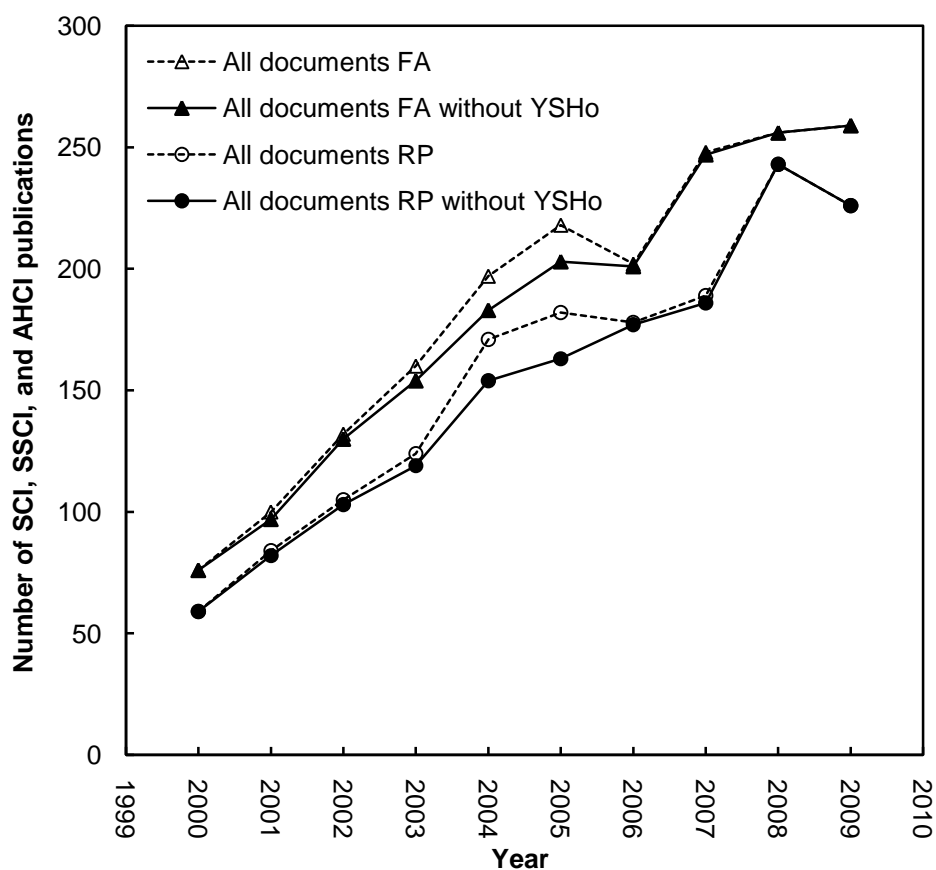
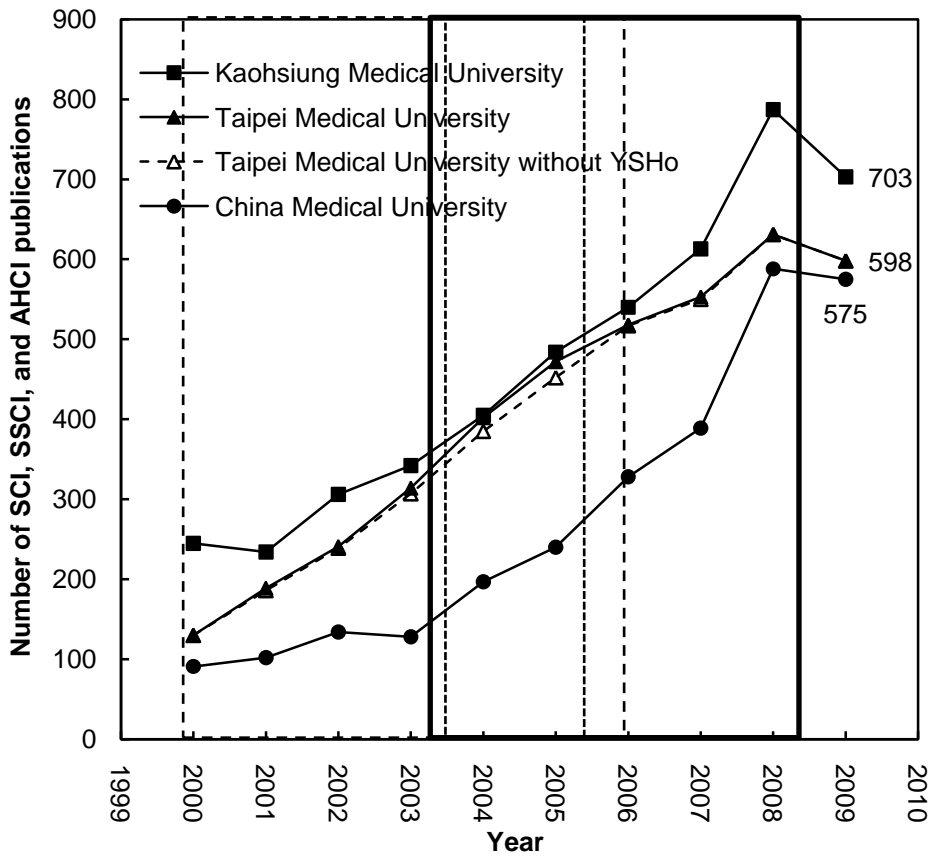
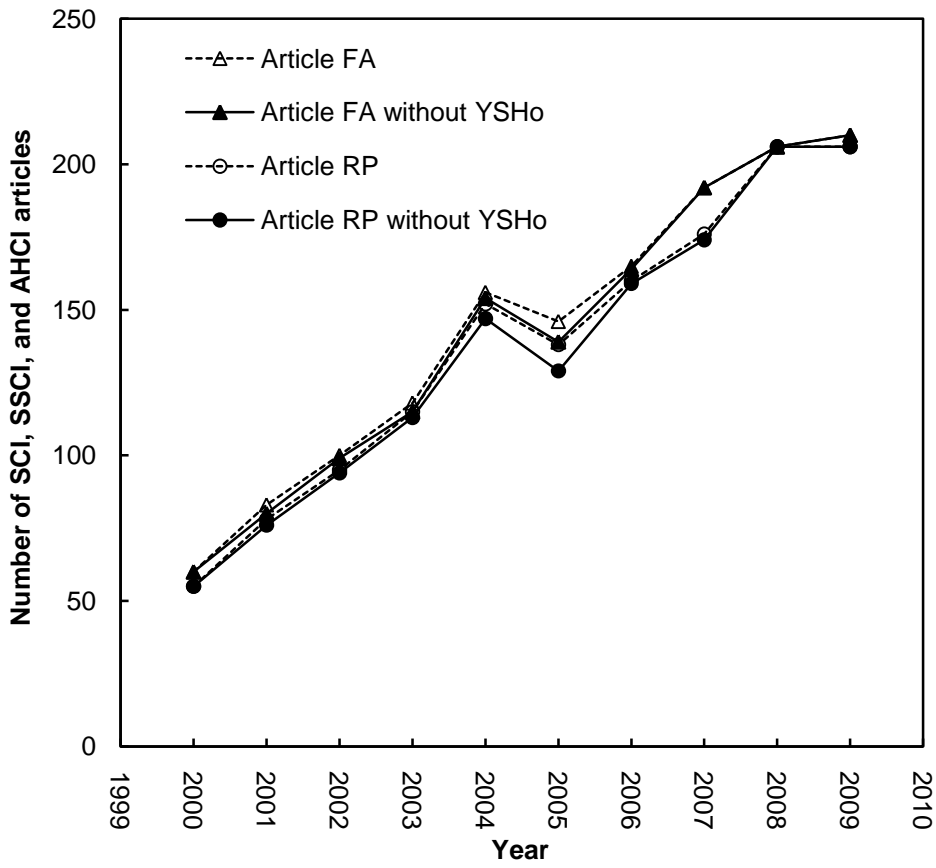
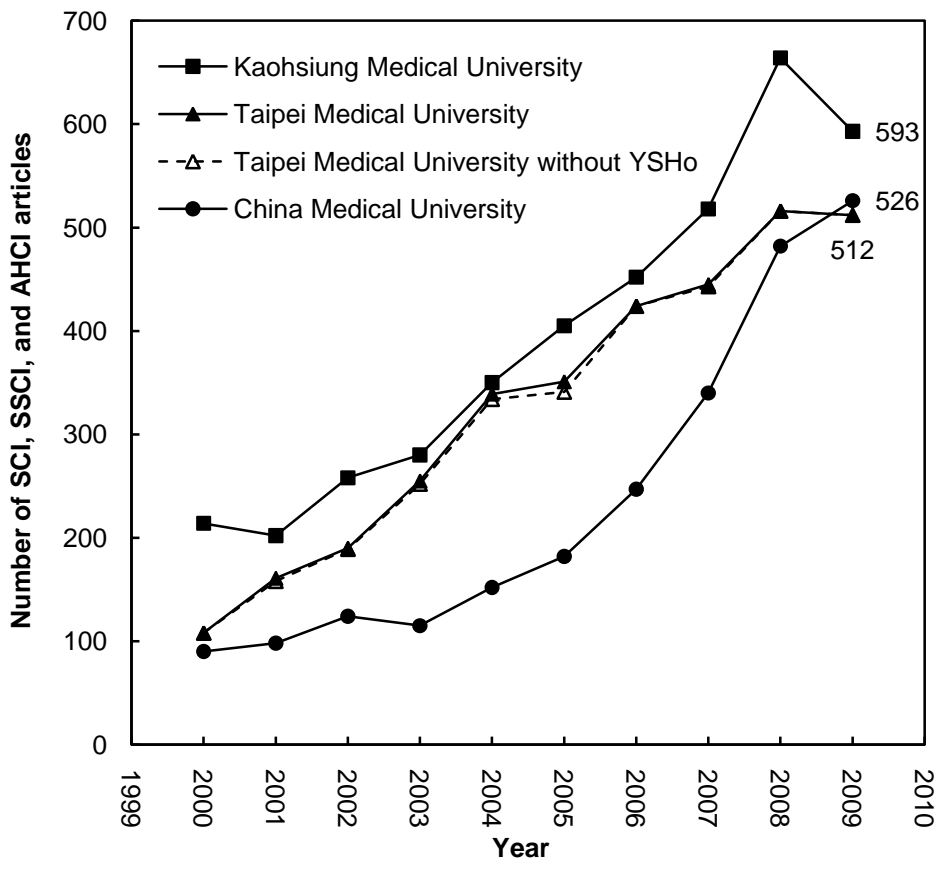
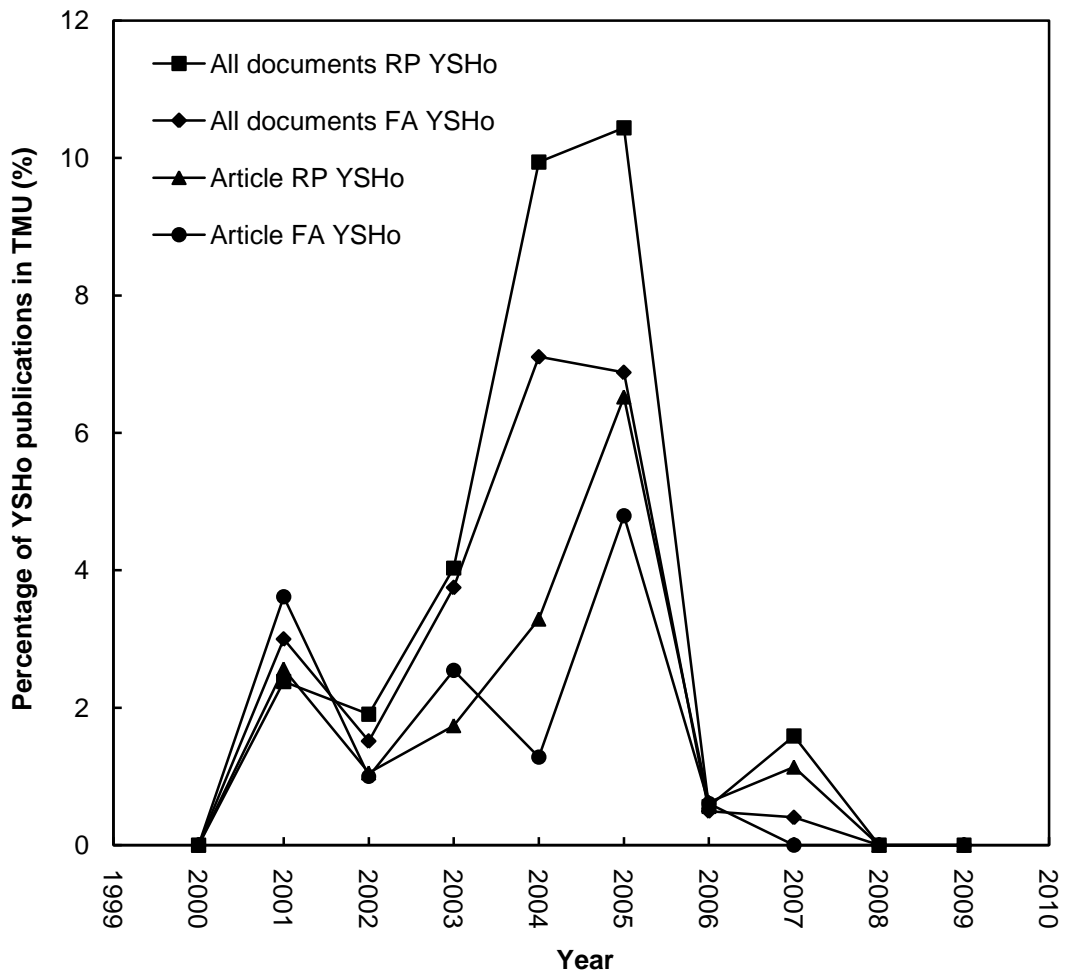


北醫本世紀的第一個十年，SCI, SSCI, AHCI 期刊文章分析，至 12 月 04 止調查如下。RP: corresponding author publications, FA: first author publications









2000-04/12/2009 期間在 SCI, SSCI, and AHCI 期刊發表的文章，至 04/12/2009 止，台北醫學大學 12 篇文章被引用超過一百次，兩篇以上作者如下表。

作者	文章總數(%)	第一作者文章總數(%)	通訊作者文章總數(%)
YSHo (前北醫助理教授)	5	5 (42)	4 (33)
邱弘毅 (北醫教授)	3	1 (8.3)	0 (0)
Lee, TjF (So Illinois Univ)	2	0 (0)	0 (0)
陳建仁 (台大教授)	2	0 (0)	1 (8.3)
曾慶孝 (臺大醫院)	2	1 (8.3)	1 (8.3)
陳彥州 (北醫教授)	2	2 (17)	0 (0)
楊玲玲 (北醫講座教授)	2	0 (0)	2 (17)

北醫目前有九篇文章被列入 Essential Science Indicators

Record 1 of 9 北醫第五作者

Hsu, YS; Chien, RN; Yeh, CT; Sheen, IS; Chiou, HY; Chu, CM; Liaw, YF. 2002. Long-term outcome after spontaneous HBeAg seroconversion in patients with chronic hepatitis B. *HEPATOLOGY* 35 (6): 1522-1527.

Document Type: Article

Addresses: Chang Gung Mem Hosp, Liver Res Unit, Tokyo 105, Japan; **Taipei Med Univ**, Sch Publ Hlth, Taipei, Taiwan

Reprint Address: Liaw, YF, Chang Gung Mem Hosp, Liver Res Unit, 199 Tung Hwa N Rd, Tokyo 105, Japan.

Times Cited: 175

Record 2 of 9 北醫單一作者

**Ho, YS**. 2003. Removal of copper ions from aqueous solution by tree fern. *WATER RESEARCH* 37 (10): 2323-2330.

Document Type: Article

Addresses: **Taipei Med Univ**, Sch Publ Hlth, Taipei, Taiwan

Reprint Address: **Ho, YS, Taipei Med Univ**, Sch Publ Hlth, 250, Wu Hsing St, Taipei, Taiwan.

Times Cited: 169

Record 3 of 9 北醫第一作者 通訊作者

**Ho, YS**; Chiang, CC. 2001. Sorption studies of acid dye by mixed sorbents. *ADSORPTION-JOURNAL OF THE INTERNATIONAL ADSORPTION SOCIETY* 7 (2): 139-147.

Document Type: Article

Addresses: **Taipei Med Univ**, Sch Publ Hlth, Taipei, Taiwan; Chin Mim Coll, Dept Chem Engn, Miao Li, Peoples R China

Times Cited: 134

Record 4 of 9 北醫單一作者 本篇在台灣社會科學 ESI 排名第一

**Ho, YS**. 2004. Citation review of Lagergren kinetic rate equation on adsorption reactions. *SCIENTOMETRICS* 59 (1): 171-177.

Document Type: Review

Addresses: **Taipei Med Univ**, Sch Publ Hlth, Taipei, Taiwan; **Taipei Med Univ**, Bibliometr Ctr, Wan Fang Hosp, Taipei, Taiwan

Reprint Address: **Ho, YS, Taipei Med Univ**, Sch Publ Hlth, 250 Wu Hsing St, Taipei, Taiwan.

E-mail Address: ysho@tmu.edu.tw

Times Cited: 131

Record 5 of 9 北醫單一作者

**Ho, YS.** 2006. Review of second-order models for adsorption systems. *JOURNAL OF HAZARDOUS MATERIALS* 136 (3): 681-689.

Author Full Name(s): Ho, Yuh-Shan

Document Type: Review

Addresses: **Taipei Med Univ**, Sch Publ Hlth, Taipei 11014, Taiwan

Reprint Address: **Ho, YS, Taipei Med Univ**, Sch Publ Hlth, 250 Wu Hsing St, Taipei 11014, Taiwan.

E-mail Address: ysho@tmu.edu.tw

Times Cited: 91

Record 6 of 9 北醫第九作者

Calabrese, EJ; Bachmann, KA; Bailer, AJ; Bolger, PM; Borak, J; Cai, L; Cedergreen, N; Cherian, MG; Chlueh, CC; Clarkson, TW; Cook, RR; Diamond, DM; Doolittle, DJ; Dorato, MA; Duke, SO; Feinendegen, L; Gardner, DE; Hart, RW; Hastings, KL; Hayes, AW; Hoffmann, GR; Ives, JA; Jaworowski, Z; Johnson, TE; Jonas, WB; Kaminski, NE; Keller, JG; Klaunig, JE; Knudsen, TB; Kozumbo, WJ; Lettleri, T; Liu, SZ; Maisseu, A; Maynard, KI; Masoro, EJ; McClellan, RO; Mehendale, HM; Mothersill, C; Newlin, DB; Nigg, HN; Oehme, FW; Phalen, RF; Philbert, MA; Rattan, SIS; Riviere, JE; Rodricks, J; Sapolsky, RM; Scott, BR; Seymour, C; Sinclair, DA; Smith-Sonneborn, J; Snow, ET; Spear, L; Stevenson, DE; Thomas, Y; Tubiana, M; Williams, GM; Mattson, MP. 2007. Biological stress response terminology: Integrating the concepts of adaptive response and preconditioning stress within a hormetic dose-response framework. *TOXICOLOGY AND APPLIED PHARMACOLOGY* 222 (1): 122-128.

Author Full Name(s): Calabrese, Edward J.; Bachmann, Kenneth A.; Bailer, A. John; Bolger, P. Michael; Borak, Jonathan; Cai, Lu; Cedergreen, Nina; Cherian, M. George; Chlueh, Chuang C.; Clarkson, Thomas W.; Cook, Ralph R.; Diamond, David M.; Doolittle, David J.; Dorato, Michael A.; Duke, Stephen O.; Feinendegen, Ludwig; Gardner, Donald E.; Hart, Ronald W.; Hastings, Kenneth L.; Hayes, A. Wallace; Hoffmann, George R.; Ives, John A.; Jaworowski, Zbigniew; Johnson, Thomas E.; Jonas, Wayne B.; Kaminski, Norbert E.; Keller, John G.; Klaunig, James E.; Knudsen, Thomas B.; Kozumbo, Walter J.; Lettleri, Teresa; Liu, Shu-Zheng; Maisseu, Andre; Maynard, Kenneth I.; Masoro, Edward J.; McClellan, Roger O.; Mehendale, Harlhara M.; Mothersill, Carmel; Newlin, David B.; Nigg, Herbert N.; Oehme, Frederick W.; Phalen, Robert F.; Philbert, Martin A.; Rattan, Suresh I. S.; Riviere, Jim E.; Rodricks, Joseph; Sapolsky, Robert M.; Scott, Bobby R.; Seymour, Colin; Sinclair, David A.; Smith-Sonneborn, Joan; Snow, Elizabeth T.; Spear, Linda; Stevenson, Donald E.; Thomas, Yolene; Tubiana, Maurice; Williams, Gary M.; Mattson, Mark P.

Document Type: Article

Addresses: Univ Massachusetts, Sch Publ Hlth, Amherst, MA 01003 USA; Univ Toledo, Toledo, OH 43606 USA; Univ Miami, Coral Gables, FL 33124 USA; US FDA, Rockville, MD 20857 USA; Yale Univ, New Haven, CT 06520 USA; Univ Louisville, Sch Med, Louisville, KY 40292 USA; Univ Western Ontario, London, ON N6A 3K7, Canada; **Taipei Med Univ**, Taipei, Taiwan; Univ Rochester, Rochester, NY 14627 USA; RRC Consulting, Austin, TX 78727 USA; Univ S Florida, Tampa, FL 33620 USA; Eli Lilly & Co, Indianapolis, IN 46285 USA; USDA, ARS, Rockville, MD 20857 USA; Univ Dusseldorf, D-4000 Dusseldorf, Germany; Inhalat Toxicol Associates, Washington, DC 20006 USA; US FDA, NCTR, Rockville, MD 20857 USA; Harvard Univ, Boston, MA 02114 USA; Coll Holy Cross, Worcester, MA 01610 USA; Cent Lab Radiol Protect, Warsaw, Poland; Univ Colorado, Boulder, CO 80309 USA; Michigan State Univ, E Lansing, MI 48824 USA

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Times Cited: 53

Record 7 of 9 中國附醫與北醫第一作者

Su, KP; Huang, SY; Chiu, TH; Huang, KC; Huang, CL; Chang, HC; Pariante, CM. 2008. Omega-3 fatty acids for major depressive disorder during pregnancy: Results from a randomized, double-blind, placebo-controlled trial. *JOURNAL OF CLINICAL PSYCHIATRY* 69 (4): 644-651.

Author Full Name(s): Su, Kuan-Pin; Huang, Shih-Yi; Chiu, Tsan-Hung; Huang, Kuo-Cherh; Huang, Chieh-Liang; Chang, Hui-Chih; Pariante, Carmine M.

Document Type: Article

Addresses: [Su, Kuan-Pin; Huang, Chieh-Liang] China Med Univ Hosp, Dept Gen Psychiat, Mind Body Interface Res Ctr, Taichung 404, Taiwan; [Su, Kuan-Pin; Huang, Chieh-Liang] China Med Univ Hosp, Dept Psychiat, Taichung 404, Taiwan; [Chiu, Tsan-Hung] China Med Univ Hosp, Dept Obstet & Gynecol, Taichung 404, Taiwan; [Su, Kuan-Pin; Huang, Shih-Yi] **Taipei Med Univ**, Sch Nutr & Hlth Sci, Taipei, Taiwan; [Huang, Kuo-Cherh; Chang, Hui-Chih] **Taipei Med Univ**, Sch Hlth Care Adm, Taipei, Taiwan; [Su, Kuan-Pin; Chang, Hui-Chih; Pariante, Carmine M.] Kings Coll London, Inst Psychiat, London, England

Reprint Address: Su, KP, China Med Univ Hosp, Dept Gen Psychiat, Mind Body Interface Res Ctr, 2 Yuh Der Rd, Taichung 404, Taiwan.

E-mail Address: cobolsu@gmail.com; sihuang@tmu.edu.tw

Times Cited: 24

Record 8 of 9 北醫通訊作者 第二作者

Chen, LG; Yang, LL; Wang, CC. 2008. Anti-inflammatory activity of mangostins from *Garcinia mangostana*. *FOOD AND CHEMICAL TOXICOLOGY* 46 (2): 688-693.



Author Full Name(s): Chen, Lih-Geeng; Yang, Ling-Ling; Wang, Ching-Chiung

Document Type: Article

Addresses: [Yang, Ling-Ling; Wang, Ching-Chiung] **Taipei Med Univ**, Coll Pharm, Sch Pharm, Taipei 110, Taiwan; [Chen, Lih-Geeng] Natl Chiayi Univ, Coll Life Sci, Grad Inst Biomed & Bioparmaceut Sci, Taipei 600, Taiwan

Reprint Address: Wang, CC, **Taipei Med Univ**, Coll Pharm, Sch Pharm, 250 Wu Hsing St, Taipei 110, Taiwan.

E-mail Address: crystal@tmu.edu.tw

Times Cited: 16

Record 9 of 9 北醫第四作者

Tsai, YT; Cheng, PC; Fan, CK; Pan, TM. 2008. Time-dependent persistence of enhanced immune response by a potential probiotic strain *Lactobacillus paracasei* subsp *paracasei* NTU 101.

*INTERNATIONAL JOURNAL OF FOOD MICROBIOLOGY* 128 (2): 219-225.

Author Full Name(s): Tsai, Yueh-Ting; Cheng, Po-Ching; Fan, Chia-Kwung; Pan, Tzu-Ming

Document Type: Article

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## 過去對北醫的分析

### Research Performance and Impact of the Taipei Medical University: A Bibliometric Study with Peak-Year Citation per Publication Indicator

#### Introduction

Bibliometrics is a research method used in the library and information sciences. Bibliometrics findings are useful to follow research trends in many fields. Numerous studies were focused on university's research performance (Moed et al., 1985), which have included Pontificia Universidad (Krauskopf et al., 1995), Chinese universities (Liang and Wu, 2001), German university sector (Daniel and Fisch, 1990), Polytechnic University of Valencia, Spain (Arroyo-Alonso et al., 2005), and university research performance in Flanders (Van den Berghe et al., 1998). Bibliometric indicators, such as number of publications (Frohlich and Resler, 2001), citations (Johnson et al., 1997; Zhang and Yamazaki, 1998), journal impact factors (Davis and Royle, 1996), institutional co-authorships (Melin, 1996), and research group (Van, 2006) were used for research evaluation. The scientific publications reflect the size of the scientific activity in the subfields in which a group worked. Using the publications to access the research performance often exhibits a lack of conceptual clarity. The status of production as an indicator of scientific progress is uncertain, as the relative quality or impact of publications has not been assessed (Smith and Fiedler, 1971). The purpose of this study was to investigate a university research performance and impact. Papers produced in Taipei Medical University from the years 1972 to 2005 are listed with the *Science Citation Index* (SCI) were used to analysis. Using peak-year citation per publication (PCPP) techniques, the dynamics of citation frequencies, and a number of other features of the research system, like article characteristics, international collaboration, national collaboration, journal, subject categories, number of times cited, and distribution of keywords would be studied. The methods also can be used to analyze institutional and national research efforts.

#### Methodology

In the 2005 edition of the *Journal Citation Reports* (JCR), 6,088 journals are listed in the SCI. Taipei Medical College (TMC) has changed its status to Taipei Medical University (TMU) in year 2000, articles published by TMC prior to 2000 have been added to TMU data. "Taipei Med not (Taipei Med Assoc or Taipei Med Ctr or **Taipei Med Univ**)" was used as the keyword to search address. It may include **Taipei Med Univ**, Taipei Med Col, Taipei Med Univ, Taipei Med Unit, Taipei Med Coll, Taipei Med Uni, and Taipei Med Sch. Articles originating from England, Scotland, Northern Ireland, and Wales were re-categorized as being from the United Kingdom. Collaboration type was determined based on the address of each author, with the term "independent article" being assigned if the addresses of the researchers were in TMU. The term "national article" was assigned to articles co-signed by researchers were in Taiwan. The term "international article" was assigned to articles co-signed by researchers from multiple countries. All numerical analyses used integer counts, i.e. if an article was authored by authors from two different countries, each country was counted once, thus, in some cases, The percentages will be added up more than 100 (Table 2 and 3). Downloaded information included names of author, author addresses, titles, year of publication, keywords, times cited, subject categories of the journal, and names of journal publishing the article. The records were downloaded into spreadsheet software, and additional coding was performed manually for the number of authors, country origin of collaborators, and impact

factors of the publishing journals. The reported impact factor (IF) of each journal was derived from the 2005 JCR. The IF of a journal is defined by the *JCR*, and is derived by dividing the number of current citations to articles published in the previous two years by the total number of articles published in those years. It is a measure of the frequency with which the average articles in a journal have been cited in a particular year. The IF is used to evaluate a journal's relative importance, especially when compared to others in the same field.

In order to assess the visibility of an article, we used the number of times cited as an indicator. However, the number of times cited for an article is highly correlated with the length of time since its publication. To adjust for that, a new variable was created. Figure 1 shows the relationship between the citation per publication and the number of years since its publication for the 2,088 articles. It shows that the number of times cited is the highest on the third full year since its publication, and began to decrease afterwards. Similar peak-year phenomena of citation history has been found in other previous studies, though the peak position might be shifted to 2, 3, 4, or more years, depending on the research disciplines (King, 1988; Messina et al., 1994; He, 2003; Hsieh et al., 2004; Chiu and Ho, 2005; Chuang et al., 2007).

Peak-year citation per publication is an important initial indicator of research impact, useful to establish questions and narrow an overall field of inquiry. To reduce the bias due to the differences in length of article life, a new variable peak-year citation per publication (PCPP) which was an average value for citations per papers received before, including the peak-year. PCPP is used to assess the visibility or impact of publications, much more appropriate than the previous one. In this study, the peak-year was the second year. Then the total times cited before, including the peak-year (TC2) was used for calculation of PCPP. In some cases, since there were no data for TC2s and PCPPs after 2003, we only discuss publications from 1991 to 2003 for citation tracking (Table 1).

## Results and Discussion

### Article Characteristics

The number of articles published by Taipei Medical University (TMU) researchers in the journals listed in SCI has been increasing significantly since 1972. The year-wise output is displayed in Table 1, and the growth of publications by TMU researchers relative to Taiwan publications is displayed in Fig. 2. In 1972, there were only 2 articles. After 1991, there had been a steady increase. In 2004, it had reached 347 articles, and in 2005, it had increased to 389 articles. The article growth rates of TMU and Taiwan, from 1986 to 2005, were steadily rising and follow a linear model for each 5 years. It is clear from Fig. 2 growth rates as the slope of the straight line for Taiwan were higher than that of TMU in the period of 1986 and 1991. In the following years (1996-2000) the article growth rates of TMU and Taiwan were similar. In the last 5 years (2000-2005), however, the growth rates of TMU were much higher than that of Taiwan. Figure 3 shows PCPP and the number of articles. Only 1,131 articles had a PCPP value (1986-2003). Data shows that PCPP had been fluctuating and increasing over the years. The average PCPP was 3.3 from 1986 to 2003. PCPP was the lowest in year 1986 without any citation but was the highest in year 2002 at 3.8. In addition, an article published in 2003 in *Water Research* by single author (Ho, 2003) who was in the School of Public Health had the highest TC2 of 38.

### International Collaboration

Twenty percents of all articles were international co-authorship (ICA) since 1972. The percentage of

articles with ICA is listed in Table 1. In general, ICA articles were more prevalent in earlier years than recent years. Using 5-year intervals, the percentage of articles with ICA were 33%, 32%, 37%, 22%, and 15% for the periods 1981-1985, 1986-1990, 1991-1995, 1996-2000, and 2001-2005 respectively. It appeared that papers with ICA had higher visibility than others. Of the 1,163 articles that had a PCPP value, a total of 232 articles had ICA, with an average PCPP of 4.1, while the others only averaged 3.0. Table 2 shows co-authorship countries, number of articles, TC2, and PCPP value. The most co-authored country was the USA with 150 articles (65% of all ICA articles) and a PCPP of 4.9. It is not surprising the USA was the country that TMU researchers collaborated with most often, since many researchers were trained in the USA. Japan was the second most co-authored countries with 62 articles (27%) and a PCPP of 2.9. Furthermore, PCPP values of these co-authored articles were much lower than those co-authored with the USA. It is likely that TMU research will benefit from closer ties with the USA.

#### National Collaboration

Of the 931 non-international collaborative articles, 186 out of 931 (20%) articles were published by researchers in TMU. Table 3 shows the number of articles for co-authorship institutes that has published at least 20 national collaborative articles (NCA) since 1972. Some institutes changed their status from a college to a university, and data for these institutes were grouped together under the new name. For instance, since National Yang Ming Medical College (NYMC) changed its status to National Yang Ming University (NYMU) in year 1994, articles published by NYMC prior to 1994 have been added to NYMU's data. In Table 3, the institutes were listed in descending order of the number of total national collaborative articles published. National Taiwan University (NTU) had the most number of publications with 200 articles, followed by National Defense Medical Center (NDMC) with 77 articles, and NYMU with 68 articles. In general, a medical University would have collaborative research with its hospital most. However in this study, Taipei Medical University - Wan-Fang Hospital (TMU-WFH) was ranked in 6 with 56 articles and Taipei Medical University Hospital (TMUH) was ranked in 9 with 49 articles. Among the top 14 national co-authorship institutes, 5 of them were university, 7 out of 14 were hospital, and 2 of them were research institute. Eighty percent of all TMU articles were non-international collaborative articles (931). Eighty percent of these articles were national collaborative articles. Only 16 percent of all TMU articles (186) were single institute published articles. Normally, if an institute is not able to conduct research independently, it would have difficulty to amass research outputs, unless it has an extensive amount of research networks and collaborators. To find out how TMU formed its research network, it would require further investigation and is beyond the scope of this paper. In addition, TMU had 579 (50%) first author articles with PCPP of 2.8 that was lower than others articles with PCPP of 3.7. Similarly, TMU had 471 (46%) corresponding articles with PCPP of 3.0 that was also lower than others articles with PCPP of 3.7.

Of the 931 non-international collaborative articles that had a PCPP value, a total of 186 single-institute articles were published by TMU, with an average PCPP of 2.7, while the others averaged 3.1. In terms of PCPP values for national collaborative articles, Taipei Veterans General Hospital (TVGH) leads the other institutes with 4.8, followed by Academia Sinica (4.6), and TMU-WFH (4.3) (Table 3). Comparisons showed that the 7 hospitals had an average PCPP of 3.6, and 5 universities had an average PCPP of 3.5, higher than the average PCPP of 3.1 for the 2 research institutes. The PCPP does not actually indicate the

quality of a paper, but it is a measure of its impact or visibility. For TMU, the value of PCPP for the international collaborative articles was 4.1 that was higher than the PCPP of 3.0 for the non-international collaborative articles. In addition, the value of PCPP for national collaborative articles was 3.1 that was higher than the PCPP of 2.7 for the single-institute of TMU articles.

#### Journals, Subject Categories, and Keywords

Table 4 shows the names of journals (published at least 10 TMU articles), number of articles published by these journals, PCPP, and IF. The journal that published the most number of articles by TMU researchers was *Planta Medica* with 31 articles, followed by *Journal of the Formosan Medical Association* (21), *American Journal of Chinese Medicine* (20), and *International Journal of Pharmaceutics* (20). The 11 articles published in *Biochemical Pharmacology* had an averaged PCPP of 14, and *Journal of Cellular Biochemistry* had a PCPP of 10. The *Journal of Formosan Medical Association* which published the second most number of articles had a PCPP of only 1.4, which was ranked 17<sup>th</sup> out of the 23 journals in Table 4. It also had the low impact factor among the 14 journals. Furthermore, contrary to what is expected, there is no relationship between PCPP and IF for these articles. In other words, for TMU articles, the PCPP is not associated with the impact factor of journals that publish these articles. The values of PCPP were higher than IF in 78% of the 23 journals. Impact of TMU articles published in these journals was higher than average level. Moreover, *JAMA-Journal of the American Medical Association* also had the highest IF (24.831) of all the journals publishing TMU articles. However, the *Water Research* which published only one article had the highest TC2 of 38.

The 1,161 articles with PCPP and subject category information were distributed over 106 subject categories. Table 5 shows the categories that had at least 50 articles. The four top categories with the most number of articles were Pharmacology & Pharmacy (430), Biochemistry & Molecular Biology (114), Plant Sciences (113), and Chemistry, Medicinal (106). The highest PCPP were Cell Biology (7.2), and followed by Public, Environmental & Occupational Health (6.2), and Peripheral Vascular Disease (6.0). Of the 830 articles with author keyword information had PCPP values. Examination of author keywords revealed that 2,843 keywords were used. Among them, 2,260 (79%) keywords appeared only once, 344 (12%) keywords appeared only twice, and 112 (3.9%) keywords appeared only three times. The large number of once-only author keywords probably indicates a lack of continuity in research and a wide disparity in research focuses. Table 6 shows keywords that appeared at least 10 times. The most frequently used keyword was ‘apoptosis’, appearing in 4.5% of articles with PCPP of 6.7. The 2<sup>nd</sup> most frequently used keywords were ‘nitric oxide’ at 2.5% with PCPP of 6.0. The Graduate Institute of Pharmacognosy Science and Graduate Institute of Biomedical Technology were two institutes that their research was highly associated with specific research topics with higher PCPP in TMU.

Further study was focused on the *KeyWords Plus* which provides search terms extracted from the titles of papers cited in each new article listed in the database in ISI (Garfield, 1990). The *KeyWords Plus* substantially augments title-word and author-keyword indexing. Examination of “*KeyWords Plus*” revealed that 3,627 keywords were used. The most frequently *KeyWords Plus* was “cells”, appearing in 6.1% of 1,017 articles with PCPP. The 2<sup>nd</sup> most frequently used keywords were “expression” at 5.4%, and followed by “inhibition” at 4.3%, “activation” at 3.9%, and “in-vitro” at 3.5%. Articles with these keywords had PCPP of 4.6. In addition, “metal-ions” and “waste-water” appeared once with the highest

PCPP as 38. These two keywords are not typical medical research terms.

The Essential Science Indicators (ESI) of the Institute of Scientific Information is a resource that enables researchers to conduct ongoing, quantitative analyses of research performance and track trends in science. The citation thresholds are set to select roughly the same proportion of entities from each field. For scientists the top 1% of names is selected for each of the fields (ESI frequently asked questions, 2007). Five papers were listed in ESI on May 1<sup>st</sup>, 2008, included authors from Taipei Medical University. One paper was published respectively in the fields of chemistry, environment/ecology, general social sciences, and engineering by first and corresponding authors from School of Public Health (Ho, 2001, 2003, 2004, 2006).

However, the first and corresponding authors of the paper published in the field of pharmacology & toxicology in 2007, were from the University of Massachusetts, School of Public Health, USA (Calabrese et al., 2007). Table 7 shows a comparison of papers listed in the Essential Science Indicators.

#### Conclusion

Scientific research in TMU has increased significantly over the last 35 years. Comparing to the Taiwan trend, it has increased at a much quicker pace in the last five years. The overall quality of research appeared to be improving, as indicated by an increase in the PCPP values of recently published articles. Correspondingly, the articles with international co-authorship had PCPP of 4.1, national co-authorship had 3.1, and 2.7 for TMU independent publication. Another sign of concern is that research in TMU covers a wide range of sub-topics, as indicated by the large number of one-time-only author keywords used in these articles. School of Public Health contributes most of papers listed in the Essential Science Indicators.

#### References

- Adams, J. (2005), Early citation counts correlate with accumulated impact. *Scientometrics*, **63** (3), 567-581.
- Arroyo-Alonso, A., Pulgarín, A. and Gil-Leiva, I. (2005), Scientometric study of the scientific collaboration in the Polytechnic University of Valencia, Spain. *Information Research-An International Electronic Journal*, **11**, 1.
- Bordons, M., Fernandez, M.T. and Gomez, I. (2002), Advantages and limitations in the use of impact factor measures for the assessment of research performance in a peripheral country. *Scientometrics*, **53** (2), 195-206.
- Calabrese, E.J., Bachmann, K.A., Bailer, A.J., Bolger, P.M., Borak, J., Cai, L., Cedergreen, N., Cherian, M.G., Chlueh, C.C., Clarkson, T.W., Cook, R.R., Diamond, D.M., Doolittle, D.J., Dorato, M.A., Duke, S.O., Feinendegen, L., Gardner, D.E., Hart, R.W., Hastings, K.L., Hayes, A.W., Hoffmann, G.R., Ives, J.A., Jaworowski, Z., Johnson, T.E., Jonas, W.B., Kaminski, N.E., Keller, J.G., Klaunig, J.E., Knudsen, T.B., Kozumbo, W.J., Lettleri, T., Liu, S.Z., Maisseu, A., Maynard, K.I., Masoro, E.J., McClellan, R.O., Mehendale, H.M., Mothersill, C., Newlin, D.B., Nigg, H.N., Oehme, F.W., Phalen, R.F., Philbert, M.A., Rattan, S.I.S., Riviere, J.E., Rodricks, J., Sapolsky, R.M., Scott, B.R., Seymour, C., Sinclair, D.A., Smith-Sonneborn, J., Snow, E.T., Spear, L., Stevenson, D.E., Thomas, Y., Tubiana, M., Williams, G.M. and Mattson, M.P. (2007), Biological stress response terminology: Integrating the concepts of adaptive response and preconditioning stress within a hormetic dose-response framework.

- Toxicology and Applied Pharmacology*, **222** (1), 122-128.
- Chiu, W.T. and Ho, Y.S. (2005), Bibliometric analysis of homeopathy research during the period of 1991 to 2003. *Scientometrics*, **63** (1), 3-23.
- Chuang, K.Y., Huang, Y.L. and Ho, Y.S. (2007), A bibliometric and citation analysis of stroke-related research in Taiwan. *Scientometrics*, **72** (2), 201-212.
- Citation indicators of Japanese journals. *Journal of the American Society for Information Science*, **49** (4), 375-379.
- Crouch, D., Irvine, J. and Martin, B.R. (1986), Bibliometric analysis for science policy: An evaluation of the United Kingdom research performance in ocean currents and protein crystallography. *Scientometrics*, **9** (5-6), 239-267.
- Daniel, H.D. and Fisch, R. (1990), Research performance evaluation in the German university sector. *Scientometrics*, **19** (5-6), 349-361.
- Davis, G. and Royle, P. (1996), A comparison of Australian university output using journal impact factors. *Scientometrics*, **35** (1), 45-58.
- ESI frequently asked questions. 22 August 2007, Available from:  
<http://thomsonscientific.com/support/faq/wok3new/ESI/#thresholds>.
- Frohlich, C. and Resler, L. (2001), Analysis of publications and citations from a geophysics research institute. *Journal of the American Society for Information Science and Technology*, **52** (9), 701-713
- Garfield, E. (1955), Citation indexes to science: A new dimension in documentation through the association of ideas. *Science*, **122** (3159), 108-111.
- Garfield, E. (1972), Citation analysis as a tool in journal evaluation. *Science*, **178** (4060), 471-479.
- Garfield, E. (1973), What scientific journals can tell us about scientific journals. *IEEE Transactions on Professional Communication*, **PC16** (4), 200-203.
- Gilbert, G. (1977), Referencing as persuasion. *Social Studies of Science*, **7** (1), 113-122.
- Glänzel, W. and Schoepflin, U. (1995), A bibliometric study on aging and reception processes of scientific literature. *Journal of Information Science*, **21** (1), 37-53.
- Hicks, D., Martin, B.R. and Irvine, J. (1986), Bibliometric techniques for monitoring performance in strategic research: The case of integrated optics, *R&D Management*, **16** (3), 211.
- Ho, Y.S. and Chiang, C.C. (2001), Sorption studies of acid dye by mixed sorbents. *Adsorption-Journal of the International Adsorption Society*, **7** (2), 139-147.
- Ho, Y.S. (2003), Removal of copper ions from aqueous solution by tree fern. *Water Research*, **37** (10), 2323-2330.
- Ho, Y.S. (2004), Citation review of Lagergren kinetic rate equation on adsorption reactions. *Scientometrics*, **59** (1), 171-177.
- Ho, Y.S. (2006), Review of second-order models for adsorption systems. *Journal of Hazardous Materials*, **136** (3), 681-689.
- Hsieh, W.H., Chiu, W.T., Lee, Y.S. and Ho, Y.S. (2004), Bibliometric analysis of patent ductus arteriosus treatments. *Scientometrics*, **60** (2), 205-215.
- Johnson, S.B. and Osborne, R.D. (1997), Citation analysis and Northern Ireland: A quality measure? *Higher Education Policy*, **10** (3-4), 297-313.

- King, J. (1988), The use of bibliometric techniques for institutional research evaluation: A study of avian virology research. *Scientometrics*, **14** (3-4), 295-313.
- Krauskopf, M., Vera, M.I. and Albertini, R. (1995), Assessment of a university's scientific capabilities and profile: The case of the faculty of biological sciences of the Pontificia Universidad Católica de Chile. *Scientometrics*, **34** (1), 87-100.
- Lewis, G. and Cunningham, P. (1991), Bibliometric studies for the evaluation of trans-national research. *Scientometrics*, **21** (2), 223-244.
- Liang, L. and Wu, Y. (2001), Selection of databases, indicators and models for evaluating research performance of Chinese universities. *Research Evaluation*, **10** (2), 105-113.
- Martin, B.R. and Irvine, J. (1983), Assessing basic research: Some partial indicators of scientific progress in radio astronomy. *Research Policy*, **12** (2), 61-90.
- Marx, W. and Cardona, M. (2003), The impact of solid state communications in view of the ISI citation data. *Solid State Communications*, **127** (5), 323-336.
- Melin, G. (1996), The networking university: A study of a Swedish university using institutional co-authorships as an indicator. *Scientometrics*, **35** (1), 15-31.
- Moed, H.F. and Hesselink, F.T. (1996), The publication output and impact of academic chemistry research in the Netherlands during the 1980s: Bibliometric analyses and policy implications. *Research Policy*, **25** (5), 819-836.
- Moed, H.F., Burger, W.J.M., Frankfort, J.G. and Vanraan, A.F.J. (1985), The use of bibliometric data for the measurement of university-research performance. *Research Policy*, **14** (3), 131-149.
- Moed, H.F., Burger, W.J.M., Frankfort, J.G. and Vanraan, A.F.J. (1985), The use of bibliometric data for the measurement of university-research performance. *Research Policy*, **14** (3), 131-149.
- Oromaner, M. (1983), Professional standing and the reception of contributions to economics. *Research in Higher Education*, **19** (3), 351-362.
- Small, H. and Griffith, B. (1974), The structure of scientific literatures. I: Identifying and graphing specialties. *Science Studies*, **4**, 17-40.
- Smith, R. and Fiedler, F.E. (1971), The measurement of scholarly work: A critical review of the literature. *Educational Record*, **52**, 225-232.
- Van den Berghe, H., Houben, J.A., de Bruin, R.E., Moed, H.F., Kint, A., Luwel, M. and Spruyt, E.H.J. (1998), Bibliometric indicators of university research performance in Flanders. *Journal of the American Society for Information Science*, **49** (1), 59-67.
- Van Raan, A.F.J. (2006), Statistical properties of Bibliometric indicators: Research group indicator distributions and correlations. *Journal of the American Society for Information Science and Technology*, **57** (3), 408-430.
- Vlachý, J. (1985), Citation histories of scientific publications: The data sources. *Scientometrics*, **7** (3-6), 505-528.
- Zhang, H.Q. and Yamazaki, S. (1998), Citation indicators of Japanese journals. *Journal of the American Society for Information Science*, **49** (4), 375-379.
- Zuckerman, H. (1987), Citation analysis and the complex problem of intellectual influence. *Scientometrics*, **12** (5-6), 329-338.



Table 1: Articles characteristics by year of publication

Year	TMU	Taiwan	% of Taiwan	TC2	PCPP	ICA (%)
1972	2	35	5.7	0	0	0
1973	1	177	0.56	0	0	100
1974	1	191	0.52	4	4.0	100
1975	0	224	0	0	0	N/A
1976	4	255	1.6	4	1.0	25
1977	3	315	1.0	2	0.67	67
1978	3	372	0.81	3	1.0	33
1979	3	391	0.77	16	5.3	0
1980	1	395	0.25	4	4.0	0
1981	3	437	0.69	4	1.3	33
1982	1	489	0.20	0	0	0
1983	4	572	0.70	1	0.25	0
1984	3	649	0.46	2	0.67	67
1985	3	878	0.34	9	3.0	67
1986	1	1,030	0.10	0	0	0
1987	4	1,381	0.29	11	2.8	50
1988	7	1,699	0.41	9	1.3	57
1989	11	1,973	0.56	24	2.2	36
1990	7	2,441	0.29	14	2.0	14
1991	7	3,048	0.23	6	0.86	43
1992	15	3,776	0.40	16	1.1	33
1993	22	4,331	0.51	33	1.5	50
1994	27	5,282	0.51	72	2.7	41
1995	36	5,867	0.61	108	3.0	19
1996	52	7,514	0.69	148	2.8	25
1997	72	7,990	0.90	215	3.0	28
1998	79	8,635	0.91	177	2.2	16
1999	95	9,121	1.0	319	3.4	22
2000	109	9,623	1.1	391	3.6	18
2001	156	10,752	1.5	556	3.6	13
2002	186	11,251	1.7	698	3.8	16
2003	245	12,385	2.0	900	3.7	16
2004	347	13,897	2.5			16
2005	389	15,284	2.5			15

Note: TC2 = Times cited before the second year since publishing for TMU articles; PCPP = Peak-year citation per publication for TMU articles; ICA = International Co-authorship

Table 2: International collaboration by countries

Co-authorship country	Number of articles	% of co-authored paper	TC2	PCPP
USA	150	65	741	4.9
Japan	62	27	179	2.9
Germany	13	5.6	129	10
Singapore	9	3.9	19	2.1
South Korea	9	3.9	113	13
Canada	5	2.2	102	20
France	4	1.7	81	20
New Zealand	4	1.7	98	25
India	3	1.3	1	0.3
Indonesia	3	1.3	3	1.0
Egypt	2	0.86	29	15
Italy	2	0.86	62	31
Lebanon	2	0.86	62	31
Netherlands	1	0.43	1	1.0
Pakistan	1	0.43	0	0
Philippines	1	0.43	0	0
Poland	1	0.43	0	0
Switzerland	1	0.43	0	0
Thailand	1	0.43	5	5.0
Turkey	1	0.43	8	8.0

Notes: N = 232

Table 3: National collaboration by institutes

Institute	No. of articles	% of co-authored paper	PCPP
National Taiwan University	200	27	3.5
National Defense Medical Center	77	10	3.2
National Yang Ming University	68	9.1	3.9
Academia Sinica	61	8.2	4.6
National Cheng Kung University	60	8.1	2.9
Taipei Medical University - Wan-Fang Hospital	56	7.5	4.3
Mackay Memorial Hospital	54	7.2	2.9
National Taiwan University Hospital	54	7.2	3.7
Taipei Medical University Hospital	49	6.6	2.8
Taipei Veterans General Hospital	37	5.0	4.8
Chang Gung Memorial Hospital	32	4.3	3.8
Kaohsiung Medical University	32	4.3	3.5
National Research Institute of Chinese Medicine	28	3.8	1.5
Chang Gung University	25	3.4	3.9

\* N = 745

Table 4: Journals publishing TMU articles

Name of Journal	Article	PCPP	IF	Subject Category	Ranking
Planta Medica	31	2.6	1.628	Medicinal Chemistry	18/34
				Pharmacology & Pharmacy	111/193
				Plant Sciences	42/144
Journal of the Formosan Medical Association	21	1.4	0.474	General & Internal Medicine	80/105
American Journal of Chinese Medicine	20	1.2	0.743	General & Internal Medicine	7/10
				Integrative & Complementary Medicine	63/105
International Journal of Pharmaceutics	20	3.2	2.156	Pharmacology & Pharmacy	79/193
Journal of Biomedical Science	19	2.7	1.995	Research & Experimental Medicine	37/72
Journal of the Chinese Chemical Society	18	0.67	0.617	Multidisciplinary Chemistry	85/125
Journal of Food and Drug Analysis	17	0.53	0.574	Food Science & Technology	57/93
				Pharmacology & Pharmacy	177/193
Journal of Controlled Release	16	1.9	3.696	Multidisciplinary Chemistry	14/125
				Pharmacology & Pharmacy	33/193
Journal of Pharmacy and Pharmacology	15	2.4	1.396	Pharmacology & Pharmacy	125/193
Phytotherapy Research	14	0.50	1.192	Medicinal Chemistry	23/34
				Pharmacology & Pharmacy	140/193
Biochemical and Biophysical Research Communications	13	3.1	3	Biochemistry & Molecular Biology	97/261
				Biophysics	21/65
Journal of Natural Products	13	3.1	N/A	Applied Chemistry	8/66
				Medicinal Chemistry	11/34
				Pharmacology & Pharmacy	71/193
				Plant Sciences	26/144
Anticancer Research	12	2.8	1.604	Oncology	90/123
Chemosphere	12	1.0	2.297	Environmental Sciences	21/140

European Journal of Pharmacology	12	5.1	2.477	Pharmacology & Pharmacy	63/193
Journal of Agricultural and Food Chemistry	12	4.8	2.507	Multidisciplinary Agriculture	1/31
				Applied Chemistry	6/64
				Food Science & Technology	2/93
Journal of Oral Rehabilitation	12	1.1	0.717	Dentistry, Oral Surgery & Medicine	40/49
Biochemical Pharmacology	11	14	3.617	Pharmacology & Pharmacy	38/193
Journal of Cellular Biochemistry	11	10	3.591	Biochemistry & Molecular Biology	79/261
				Cell Biology	54/153
Life Sciences	11	3.9	2.512	Research & Experimental Medicine	28/72
				Pharmacology & Pharmacy	62/193
Biomaterials	10	4.8	4.698	Biomedical Engineering	2/41
				Biomaterials Materials Science	1/15
Journal of Ultrasound in Medicine	10	2.5	1.091	Radiology, Nuclear Medicine & Medical Imaging	10/27
				Acoustics	56/84
Phytochemistry	10	1.5	2.78	Plant Sciences	19/144

Note: PCPP = Peak-year citation per publication for TMU articles published in perspective journals; IF = Impact factor of the journal in 2005.

Table 5: Number of articles and PCPP by subject category

Subject category	Article	%	TC2	PCPP
Pharmacology & Pharmacy	430	37	1,134	2.6
Biochemistry & Molecular Biology	114	10	493	4.3
Plant Sciences	113	10	262	2.3
Medicinal Chemistry	106	9.1	250	2.4
Psychiatry	89	7.7	422	4.7
Multidisciplinary Chemistry	85	7.3	178	2.1
Oncology	81	7.0	437	5.4
Neurosciences	78	6.7	234	3.0
Public, Environmental & Occupational Health	76	6.5	484	6.4
Toxicology	74	6.4	271	3.7
Environmental Sciences	72	6.2	274	3.8
Cell Biology	63	5.4	455	7.2
General & Internal Medicine	57	4.9	115	2.0
Biochemical Research Methods	56	4.8	164	2.9
Peripheral Vascular Disease	54	4.7	323	6.0
Food Science & Technology	51	4.4	144	2.8

Table 6: Frequency of keywords used

Author keyword	Articles	%	TC2	PCPP
Apoptosis	37	4.5	248	6.7
nitric oxide	21	2.5	126	6.0
Taiwan	16	1.9	35	2.2
Arsenic	15	1.8	88	5.9
Antioxidant	15	1.8	67	4.5
lipid peroxidation	14	1.7	44	3.1
Cytotoxicity	10	1.2	32	3.2
platelet aggregation	10	1.2	17	1.7

Table 7. Comparison of papers listed in the Essential Science Indicators

Year	2001	2003	2004	2006	2007
TC	101	113	63	21	8
AU	2	1	1	1	58
CI	80	112	50	27	11
CA	198	254	97	67	19
CJ	38	43	29	17	5

TC, times cited from it was published to 1<sup>st</sup> June 2008; AU, Number of authors; CN, Number of citing countries; CI, Number of citing institutes; CA, Number of citing authors; CJ, Number of citing journals



Figure 1. Citation per publication by article life

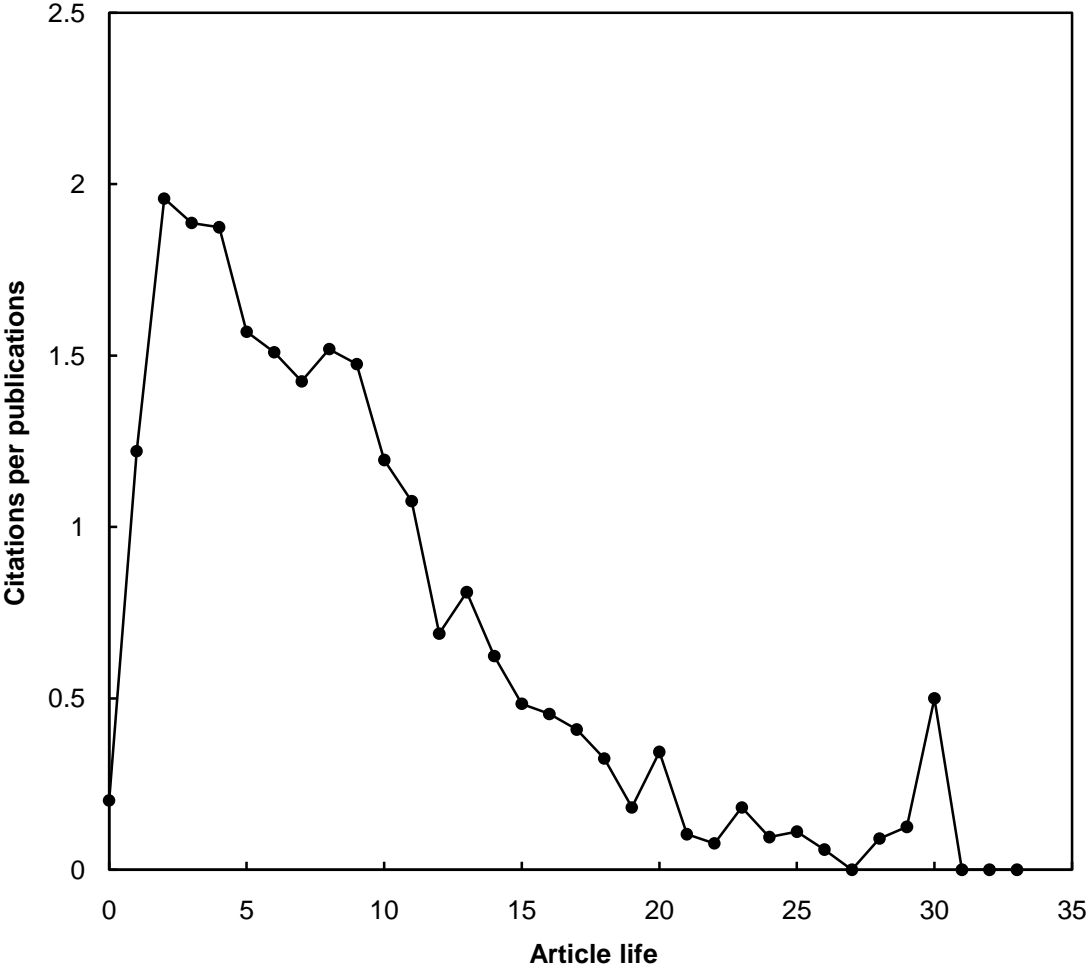


Figure 2. Number of articles published for TMU and Taiwan 1986-2005

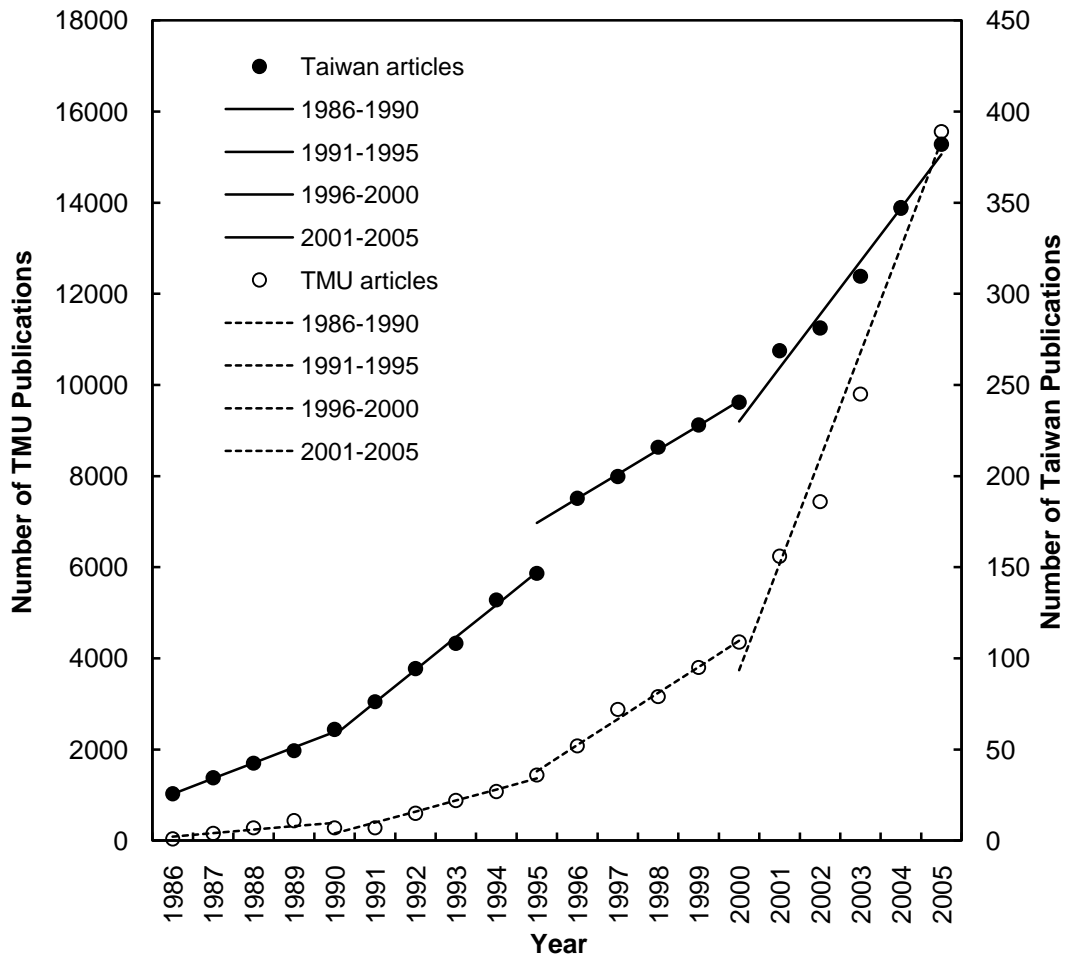


Figure 3. Number of research articles and peak-year citation per publications in TMU 1986-2003

