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LETTER TO THE EDITORS

The one hundred most frequently cited articles in the field of clinical liver transplantation

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Sirs,

A citation analysis represents an area of bibliometrics that studies the relation between references and citations. The number of citations an article receives measures its impact on a specific medical field. The ''best-sellers'' in medicine nearly always represent ''classic or landmark'' contributions. Their study allows one to better understand the role of these cornerstone publications in the evolution of medicine.

Recently, several articles that focalized on ''the most cited articles'' ever published in different medical fields have been reported [1–3]. No such study has been done in relation to clinical liver transplantation (LT). This article analyzes the top-100 most cited articles published in this field.

The SCOPUS database was used for this intent [4]. The research was done using the term ''*liver transplantation*'' among all titles, abstracts, and key-words of the articles collected in the database. Inclusion criteria were the following: (i) medicine unique subject area; (ii) only journals as source type; (iii) only articles written in English; and (iv) only human clinical studies. A first list of 31.500 articles was obtained. Publications were then systematically reviewed: non-clinical studies, basic science articles or papers not fully related to LT were progressively removed. Finally, the list of top 100 articles written in English was obtained. The oldest article was published in 1963, the most recent ones in 2009: only 2 and 13 articles were published, respectively, before 1980 and 1990.

The articles originated from 13 countries; US (n = 40) UK (n = 12), France and Spain (n = 9, each) led the list. Fifty-three articles originated from English-speaking countries. Seven articles were based on multi-national collaborations. Seventeen journals were chosen for publication; Hepatology (n = 39), Gastroenterology, and Lancet (n = 12, each) were the top-3. HCV and HBV infections were the most cited subjects with 18 articles, followed by hepatocellular cancer (HCCa) (n = 16).

The top authors were Starzl TE and Williams R (n = 9) and Bismuth H (n = 8). A more detailed analysis of the top 100 list reveals V Mazzaferro's work dealing with the impact of ''Milan criteria'' in the selection of cirrhotic recipients with HCCa as the number 1 article. The extended UCSF criteria (by Yao FY) and the Barcelona liver cancer group therapeutic algorithm (by Llovet JM) rank positions 6 and 7.

The number 2 article by O'Grady JD deals with the King's College criteria defining the necessity of LT in patients with acute toxic liver failure; this group later on refined the definition of hyperacute liver failure (article number.28).

The number 3 article by Llovet JM investigates the value of partial hepatectomy and LT in the treatment of HCCa. Majno PE confirms the beneficial effect of neo-adjuvant therapies during wait list time (number.65) and Poon RT underlines the value of salvage LT in case of tumor recurrence after partial liver resection (number.79).

The number four article by Malinchoc M introduces the MELD score in patients with chronic liver disease. This score was later introduced as a prioritization model for of liver recipients (Wiessner R, number.10 and Freeman RB, number.97).

Gane EJ describes in article number.5 the outcome of HCV infected liver recipients. Samuel D (number.93) and Bizollon T (number.95) both value the combined anti-viral therapy using alpha-IFN and ribavirin in such recipients.

The number.eight article by Ojo AO draws attention to the problem of chronic renal failure after all different types of extra-renal transplantation.

Samuel D stresses the need for long-term anti-viral prophylactic therapy in HBV recipients in article number.9. Tipples GA, Ling R and Bartholomew MM (numbers.22, 23, 31) identify the importance of viral mutation after treatment of lamivudine and Perrillo R describes the impact of adefovir in case of viral mutations (number.25).

Williams, R and Klintmalm GB, respectively, report in articles 12 and 14 European and American experiences comparing use of tacrolimus or cyclosporine in LT.

At position 36, Starzl TE reports on the first clinical experiences with tacrolimus. Calne RY advocated several years earlier the use of cyclosporine in clinical LT (number.92).

Mitzner SR, Watanabe FD and Ellis AJ investigated the role of a liver assist device in the treatment of acute liver failure (numbers.27, 30, and 56).

At number.42, Dickson ER publishes the Mayo Clinic score for primary biliary cirrhosis patients.

At number.54, Raia S reports the first attempt of LDLT in a pediatric recipient, Strong RW reports the first successful pediatric case (number.37) and Lo CM (number.33) the first series of adult LDLT.

At number.86, Tzakis A reports the caval vein sparing technique and piggy-back allograft implantation.

Curiously enough the very seminal article by Starzl TE from 1963 about the first cases of human LT reported occupies only rank 50. This surprisingly low position can be explained: (i) as time goes by, articles are gradually less cited because their content has been ''absorbed'' by current knowledge, a phenomenon called ''obliteration by incorporation'' [5]; (ii) as LT has grown exponentially during the last three decades, articles published before this period had a limited opportunity to be cited attributable to the smaller number of publications; and (iii) authors usually include recent publications to provide the reader with the most updated information [6]. As a consequence, ''classics'' are, cited in very particular conditions only by real experts being interested in the development of LT [7–9]. Luckily enough all these important seminal papers related to experimental LT, immunosuppression, hepatotrophic physiology, and human trials in LT have been ''saved'' for the future transplant generations by Starzl TE *et al.* [10] in the books ''Clio Chirurgica: Liver transplantation'' and ''Liver Transplantation: a 31 years perspective.''

In conclusion, the analysis of the top-100 cited articles in LT allows the reader to easily identify important contributions and their authorship and to better understand the development of LT from ''an impossible operation'' to a, nowadays, routinely applied, successful, treatment of end-stage acute and chronic liver disease as well as of liver based metabolic diseases. Modern, internet-based, search machines unfortunately have reduced the value of many seminal contributions to ''footnotes'' in the discourse of the modern history of liver transplantation.

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The top-100 references list can be obtained directly from the Authors.

References

1. Kelly JC, Glynn RW, O'Briain DE, Felle P, McCabe JP. The 100 classic papers of orthopaedic surgery: a bibliometric analysis. *J Bone Joint Surg Br* 2010; **92**: 1338.
2. Ponce FA, Lozano AM. Highly cited works in neurosurgery. Part I: the 100 top-cited papers in neurosurgical journals. *J Neurosurg* 2010; **112**: 223.
3. Paladugu R, Schein M, Gardezi S, Wise L. One hundred citation classics in general surgical journals. *World J Surg* 2002; **26**: 1099.
4. SciVers SCOPUS on-line database (Elsevier). Available at: http://www.scopus.com/ (accessed November 15, 2011).
5. Garfield E. 100 Citation classics from the Journal of the American Medical Association. *JAMA* 1987; **2**: 257.
6. Campbell FM. National bias: a comparison of citation practices by health professionals. *Bull Med Libr Assoc* 1990; **78**: 376.
7. Orlando G, Baptista P, Birchall M, *et al.* Regenerative medicine as applied to solid organ transplantation: current status and future challenges. *Transpl Int* 2011; **24**: 223.
8. Starzl TE. Experience in Liver Transplantation. Philadelphia: WB Saunders Company, 1969: 9 pp.
9. Starzl TE, Demetris AJ. Liver Transplantation: a 31-Year Perspective (Current Problems in Surgery Classic). Chicago: Year Book Medical Publishers, 1990: 224 pp.
10. Starzl TE, Groth C, Makowka L. Clio Chirurgica: Liver Transplantation. Austin (Texas): Silvergirl Books, 1988: 363 pp.