冷凍及自體移植獲得國際重視冷凍保存的層級由細胞及組織層級提昇主器官層次。而本次我個人發表活體追蹤，藉由基因轉殖鼠攜帶冷光報導基因來觀察同或同種異體卵巢移植的效應與排斥。此乃根據國科會於 96 年~97 年資助我的研究經費的研究成果。本次與會在 500 多篇獲發表的作品中來自台灣僅 4 篇。本篇的研究創新亦獲得重視。而今日的演講包括冷凍性腺及卵子以玻璃化的技術將冷凍技術的運用推向一個新時代。10:00~11:30 的專題共 6 個演講，我更是投入醉心於自己多年從事的研究，經由多國的學者專家發表多面向的技術及顯微結構如紡錘體的變化。讓我們能藉今日的會議改良冷凍技術及有力的觀察方式。下午 14:00~15:00 接受大會專題演講之場提供現今人工生殖及胚胎操控的歐洲的規，且對反覆性流產的評估的 *gnidline* 的現今概念提供我們嚴謹的生殖技術的高標準。同日下午 15:15 至 16:30 共 6 場關於我研究主題:「冷凍卵子及卵巢」，讓我們再度觀摩學習到來自義大利及美國的經驗。17:00~18:00 共四場演講，觀摩了女性生殖自診斷卵巢得獲幹細胞移植及卵巢功能預測等四個臨床實務的主題。對改善臨床應用極有幫助。

7 月 9 日第三次的演講自 08:30~09:30 強調青春期前的癌症患者接受放射或化學治療對喪失生殖功能的風險及適當的性腺保護或保存很重要。然而排卵藥的大量使用於不孕症患者日後致癌的風險評估也讓我們更謹慎於這方面的操作。自 10:00~12:00 共 7 個演講，聽到一個來自巴西的幹細胞研究的頂尖學者闡述驚人的研究成果。即將體細胞的幹細胞經胚胎環境可重塑本幹細胞具有形成精蟲的能力。這種研究也開拓未來生殖能力的恢復可能藉由體細胞的重塑回春，此外，睪卵的環境亦可誘導成體幹細胞產生精蟲，這是非常重要的前衛的觀念。同日下午 14:00~15:00 關於胚胎幹細胞的細胞生物學及分子生物學的研究讓我們對於幹細胞研究現況及未來從事這方面研究的可能域有非常多的啟發。結束後，對 500 多篇研究的摘要發表全流質讓我們極充實及圓滿收穫，並於次日起程返國。

伍.回單位後報告情形

於 7 月 15 日於三總婦產部不孕科的固定會議時間立即報導本次會議的演講論文摘要 1 小時。對本臨床團體介紹新的精卵胚胎及冷凍技術的可能改良，而對本實驗室未來可能研究的可及方向如冷凍卵巢、著床機轉及精蟲的細胞凋零機轉或新藥物的動物實驗多所著墨。在台灣的年輕醫師，常常因為工作勞累，負擔過重而失去和其他人互相交流的機會，平常連在台灣本島內院際的交流就很少了，更惶論國際性的學術交流和國際友誼的建立，殊不知我們目前擁有的一切，都是婦產科前輩一點一滴的努力所累積得來的。如果不能延續前輩的腳步，我們在國際舞台的空間將越來越小、越來越窄，屆時在醫界，婦產科的發言權也就越來越小，而進入一個無法自拔的惡性循環。屬於婦產科的美麗與哀愁，只有身在其中的你我最為了解，有些趨勢我們無法改變，但我們仍期盼儘己所能護衛婦女的健康，這次非常感謝有這樣的一個機會，讓我對自己未來的任務有更深的體悟，期盼未來的後進，也可以藉由這個機會改變未來婦產科的命運。雖然歐洲醫學會不像 ASRM 的規模，與台灣婦產科年會規模差不多，但是參加國外醫學會，有一個不變的心得與督促，那就是語言（英語，日語）是相當重要的溝通工具，可不要因循於日常生活的語言習慣而懶得自我充實。參與本次歐洲生殖醫學會的同仁均能身歷其境的了解最新的知識技術。

陸.建議事項

- 1.鼓勵經費的獎勵提供具發表優良論文者，多參與高水準品質的國際會議。
- 2.鼓勵多建立如姐妹校或其它國際合作的簽定，讓從事研究學者能藉由長、短期進修學習國外優點。
- 3.定立學術會議的品質與等級，以鼓勵實際發表及聆聽演講學習的充分性，以免流於流水席或出國遊玩的心態。

柒.參加此次會議對單位之貢獻

- 1.鼓勵從事研究計劃的學者飽受激勵而發憤研究的精進提昇院譽及台灣的學術能見度。
- 2.激發後進學弟妹等年輕醫師起而效尤，從事研究發展工作。
- 3.研究執行能力與信用能贏得科部的信用與實際性
- 4.改善臨床生殖醫學技術如人工生殖技術試管嬰兒的觀念與作法
- 5.前瞻技術研發本部究卵巢冷凍保存與移植及未來運用的特色
- 6.提昇國際學者及國內與會學者的互相瞭解，具實傳及合作的意義。
7. 極與院外學術單位或產業界合作：許多的研究設備，在其他研究單位或民間公司已經具有，若要等自己添購研究設備後再進行實驗，不僅經費不允許，時間也要很久，這對競爭性日增的研究領域而言，都是很大的阻礙。應積極鼓勵本院研究團隊與其他研究單位或產業界合作，導入院外的研究能量為本院的研究加分。可補助貴重儀器設備的使用，而不用自己買設備。對於產業界的合作應當抱持歡迎的態度且有具體支持得作法，如給予相對的研究經費等。這樣才能擴大本院的研究能量並能與時俱進。

接受會

ESHRE2008-Confirmation poster present

Friday, April 11, 2008 3:36 AM

From:

"info@eshre.com" <info@eshre.com>

[Add sender to Contacts](#)

To:

chihuangndmc@yahoo.com

Date: 11/04/08

Dear Dr. Chen,

RE: Acceptance abstract - 24th Annual Meeting of ESHRE - Barcelona 2008

Thank you once again for having submitted an abstract for our 24th Annual Meeting, which will be held in Barcelona (Spain) from 6 to 9 July 2008.

Please note that your abstract entitled "Assessment of patterns of engraftment, rejection and survival in mouse ovarian tissue transplantation using in vivo bioluminescence imaging" was evaluated anonymously by 3 international referees and a computer-weighted score was calculated. As a result, your abstract has been accepted for poster presentation.

Please note that all posters will be presented in electronic format (i.e. there will be no poster boards) and participants will be able to view posters on a number of computer terminals. Precise instructions as to how you should submit your poster in electronic format will be sent to you in due course.

If for any reason you are unable to attend the meeting, please arrange for one of the co-authors of your abstract to be present during the poster discussions. Please notify the ESHRE Central Office as early as possible of such a replacement. Presenters who fail to present their poster without due written notice within 15 days of this confirmation, will be sanctioned.

We would be grateful if you would arrange your registration to the meeting, if you have not already done so. Please note that the deadline for low fee registrations has been extended to

22 April 2008. It is possible to register online via our web-site at the following URL
<http://www.eshre.com/emc.asp?pagelid=288> Online booking of accommodation is also
available on our web-site at the following URL: <http://www.eshre.com/emc.asp?pagelid=287>

Details of the full scientific program will also be available on our web-site in due course.

Congratulations with your selection and looking forward to seeing you in Barcelona!

Yours sincerely,

Bruno Van den Eede,
on behalf of the Program Committee.

議程

Pre-congress Courses - 6 July 2008

■ Course 1 - Organised by the Paramedical Group

(pdf 1820 KB)

■ Course 2 - Organised by the Special Interest Group Embryology

"The Human IVF lab in 2008 and beyond"

(pdf 808 KB)

■ Course 3 - Organised by the Special Interest Group Endocrinology

"Gender specific medicine: Redefining reproductive endocrinology"

(pdf 8790 KB)

■ Course 4 - Organised by the Special Interest Group Endometriosis & Endometrium

"Abnormal uterine bleeding: strategies for management"

(pdf 3867 KB)

■ Course 5 - Organised by the Special Interest Group Stem Cells / Ethics & Law

"Ethical and scientific analysis of controversial developments in stem cell research"

(pdf 2070 KB)

■ Course 6 - Organised by the Special Interest Group Reproductive Genetics

"Sex chromosomes in human reproduction: towards understanding their basic function"

(pdf 3905 KB)

■ Course 7 - Organised by the Special Interest Group Psychology and Counselling & The International Infertility Counsellors Organisation

"Psycho-social counselling in fertility treatment"

(pdf 1890 KB)

■ Course 8- Organised by the Special Interest Group Safety and Quality in ART

"From evidence to clinical practice: the role of clinical guidelines"

(pdf 2078 KB)

■ Course 9 - Organised by the Special Interest Group Reproductive Surgery

"Training and education in endoscopy"

(pdf 7250 KB)



Course 10 - Organised by the Special Interest Group Andrology

"Paternal inheritance - sperm and epigenetics"

(pdf 10287 KB)

■ Course 11 - Organised by the Special Interest Group Early Pregnancy

"Pregnancy after ART"

(pdf 4110 KB)

■ Course 12 - Organised by the Task Force Developing countries & infertility

(pdf 6515 KB)

■ Course 13 - Organised by the American Society for Reproductive Medicine

"How do guidelines and regulations in reproductive medicine affect practice? An evidence-based course assessing the data"

(pdf 11616 KB)

Course 14 - ESHRE Journals course for authors

Monday, 7 July 2008

08.30 to 09.30 **Keynote lectures session**

- Healing the sick literature – **D. Rennie (USA)**
- Women's health: a focus in reproduction – **C. Valls Llobet (E)**

09.30 to 10.00 **Coffee break**

10.00 to 11.30 **6 Parallel Selected Oral Communication Sessions**

11.45 to 12.45 **Progesterone receptor modulators**

- What can primate models tell us about their mechanism of action?

R.M. Brenner (USA)

- Endometrial histology and anti-progestins: A curiosity or a concern?

A. Williams (UK)

11.45 to 12.45 **Members information session**

- "Consortium on Epidemiology/Demography/Health Economy" - **A. Sunde (N)**

- "Embryology Certification" - **K. Lundin (S)**

- "FertiQol" - **J. Boivin (UK)**

11.45 to 12.15 **Fertility Society of Australia Exchange Lecture**

- "Double trouble or fun with one?" - **Ph. Clements (AU)**

11.45 to 12.45 **Paramedical Invited Session: Nursing**

- J. Jack Exchange Lecture (*speaker TBA*)

- How can you prove you are "fit to practice"? - **M. Spelt (NL)**

11.45 to 13.00 **Company symposium**

13.00 to 14.00 **Lunch break**

14.00 to 15.00 **Prepatterning in mammalian preimplantation embryo development? (Debate)**

- Prepatterning is significant – **R.L. Gardner (UK)**

- Prepatterning is not significant – **T. Hiragi (D)**

14.00 to 15.00 **Infertility services in poorly resourced countries**

- Access to infertility services – **G. Serour (Egypt)**

- Organisational and clinical aspects of infertility services - **I. Cooke (UK)**

- 14.00 to 15.00 **Paramedical Selected Oral Communication Sessions**
- 14.00 to 15.15 **Company symposium**
- 15.15 to 16.30 **6 Parallel Selected Oral Communication Sessions**
- 16.30 to 17.00 Coffee break**
- 17.00 to 18.00 **Angiogenesis, from bench to bedside**
 - Mesenchymal stem cells and angiogenesis in endometrium - *C.E. Gargett (AUS)*
 - Angiogenesis in endometriosis – *C.M. Becker (D)*
- 17.00 to 18.00 **The preimplantation embryo: from morphology to genes**
 - Objective embryo quality assessment – *D. Sakkas (USA)*
 - Gene expression in preimplantation embryos – *M. Garcia Bermudez (E)*
- 17.00 to 18.00 **Paramedical Selected Oral Communication Sessions**

Tuesday, 8 July 2008

- 08.30 to 09.30 **Adenomyosis (Clinical Tutorial)**
 - Advances in diagnosis – *M. Bazot (F)*
 - Advances in treatment – *J. Rabinovici (IL)*
- 08.30 to 09.30 **Vitrification: as clear as glass?**
 - Vitrified embryos and oocytes: The way forward? – *M. Wood (UK)*
 - Clinical outcome of vitrification. What is the evidence? – *U.B. Wennerholm (S)*
- 08.30 to 09.30 **SMRU / ASRM Exchange session on State of the Art: Diagnosis and Treatment of Male Infertility**
 - The role of the andrologist in the treatment of male infertility - *R.Z. Sokol (USA)*
 - Male reproductive surgery in the age of ICSI -*Craig Niederberger (USA)*
- 08.30 to 09.30 **Paramedical invited session: Laboratory**
 - Oocyte freezing - *S. Barlow (UK)*
 - Ovarian tissue freezing - *J. Smitz (B)*

- 09.30 to 10.00** **Coffee break**
- 10.00 to 11.30 **6 Parallel selected oral communication sessions**
- 11.45 to 12.45 **Molecular analysis of preimplantation embryos using microarrays**
 - Microarrays. Their methodology and application for PGD and PGS – *J. Vermeesch (B)*
 - Molecular roadmap to embryo implantation – *S.K. Dey*
- 11.45 to 12.45 **Male's sexual health**
 - Erectile dysfunction and treatment - *P. Chan (CND)*
 - The ageing male – *E. Nieschlag (D)*
- 11.45 to 12.45 **Paramedical selected oral communication sessions**
- 11.45 to 13.00 **Company symposium**
- 13.00 to 14.00** **Lunch break**
- 14.00 to 15.00 **Postmenopausal pregnancy (Debate)**
 - Pro – *Ian Craft (UK)*
 - Con – *M. Camus (B)*
- 14.00 to 15.00 **Data from the ESHRE PGD Consortium**
- 14.00 to 15.00 **Paramedical Invited Session - Laboratory**
 - Polsope imaging in the IVF and research lab - *B. Heindryckx (B)*
 - Sperm morphology and ICSI outcome - *B. Bartoov (IL)*
- 14.00 to 15.15 **Company symposium**
- 15.15 to 16.30 **6 Parallel selected oral communication sessions**
- 16.30 to 17.00** **Coffee break**
- 17.00 to 18.00 **6 Parallel selected oral communication sessions**
- 18.00 to 19.00 **Annual General Assembly of Members**

Wednesday, 9 July 2008

- 08.30 to 09.00 **European IVF Monitoring (EIM)**
- Assisted reproductive technology in Europe, 2005. Results generated from European registers by ESHRE - *A. Nyboe Andersen, K.G. Nygren, Anna Pia Ferraretti, J. de Mouzon, S. Bhattacharya and R. Felberbaum*
- 08.30 to 09.30 **Early pregnancy and genetic developments**
- Cytogenetic aspects of early pregnancy loss – *M. Stephenson (USA)*
 - The role of Genomic Imprinting in placental development – *M. Constanica (UK)*
- 08.30 to 09.30 **Reproduction and cancer**
- Fertility preservation for children and young people with cancer (male and female) - *A. Wallace (UK)*
 - Cancer risk after fertility treatment (female) – *L.A. Brinton (USA)*
- 09.30 to 10.00 Coffee break**
- 10.00 to 11.00 **The influence of national legislation on ART practice**
- 10.00 to 11.45 **5 Parallel selected oral communication sessions**
- 12.00 to 13.00 **Contraception**
- Potential new targets for contraception – *A. Glasier (UK)*
 - Demographic consequences of contraception use - *H. Leridon (F)*
- 12.00 to 13.00 **ASRM Exchange session on Bleeding problems at the extremes of life-evidence based information**
- Abnormal uterine bleeding in the adolescent - *J.S. Sanfilippo (USA)*
 - Perimenopausal and Postmenopausal Bleeding - *S.J. Ory (USA)*
- 12.00 to 13.00 **Paramedical session - Dictating patients' lifestyle.**
- Have we gone too far? (Debate)**
- In favour of patients' freedom of choice - *Y. Van Kasteren (NL)*
 - Clinics and not patients should make the final decision on treatment. - *G. Lockwood (UK)*
- 13.00 to 14.00 Lunch break**

14.00 to 15.15 **6 Parallel selected oral communication sessions**

15.30 to 16.00 **Late Breaking Research Session**

16.00 to 16.30 **Awards and Closing Ceremony**

論文摘要

Assessment of patterns of engraftment, rejection and survival in mouse ovarian tissue transplantation using in vivo bioluminescence imaging

e-Poster: 497

Congress: ESHRE 2008

Type: Scientific poster

Topic: [Female fertility: basic research](#)

• Purpose

The applications of in vivo bioluminescence imaging (BLI) with luciferase reporter gene are distributed widely across biomedical fields. By utilizing luciferase transgenic mice as a highly useful donor for tracking transplanted ovarian tissues, realization of the full potential of this system may greatly benefit the study of the physiological behavior and function of transplanted grafts, and the evaluation of new transplantation protocols in a rapid and reliable fashion in this pilot study.

[read more](#)

• Methods and Materials

FVB/N-Tg(PoII-luc)Ltc transgenic mouse with luciferase gene fragment as a reporter is generated by pronuclei microinjection of PoII-Luc transgene into FVB/N fertilized embryos. The construct (gene fragment), PoII-luc, contains a 712bp mouse RNA Polymerase II promoter (PoII) and modified firefly luciferase cDNA (Promega pGL-2)(Figure 1). Recipient mice included group 1 (n=5): FVB/N wild type (isogenic) with daily cyclosporine-A (25 mg/kg) treatment, group 2 (n=5): FVB/N wild type without...

[read more](#)

• Results

The trend of BLI photon quantity declined significantly between the 1st day to the 5th day after transplantation. The steepest slope declined in group 4. It revealed mild increase trend between the 5th to 9th day but the trend declined again between the 9th day afterward in group 2, 3 and 4 but increased in group 1. Among the latter three groups in the second decline trend, the steepest slope occurred in group 4 (Figure 3 & 4). Among the multiple comparisons, time by group effect showed...

[read more](#)

- Conclusion

In vivo optical molecular imaging expedites the fast throughput screening of engraftment by a longitudinal monitoring of transplanted ovarian tissue survival in living animals, accomplished with BLI techniques which will allow investigators to rapidly evaluate graft damage during reperfusion ischemia and rejection. The pattern of engraftment of isogenic and allogenic ovarian graft existed differently depending on genetic background and the use of immunosuppressive therapy.

[read more](#)

- References

Flower M, et al. Assessment of Pancreatic Islet Mass after Islet Transplantation Using In Vivo Bioluminescence Imaging. *Transplantation* 2005; 79: 768–776.

[read more](#)

-  [enlarge](#)