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## BUILDING A LIST OF JOURNALS WITH CONSTRUCTED IMPACT FACTORS

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This communication describes the building of a list of constructed impact factors (CIF) for biomedical journals not included in the 1996 editions of the *Journal Citation Reports (JCR)*. The online retrieval from the host DIMDI of the data needed for impact factor calculation is described in detail. At present, the CIF list comprises 338 titles. The top 100 (ranked according to their CIFs) are shown. The complete list is available via the World Wide Web at the URL: <http://www.medizin.fu-berlin.de/medbib/CIF/cif.html>. The possible usefulness of constructed impact factors for citation and evaluation studies is discussed.

### INTRODUCTION

The Institute for Scientific Information's (ISI) *Journal Citation Reports (JCR)* for Science and Social Sciences are important tools not only for visualising and comparing the impact of the journals included [1, 2], but also for measuring the scientific performance of universities, faculties, institutes [3, 4], and individual authors [5]. In addition, the *JCR* may also serve as a decision tool for library acquisition policies [6, 7].

The most prominent (and often only known) [8] feature of the *JCR* is the impact factor (IF), a number which gives a ratio between papers published in a journal and the subsequent citations of this journal, related to a defined period of time. Sorting journals listed in the *JCR* according to their IFs can give an impression of a journal's importance.

It is well known that only a fraction of all relevant journals is listed in the *JCR* [2, p. 742; 9, 10]. For example, the *JCR* science edition 1996 on CD-ROM lists 4,779 journals in all science areas. Counting together all biomedical journals using the filter-by-category feature of the database reveals that about 2,000 biomedical journals are listed in the *JCR* (about 3,000 journals if the whole fields of biology, agriculture, and ecology are included). In contrast, searches in the CD-ROM editions (years 1996, 1997, 1998) of the serials database *SERLINE* of the US National Library of Medicine (NLM) retrieve about 7,000 unique journals currently indexed in at least one of the large biomedical databases *MEDLINE*, *EMBASE* and *BIOSIS* (Figure 1).

In order to find a measure for ranking the many non-*JCR* journals and to show their standing in the same way as is done with the journals included in the *JCR*,

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(a) SERLINE search results		(b) SERLINE search profile		
SERLINE issue <sup>†</sup> (year)	Number of journals	No.	Records <sup>‡</sup>	Request
		#1	29916	OPEN in PS
1996	6,955	#2	4065	#1 and (EM in IA)
1997	6,986	#3	4585	#1 and (BA in IA)
1998	7,290	#4	4170	#1 and (CURRENTLY- INDEXED in MI)
		#5	7505	#2 or #3 or #4
		#6	7290	#5 not (CONGR* or CONFER* or CONF or SYMPOS* or MEETING*)

PS: publication status; EM: *Excerpta Medica*; IA: indexing and abstracting publications; BA: *Biological Abstracts*, MI: *MEDLINE* indexing status; \*: truncation symbol.

<sup>†</sup>The CD-ROM version (SilverPlatter©) of *SERLINE* was used (see Methods).

<sup>‡</sup>The record numbers are from the 1998 issue of *SERLINE*.

Figure 1. Number of journals currently indexed in *MEDLINE*, *EMBASE*, and *BIOSIS*

it may be of some value to be able to calculate journal impact factors independently of the *JCR*.

It is indeed possible to calculate impact factors (as well as other journal features published in the *JCR*) for all journals, whether included in the *JCR* or not, on a provisional basis using ISI's online databases *Scisearch*, *Social Scisearch* and *Arts & Humanities Search* because these databases not only contain the bibliographic data for all indexed source items, but also include (in abbreviated form) the list of references given in an article. The implementation of the databases at various hosts allows searching for whole cited references as well as for cited journals only (independent of a special reference).

As all references are included, it is possible to retrieve citation data also for journals which are not ISI source journals and therefore are not included in the *JCR*. In principle, the usage of ISI's online databases for this special kind of bibliometric analysis should be known to every person trained in searching these databases. Several papers describing the calculation of impact factors by the use of these databases (or the corresponding printed citation indexes *SCI*, *SSCI*, *A&HCI*) for journals not listed in the *JCR* have already been published: in 1979, Spaventi et al. [11] calculated impact factors for several journals from (former) Yugoslavia, including some titles listed in the *JCR* (the calculated values being similar to the values published in the *JCR*). Ten years later, Sen et al. [12] calculated impact factors for a couple of Indian non-*JCR* journals by correlating the citation frequencies (derived from *Scisearch* and by manual counting of the 'self-citations') of the journals investigated with their (manually) counted citable items. The authors emphasise the usability of their method for determination of impact factors for all non-*SCI* journals [12, p. 141]. More recently, the possibility

of online impact factor calculation was discussed by Christensen and Ingwersen [13], and Harter [14, 15] calculated impact factors for some electronic journals using citation data retrieved from the three databases online. Christensen et al. described their method of 'online determination of the journal impact factor' [16] in detail, stressing the fact of the missing of self citations in non-ISI journals (therefore, they called the impact factors calculated for those journals 'External Cited Impact Factor'). Stegmann presented several examples of 'Constructed Impact Factors' (CIF) for journals included and not included in the science edition of the *JCR* [17]. The conformity of the constructed impact factors for *JCR*-journals with the *JCR*-derived impact factors let him conclude that his version of the method is reliable and also suitable for constructing impact factors for non-*JCR* journals. It is clear, however, that the so-called self citations for journals not included as source journals in ISI's citation databases cannot contribute to the construction of impact factors based on data retrieved online; this was stressed also by Schoonbaert and Roelants in a subsequent communication [18] and is also mentioned on the *JCR* CD-ROM [19].

Despite this *a priori* limitation, a list of non-*JCR* journals with their constructed impact factors could serve as a quick reference tool for the scientific community, giving an impression of the frequency a journal is cited and in which part of the *JCR* ranked list it could be placed. A similar 'yearly citation directory of the non-ISI journals' has already been proposed by Maricic [20].

This paper describes the steps necessary to build such a list and presents some data on the basis of the current list of impact factors (year 1996) constructed for biomedical journals not included in the 1996 editions of the *JCR* on CD-ROM.

The methods used for online retrieval of the data necessary to calculate impact factors were already briefly mentioned in [17] and are in principle identical to those described earlier by Christensen et al. [16, p. 532–535] for the Dialog system. The present paper shows that it is possible to build large constructed impact factor lists of non-*JCR* journals complementary to ISI's impact factor lists contained in the *JCR*.

#### METHODS

1. *Online searching* All online searches to retrieve article and citation counts were performed via a telnet connection to the German host DIMDI (Deutsches Institut für Medizinische Dokumentation und Information) between April and October 1998.

2. *Obtaining journal titles* Journal titles were obtained mainly from DIMDI databases in the course of a separate study (in preparation) which compares German medical university faculties on the basis of their journal publications in the years 1994 and 1995.

Briefly, searches were performed retrieving hits on the basis of (German) institutional addresses. Results were analysed with respect to the titles of the journals used for publications. Using a self made Unix shell script, these titles were matched against a file containing all 4,779 journal titles in the *JCR* science edition 1996, downloaded from the CD-ROM. Titles not matching were checked a second time, now one by one using the *JCR* database on CD-ROM directly, followed by

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checking also against the *JCR* social sciences edition 1996 on CD-ROM. Both *JCR* editions had to be used because some of the titles (about 10%, data not shown) not listed in the science edition were found in the social science edition of the *JCR*. Only those titles which are definitely not listed in the *JCR* were used for impact factor construction. About 22% of the journals in which German medical faculties published are not listed in the *JCR* (nine faculties analysed so far; data not shown).

3. *Impact factor construction* Impact factors were constructed according to ISI's definition [21, 22] and required two basic steps. First, the number of papers (research articles, notes, and reviews) published in the journal in question in the desired period (publication years 1994, 1995) were determined by online searching using DIMDI's superbase mode (parallel searching in different databases). The following databases were searched: *EMBASE* (EM74), *MEDLINE* (ME66), *CANCERLIT* (CL80), *Healthstar* (HE75), *Bioethicsline* (BE73), *BIOSIS* (BA70), *Scisearch* (IS74), *Social Scisearch* (IN73), *PSYNDEX* (PY81), *PSYCINFO* (PI67). The standard search profile is shown in Figure 2. Second, the number of citations the journal under investigation received in the year 1996 to any papers from the two preceding years was determined in the databases *Scisearch* and *Social Scisearch*. The two databases had to be searched one after the other, because the *number of references* – which is at least equal to but often higher than the number of citing documents – could not be retrieved in the superbase mode (see Figure 3 for the standard search profile). In both steps, duplicate articles were eliminated using the 'check duplicates' command of DIMDI's retrieval language.

<i>Search no.</i>	<i>Number of records retrieved</i>	<i>Search formulation</i>
1.00	45629613	SELECT <sup>†</sup> EM74;ME66;CL80;HE75;BE73; BA70;IS74;IN73;PY81;PI67
2.00	967	FIND JT=EUROPEAN SPINE JOURNAL
3.00	394	FIND 2 AND PY=(1994;1995)
4.00	378	FIND 3 AND (DT=(JOURNAL ARTICLE; ARTICLE;NOTE;REVIEW; LITERATURE REVIEW?); IC=(1;60;63); (ARTICLE;NOTE;REVIEW)/ UT AND BASE=BA70)
5.01	373	CHECK DUPLICATES <i>DUPLICATE CANDIDATES IN S= 4.00</i> <i>(OUTPUT ONLY)</i>
5.02	236	<i>DUPLICATES REMOVED FROM S= 4.00</i> <i>(OUTPUT ONLY)</i>
6.00	142	<i>UNIQUE IN S= 4.00</i>

<sup>†</sup>Database selection (superbase mode). Database abbreviations: see Methods.

JT: journal title; PY: publication year; DT: document type; IC: Emtags code (1=review; 60=article; 63=note); UT: uncontrolled term; ?: truncation symbol.

Italicised text: system answers.

Figure 2. *Standard search profile used for retrieval of the number of research articles and reviews. Example: European Spine Journal*

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<i>Search no.</i>	<i>Number of records retrieved</i>	<i>Search formulation</i>
		BASE IS74 <sup>†</sup>
		DISPLAY RJ=E? SPIN? J?
1.01	1	<i>E SPINE J</i>
1.02	3	<i>EUR SPIN J</i>
1.03	275	<i>EUR SPINE J</i>
1.04	1	<i>EUR SPINE J SI</i>
1.05	1	<i>EURO SPINE J</i>
1.06	3	<i>EUROP SPINE J</i>
1.07	19	<i>EUROPEAN SPINE J</i>
1.08	1	<i>EUUR SPINE J</i>
		1
2.00	76	FIND 1 AND PY=1996 AND RY=(1994;1995)
3.00	49	FIND REFS WHERE 2 <sup>‡</sup>
		<i>57 REFERENCES IN 49 HITS</i>
		CHECK DUPLICATES
4.01	0	<i>DUPLICATE CANDIDATES IN S= 3.00</i>
4.02	0	<i>DUPLICATES REMOVED FROM S= 3.00</i>
5.00	49	<i>UNIQUE IN S= 3.00</i>
		BAS IN73;S=3 <sup>†‡</sup>
1.01	–	<i>RJ=E SPINE J</i>
1.02	–	<i>RJ=EUR SPINE J</i>
1.03	10	<i>RJ=EUR SPINE J</i>
1.04	–	<i>RJ=EUR SPINE J SI</i>
1.05	–	<i>RJ=EURO SPINE J</i>
1.06	1	<i>RJ=EUROP SPINE J</i>
1.07	–	<i>RJ=EUROPEAN SPINE J</i>
1.08	–	<i>RJ=EUUR SPINE J</i>
2.00	4	FIND 1 AND PY=1996 AND RY=(1994;1995)
3.00	1	FIND REFS WHERE 2
		<i>... 1 REFERENCES IN 1 HITS</i>
		CHECK DUPLICATES;STATE=UP
4.01	1	<i>DUPLICATE CANDIDATE IN S= 3.00</i>
4.02	1	<i>DUPLICATES REMOVED FROM S= 3.00</i>
5.00	0	<i>UNIQUE IN S= 3.00</i>

<sup>†</sup>Database selection (IS74: *Scisearch*)

<sup>‡</sup>Same-string-search for RJ and RY.

<sup>†‡</sup>Subsequent database selection with automatic search profile transfer (IN73: *Social Scisearch*).

RJ: referenced journal; ?: truncation symbol; PY: publication year; RY: referenced year; STATE=UP: update duplication check (new documents retrieved are checked against the documents of the precedent duplication check).

Italicised text: system answers.

Figure 3. *Standard search profile used for retrieval of the number of citations. Example: European Spine Journal*

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<i>Search no.</i>	<i>Number of records retrieved</i>	<i>Search formulation</i>
1.00	112	BASE IS74 FIND JT=INTERNATIONAL JOURNAL OF BIOLOGICAL MARKERS
2.00	26	FIND 1 AND PY=1996 AND RY=(1994;1995)
3.00	26	FIND REFS WHERE 2 <i>109 REFERENCES IN 26 HITS</i> SHOW REPORT=STAT;F=RJ <sup>†</sup>
	<i>OCC</i>	<i>TERM</i>
	2	ACTA ONCOL
	.	.
	.	.
	.	.
	3	IMMUNOL TODAY
	<b>6</b>	<b>INT J BIOL MARKER</b>
	<b>2</b>	<b>INT J BIOL MARKERS</b>
	2	INT J ONCOL
	.	.
	.	.
	.	.

<sup>†</sup>This command creates an output from the 'referenced journal' (RJ) field and lists under 'TERM' the cited journals and under 'OCC' (urrency) the corresponding citation frequency.

The two bold lines contain the self citations.

See text and Figures 2 and 3 for further explanation.

Figure 4. *Standard search profile used for retrieval of the number of journal self citations. Example: International Journal of Biological Markers*

Impact factors were constructed by dividing the number of citations retrieved in step two by the number of source items retrieved in step one.

4. *Retrieving self citations* Each journal which was processed for impact factor construction as described in the previous paragraph was checked for being indexed in *Scisearch/Social Scisearch* in 1996. If so, the number of references to papers published in the same journal in 1994 or 1995 was determined for this journal by means of the statistical function of DIMDI's retrieval language: the command 'SHOW REPORT=STAT;F=RJ' yields a list of title abbreviations of the cited ('referenced') journals including the citation frequency (see Figure 4 for standard search profile and more detail).

5. *Searches in SERLINE* The CD-ROM issues 1996, 1997, 1998 of the SilverPlatter© version were used.

## RESULTS AND DISCUSSION

In order to retrieve all articles and reviews (giving the 'article counts' [22]) published in a non-*JCR* journal in the field of biomedicine – including psychology,

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and public health – several databases had to be searched. Reasonably, the ten databases selected (see Methods and Figure 2) seem to cover the whole field sufficiently, i.e. there is some guarantee that if a journal is found in one or more of these databases all of the relevant items are indexed. Inclusion of more databases surely would extend the journal spectrum, but would probably not retrieve additional articles from journals already found in the selected databases. *Scisearch* and *Social Scisearch* were included because many journals although not listed in the *JCR* are indexed in these databases [23].

Figure 2 shows the standard search profile used for the retrieval of articles, notes and reviews. Different database specific document type descriptors (DT) had to be used. In *BIOSIS*, the document type is described in the UT (uncontrolled term) field\*. Initially, the search profile used included only bibliographic descriptors for journal articles and reviews, due to the information given on the *JCR* CD-ROM that only 'original research articles' and 'reviews' are counted as citable items for the *JCR* [19]. However, Moed and van Leeuwen [24] obtained evidence that also 'notes' are counted as citable items for journals listed in the *JCR*, and Garfield [10, p. 411] explicitly stated the inclusion of 'notes' in source items counting for *JCR* journals. In addition, articles tagged as 'notes' in ISI databases – accounting for 7.1% and 3.4% of all articles indexed in *Scisearch* and *Social Scisearch*, respectively (data not shown) – are frequently indexed as 'journal articles' in other databases (personal observation). Thus, in order to retrieve also all 'note' documents the bibliographic descriptor 'note' was routinely included in searches for source items.

Searches were restricted to the publication years (field PY) 1994 and 1995. Using the database release date (RD) instead of the publication year would retrieve documents not belonging to the two-year period in question (e.g. restriction to 'RD=1994 to 1995' retrieves some items also from 1993 and 1996) (data not shown).

All journals investigated have papers published in 1994 and/or 1995. It was not checked if a journal started or ceased during that time period.

The number of times a journal is cited was retrieved from *Scisearch* and *Social Scisearch*. Although most of the non-*JCR* journals do not receive citations from journals indexed in *Social Scisearch*, both databases had to be used because journals especially in the field of psychology were found to receive a considerable amount of citations from journals indexed in *Social Scisearch*. The database *Arts & Humanities Search* (which is not available on the DIMDI system), however, was not used which seems justifiable due to the restriction of this investigation to journals in the field of biomedicine only. Figure 3 shows the standard search profile used for retrieval of the citation data. Whereas there is in general no problem in retrieving the numbers of published papers because full journal titles are searchable in almost all of the databases hosted at DIMDI, it is often laborious to retrieve the different abbreviations for the same cited journal in *Scisearch* and *Social Scisearch* (already outlined in [14, p. 8–11; 16, p. 532]). This is obvious also in the example presented in Figure 3. Searches were limited to the publication year 1996, and the 'FIND REFS WHERE' command had to be used to retrieve only documents which have been published in 1996 and cite any paper(s)

\*Recently *BIOSIS* was restructured, and from 1993 the document type is described in the DT field.



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published in the referenced journal (RJ) in the referenced year(s) (RY) 1994 and/or 1995.

Figure 4 shows the standard search profile used for retrieval of self citation data. Journal self citations could be determined online only for those journals which are – although not listed in the *JCR* – indexed in *Scisearch* or *Social Scisearch* in the citing year in question (1996). Manual counting of self citations for other non-*JCR* journals was not performed. Thus, for those journals not indexed in *Scisearch* or *Social Scisearch* the constructed impact factor corresponds to the ‘External Cited Impact Factor’ [16, p. 536]. The current list of CIF journals comprises 338 titles, at present. The list is available via the World Wide Web at the URL <http://www.medizin.fu-berlin.de/medbib/CIF/cif.html>.

The WWW presentation was chosen because the list is still growing (depending on time and manpower invested); it is also planned to extend the list to further citing and cited years. The list shows journal titles, constructed impact factors and the underlying data (papers 1994 and 1995, citations 1996). If possible, self citations are given as a percentage of citations.

A list of the present top 100 journals (ranked according to their CIF) is shown in the appendix. The highest CIF found so far is 4.504 for *Current Opinion in Lipidology*. This and other journals with high CIF are in fact included in the 1997 science edition of the *JCR* [25].

Table 1 shows ‘weighted’ and ‘unweighted’ (according to [26]) mean values for CIFs (non-*JCR* journals) and IFs (*JCR* journals). Although the CIF data are preliminary – because only a small number of non-*JCR* journals has been analysed so far and the journal selection surely is biased due to the retrieval only of journals which published papers from German medical faculties (see Methods) – one can conclude from Table 1 that mean CIF values are considerably lower than mean IF values. This is not surprising; in fact, one can expect rapid inclusion of highly cited non-*JCR* journals into the *JCR* [2, p. 742]. CIFs might also be lowered by missing self citations.

For seventy-seven of the 338 journals analysed so far self citation data could be retrieved from *Scisearch/Social Scisearch*. These journals received 6,250 citations including 1,455 self citations. Thus, an average self citation rate of 23% can be calculated (for individual data see the WWW list). The average self citation rate of *JCR* journals can be calculated from the data available on the CD-ROM and is 15% (*JCR* 1996, science edition, all journals; data not shown). Although the self citation rate for CIF journals is not yet a ‘hard’ value (due to limited data) it is clear that the mean CIF value would be considerably raised by inclusion of all self citations. Nevertheless, the data presented in this communication show that the constructed impact factors are in the range of many *JCR*-derived impact factors. As one can observe – especially in libraries offering the *JCR* (personal experience) – a growing usage of the *JCR* impact factor listings leading to heavy demand for similar tools for non-*JCR* journals, the list of journals with constructed impact factors presented here clearly can serve as an information tool about the citation status of a journal not included in the *JCR*. In addition, the CIF list allows the inclusion of non-*JCR* journals in evaluation studies of scientific performance based on journal impact factors. Furthermore, researchers should have easy and filterless access to all data in their fields. In the field of the normal bibliographic databases not containing citation data comprehensiveness is fairly achieved by the many different databases, database producers and vendors. In contrast,



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Table 1. Mean values of Constructed Impact Factors 1996 (CIF-96) for non-JCR journals (calculated from the current list) and of JCR Impact Factors 1996 (calculated from the CD-ROM editions)

	A	B	C	D	E	F
	Number of journals	$\Sigma IF$ (CIF)	Mean IF (CIF) non-weighted (B/A)	Source items	Cites 1996	Mean IF (CIF) weighted (E/D)
JCR-96 sci	4779	6251.789	1.308	1,284,116	2,486,728	1.937
JCR-96 soc-sci	1512	1128.689	0.747	123,861	105,448	0.851
CIF-96 current list	338	135.732	0.402	37,769	13,577	0.360

(JCR-96, sci.: science edition, soc-sci.: social sciences edition)

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studies needing citation data are restricted *a priori* because only ISI's databases with their limited sets of data are available. Undoubtedly, these databases are invaluable tools for all kinds of citation studies, but the availability of supplementary databases is desirable.

The building of a list of biomedical journals with constructed impact factors described here could be a (small) step to comprehensiveness in the availability of citation data. A further logical step would be the inclusion of the cited references contained in these non-*JCR* journals for calculation of impact factors and constructed impact factors. This formidable task could be a challenge to the scientific community, especially for librarians and other people working in the fields of library and information science. A database containing at least the basic data necessary for impact factor calculation could be built, for example by librarians from all over the world communicating via the World Wide Web, as part of the 'universal citation database' suggested recently by Cameron [27].

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#### REFERENCES

1. Todorov, R. and Glänzel, W. Journal citation measures: a concise review. *Journal of Information Science*, 14, 1988, 47–56.
2. Schoonbaert, D. and Roelants, G. Citation analysis for measuring the value of scientific publications: quality assessment tool or comedy of errors? *Tropical Medicine and International Health*, 1, 1996, 739–752.
3. Schubert, A., Glänzel, W. and Braun, T. Against absolute methods: relative scientometric indicators and relational charts as evaluation tools. In: van Raan, A.F.J., ed. *Handbook of quantitative studies of science and technology*. North Holland: Elsevier, 1988, 137–176.
4. Davis, G. and Royle, P. A comparison of Australian university output using journal impact factors. *Scientometrics*, 35(1), 1996, 45–58.
5. Korwitz, U. Welchen 'Rang' hat ein Wissenschaftler? *Nachrichten für Dokumentation*, 46(5), 1995, 267–272.
6. Smith, T.E. *The Journal Citation Reports* as a deselection tool. *Bulletin of the Medical Library Association*, 73(4), 1985, 387–389.
7. Deurenberg, R. Journal deselection in a medical university library by ranking periodicals based on multiple factors. *Bulletin of the Medical Library Association*, 81(3), 1993, 316–319.
8. Aguillo, I.F. Increasing the between-year stability of the impact factor in the *Science Citation Index*. *Scientometrics*, 35(2), 1996, 279–282.
9. Allee, R.W. The relationship between primary and secondary publishers – ISI's journal selection guidelines and use of the *Journal Citation Reports (JCR)*. *Serials Librarian*, 13(2–3), 1987, 47–55.

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10. Garfield, E. How can impact factors be improved? *British Medical Journal*, 313, 1996, 411–413.
11. Spaventi, J., Tudor-Šilovic, N., Maricic, S. and Labus, M. Bibliometrijska analiza znanstvenih casopisa iz Jugoslavije (Bibliometric analysis of scientific journals from Yugoslavia). *Informatologia Yugoslavica*, 11, 1979, 11–23.
12. Sen, B.K., Karanjai, A. and Munshi, U.M. A method for determining the impact factor of a non-SCI journal. *Journal of Documentation*, 45(2), 1989, 139–141.
13. Christensen, F.H. and Ingwersen, P. Online citation analysis. A methodological approach. *Scientometrics*, 37(1), 1996, 39–62.
14. Harter, S.P. The impact of electronic journals on scholarly communication: a citation analysis. *The Public-Access Computer System Reviews*, 7(5), 1996, 5–34. Also available at: <http://info.lib.uh.edu/pr/v7/n5/harter.7n5> (visited 20 November 1998).
15. Harter, S.P. Scholarly communication and electronic journals: an impact study. *Journal of the American Society for Information Science*, 49(6), 1998, 507–516.
16. Christensen, F.H., Ingwersen, P. and Wormell, I. Online determination of the journal impact factor and its international properties. *Scientometrics*, 40(3), 1997, 529–540.
17. Stegmann, J. How to evaluate journal impact factors. *Nature*, 390, 1997, 550.
18. Schoonbaert, D. and Roelants, G. Impact takes precedence over interest. *Nature*, 391, 1998, 222.
19. Institute for Scientific Information. Using the *JCR* wisely. *Journal Citation Reports on CD-ROM (Science ed.)*, 1996.
20. Maricic, S. The mainstream-peripheral science communication. *Technoscience*, 10(1), 1997. <http://www.cis.vt.edu/technoscience/97win/comm.htm> (visited 20 November 1998).
21. Institute for Scientific Information. Impact factors. *Journal Citation Reports on CD-ROM (Science ed.)*, 1996.
22. Institute for Scientific Information. Citation and article counts. *Journal Citation Reports on CD-ROM (Science ed.)*, 1996.
23. Institute for Scientific Information. *Citation Database Products*. 1998. Available at: <http://www.isinet.com/prodserv/citation/citsci.html> (visited 20 November 1998).
24. Moed, H.F. and Van Leeuwen, Th.N. Improving the accuracy of Institute for Scientific Information's journal impact factors. *Journal of the American Society for Information Science*, 46(6), 1995, 461–467.
25. Institute for Scientific Information. *Journal Citation Reports on CD-ROM (Science ed.)*, 1997.
26. Moed, H.F. Differences in the construction of SCI based bibliometric indicators among various producers: a first overview. *Scientometrics*, 35(2), 1996, 177–191.
27. Cameron, R.D. A universal citation database as a catalyst for reform in scholarly communication. *Firstmonday*, 2(4), 1997. Available at: [http://www.firstmonday.dk/issues/issue2\\_4/cameron/index.html](http://www.firstmonday.dk/issues/issue2_4/cameron/index.html) (visited 20 November 1998).

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June 1999

JOURNAL IMPACT FACTORS

APPENDIX: RANKING OF JOURNALS NOT LISTED IN THE JCR ACCORDING TO THEIR CONSTRUCTED IMPACT FACTORS 1996 (CIF-96) (TOP 100 OF THE CURRENT CIF-96 LIST) (NUMBERS IN PARENTHESES: % SELF CITATIONS; INDICATED ONLY FOR JOURNALS INDEXED IN SCISEARCH/SOCIAL SCISEARCH IN 1996)

<i>Journal Title</i>	<i>A</i> <i>Papers 1994</i>	<i>B</i> <i>Papers 1995</i>	<i>C</i> <i>Papers 1994+1995</i> <i>(A+B)</i>	<i>D</i> <i>Cites received in 1996</i> <i>to papers from 1994+1995</i>	<i>E</i> <i>CIF-96</i> <i>(D/C)</i>
Current Opinion In Lipidology	57	64	121	545 (6.8)	4.504
Psychiatric Genetics	35	24	59	183 (7.7)	3.102
Periodontology 2000	0	31	31	96 (11.5)	3.097
Phytomedicine	0	18	18	53 (30.2)	2.944
APS Journal	18	0	18	52	2.889
Critical Reviews in Oncogenesis	25	19	44	127 (2.4)	2.886
Xenotransplantation	16	48	64	160 (25.0)	2.500
Advances in Pharmacology	130	50	180	441	2.450
Microbial Drug Resistance-Mechanisms					
Epidemiology and Disease	0	50	50	118 (5.9)	2.360
Reproductive Medicine Review	0	15	15	33	2.200
Current Opinion in Oncology	93	88	181	371	2.050
Endocrinology and Metabolism	0	31	31	57	1.839
Journal of Hematotherapy	42	62	104	180	1.731
New Horizons	66	77	143	240	1.678
Protein and Peptide Letters	0	29	29	47 (6.4)	1.621
Annals of Epidemiology	71	69	140	214 (5.1)	1.529
Endothelium	39	41	80	119	1.488
International Journal of Impotence Research	29	29	58	85	1.466
American Journal of Dentistry	67	76	143	203 (40.9)	1.420
Pediatric Allergy and Immunology	48	51	99	137 (16.1)	1.384
Journal of Serotonin Research	0	31	31	39	1.258
European Journal of Cancer Prevention	84	59	143	177 (17.5)	1.238
Bioimaging	20	18	38	47	1.234

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<i>Journal Title</i>	<i>A</i> <i>Papers 1994</i>	<i>B</i> <i>Papers 1995</i>	<i>C</i> <i>Papers 1994+1995</i> <i>(A+B)</i>	<i>D</i> <i>Cites received in 1996</i> <i>to papers from 1994+1995</i>	<i>E</i> <i>CIF-96</i> <i>(D/C)</i>
Journal of the American Society of Echocardiography	97	125	222	267	1.203
Journal of Heart Valve Disease	125	144	269	319 (42.0)	1.186
Neurocase	0	27	27	32 (37.5)	1.185
Transplant Immunology	64	45	109	128	1.174
Journal of Vestibular Research-Equilibrium and Orientation	40	40	80	88	1.100
Immunotechnology	0	24	24	26 (3.8)	1.083
Experimental Dermatology	41	58	99	106	1.071
Allergo Journal	11	17	28	30	1.071
International Journal of Prosthodontics	74	58	132	141 (29.1)	1.068
American Journal of Contact Dermatitis	0	39	39	40	1.026
International Journal of Periodontics & Restorative Dentistry	38	77	115	116 (20.7)	1.009
Sport Science Review	5	4	9	9 (0.0)	1.000
Brain Topography	30	29	59	56 (3.6)	0.949
Letters in Peptide Science	19	64	83	78 (7.7)	0.940
International Journal of Biological Markers	40	51	91	85 (9.4)	0.934
Annals of Clinical Psychiatry	40	32	72	67	0.931
European Journal of Neurology	7	100	107	98 (14.3)	0.916
Aktuelle Ernährungsmedizin	9	11	20	18	0.900
Blood Pressure	131	81	212	184	0.868
Schmerz	0	35	35	30 (46.7)	0.857
Clinical and Diagnostic Virology	35	92	127	107 (12.1)	0.843
Aktuelle Augenheilkunde	4	8	12	10	0.833
International Dental Journal	86	38	124	102	0.823
Epithelial Cell Biology	24	20	44	36	0.818
International Journal of Neuroscience	150	96	246	197 (44.2)	0.801

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JOURNAL IMPACT FACTORS

<i>Journal Title</i>	<i>A</i> <i>Papers 1994</i>	<i>B</i> <i>Papers 1995</i>	<i>C</i> <i>Papers 1994+1995</i> <i>(A+B)</i>	<i>D</i> <i>Cites received in 1996</i> <i>to papers from 1994+1995</i>	<i>E</i> <i>CIF-96</i> <i>(D/C)</i>
Zeitschrift für Rheumatologie and Biopharmaceutics	41	44	85	67 (29.9)	0.788
American Journal of Cardiac Imaging	76	60	136	107 (14.0)	0.787
Current Topics in Pathology	35	40	75	58	0.773
Cell Biophysics	8	27	35	27	0.771
International Psychogeriatrics	36	17	53	40	0.755
Journal für Hirnforschung	21	59	80	60	0.750
Cancer Control	44	58	102	76	0.745
Hygiene und Medizin	0	44	44	31	0.705
Gynaecological Endoscopy	12	11	23	16	0.696
European Journal of Implant and Refractive Surgery	33	54	87	60	0.690
Human Antibodies and Hybridomas	47	51	98	67	0.684
International Journal of Pediatric Hematology Oncology	24	18	42	28	0.667
Oral Diseases	0	67	67	44 (4.5)	0.657
Breast	0	37	37	24	0.649
Lecture Notes in Artificial Intelligence	45	60	105	68 (17.6)	0.648
Journal of Dermatological Science	0	373	373	241 (27.4)	0.646
Journal of Telemedicine and Telecare	80	59	139	89 (10.1)	0.640
Magnesium Research	0	35	35	22	0.629
Advances in Neurology	38	40	78	49 (40.8)	0.628
Clinical Intensive Care	20	102	122	76 (5.3)	0.623
In Vivo	45	44	89	55	0.618
Academic Radiology	160	93	253	153 (16.3)	0.605
Journal of Biomaterials Applications	57	217	274	165 (44.8)	0.602
Scanning Microscopy	16	16	32	19 (31.6)	0.594
	145	134	279	161	0.577



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Journal of the Society of Cosmetic Chemists	30	29	59	34 (8.8)	0.576
Verhaltenstherapie	23	26	49	28 (39.3)	0.571
Physica Medica	14	20	34	19 (10.5)	0.559
German Journal of Ophthalmology	60	67	127	71 (14.1)	0.559
Contributions to Nephrology	122	136	258	139	0.539
Gastrointestinal Endoscopy Clinics of North America	47	75	122	64	0.525
Pteridines	18	38	56	29 (41.4)	0.518
Endoscopic Surgery and Allied Technologies	67	45	112	58	0.518
Drugs of Today	59	81	140	72 (12.5)	0.514
Chirurgia Gastroenterologica	0	45	45	23	0.511
Cardiovascular Surgery	141	131	272	139	0.511
Journal of Nephrology	48	54	102	52 (0.0)	0.510
Surgical Forum	312	303	615	313	0.509
Cardiovascular Risk Factors	23	34	57	29 (27.6)	0.509
Zentralblatt für Pathologie	69	9	78	39	0.500
Diagnostic and Therapeutic Endoscopy	0	18	18	9	0.500
Cardiology Review	40	0	40	20	0.500
Current Opinion in Psychiatry	20	85	105	52 (21.2)	0.495
Ocular Immunology and Inflammation	23	26	49	24 (25.0)	0.490
European Journal of Ophthalmology	39	48	87	42	0.483
Current Opinion in Anaesthesiology	79	45	124	59	0.476
Methods in Molecular and Cellular Biology	33	70	103	49 (0.0)	0.476
Advances in Dental Research	41	60	101	49	0.475
Folia Histochemica et Cytobiologica	41	38	79	37 (16.2)	0.468
European Child & Adolescent Psychiatry	25	29	54	25 (20.0)	0.463
Krankenhausarzt	3	19	22	10	0.455
Methods in Molecular Biology	407	377	784	348	0.444