

Editorial Comment

Low impact factor of Italian Journals: another aspect of the poor research funding?

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The publication of research results is the key phase of scientific work. It is reported that Italy ranks seventh–eighth among the largest countries in terms of publication output [5], and about fourteenth in terms of citations per paper [4,3]. However, these data reveal little or nothing about the impact of Italian journals. Each year the Institute of Scientific Information (ISI) (Philadelphia, USA) publishes Journal Citation Reports (JCR), an index and a classification of journals in fields of science and technology [2]. The index, based on citations and impact factor (IF), a measure of the frequency with which the average article published in a Journal in a current year has been cited during the previous two years, can provide quantitative estimates for evaluating scientific journals. Despite limitations and artefacts, the method entailing the count of citations in scientific journals remains the most accessible, reproducible, widely used and globally accepted tool to assess the quality of journals.

Editions of JCR from 2000 to 2003 were considered. The 2000 edition of JCR lists a total of 5686 journals. Seventy-three Italian journals, all of which were published in English, were indexed and of these, only 14 had an IF > 1. This is not a good share, considering that more than 40% of the journals published in countries other than Italy had an IF > 1, including 48 with an IF > 10 and 18 an IF > 20. Based on these numbers, we can deduce that more than 95% of the scientific articles appearing in the nearly 2000 scientific journals published in Italy very likely go unnoticed by the

international scientific community. Moreover, the Italian position improved no further in the following years, in fact, while the number of titles with an IF > 1 increased from 14 (2000) to 17 (2003), the total number of Italian scientific journals has constantly decreased every year. The 2003 edition of JCR lists a total of 5907 journals, showing an overall growth compared with previous years (5752 in 2001 and 5876 in 2002), while the number of Italian journals dropped from 73 in 2000 to 65 in 2003.

Table 1 lists the Italian titles, their IF, and the maximum IF of the ISI category. A blank cell in the IF column points out that the journal achieved an IF < 1 in that year.

A journal's impact is shaped by many factors, including language, journal history and format, publication schedule, coverage and degree of specialisation. The most often cited Italian journals, even though publishing prevalently in English, showed a rather low influence on the global scientific community when evaluated in terms of citations and other related parameters [6], thus revealing that Italian journals overall do not seem to fare favourably at the international level. An exception was the *Journal of High Energy Physics*, which performed well in terms of both IF (during 2001 its IF was 8.664, the best of the ISI category) and the other indicators taken into consideration, confirming that high energy physics research in Italy is highly regarded by the international community. The economic policies for research and development (R&D) of the country in which a given Journal is published thus assumes pivotal importance, since they can decisively encourage (or impede) the development of a high quality market for scientific publishing. Italy's low overall expenditure on R&D and low number

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Table 1
The top Italian journals ranked by impact factor, 2000–2003

Journal title (abbreviated)	2000			2001			2002			2003			ISI FIELD categories
	Impact factor	Impact factor max	Articles number	Impact factor	Impact factor max	Articles number	Impact factor	Impact factor max	Articles number	Impact factor	Impact factor max	Articles number	
<i>AGING-CLIN EXP RES</i>				1.420	5.294	56	1.571	6.155	39	1.100	5.552	56	GERIATRICS & GERONTOLOGY
<i>ARCH ITAL BIOL</i>							2.021	24.091	32	1.873	30.167	19	NEUROSCIENCES
<i>CLIN EXP RHEUMATOL</i>	1.638	6.841	172	1.614	7.389	184	1.284	7.379	161	1.919	7.190	196	RHEUMATOLOGY
<i>CORTEX</i>	1.382	26.676	52	1.204	27.152	52				2.000	30.167	47	BEHAVIOURAL SCIENCES-NEUROSCIENCES
<i>EUR J HISTOCHEM</i>	1.039	32.440	38				1.507	28.740	38	1.041	35.041	46	CELL BIOLOGY
<i>HAEMATOLOGICA</i>	2.538	10.893	178	3.216	10.157	143	3.226	10.125	146	3.453	11.164	146	HAEMATOLOGY
<i>INT J ARTIF ORGANS</i>				1.072	4.184	97	1.192	4.940	155				ENGINEERING, BIOMEDICAL - TRANSPLANTATION
<i>INT J BIOL MARKER</i>	1.292	24.674	49	1.467	35.933	35	1.571	32.886	41	1.092	33.954	43	BIOTECHNOLOGY&APPLIED MICROBIOLOGY-ONCOLOGY
<i>INT J CLIN LAB RES</i>	1.371	27.905	23	1.063	27.906	0	1.258	28.740	0				MEDICINE, RESEARCH & EXPERIMENTAL
<i>INT J IMMUNOPATH PH</i>	1.174	50.340	22				4.091	54.455	33	3.927	52.280	46	IMMUNOLOGY -PATHOLOGY-PHARMACOLOGY & PHARMACY
<i>ITAL J GASTROENTEROL</i>	1.289	12.246	0	1.594	13.020	0							GASTROENTEROLOGY & HEPATOLOGY
<i>J CHEMOTHERAPY</i>				1.256	35.933	84				1.088	33.954	80	ONCOLOGY
<i>J ENDOCRINOL INVEST</i>	1.398	19.524	120	1.592	26.456	132	1.476	21.643	158	1.621	17.324	156	ENDOCRINOLOGY & METABOLISM
<i>J HIGH ENERGY PHIS</i>	4.196	5.408	134	8.664	8.664	447	6.854	7.179	637	6.057	8.667	675	PHYSICS, PARTICLES & FIELDS
<i>J NEPHROL</i>	1.289	5.745	74	1.241	6.337	96				1.025	7.499	145	UROLOGY & NEPHROLOGY
<i>NUTR METAB CARDIOVAS</i>				1.123	26.456	37	1.679	21.643	34	2.148	17.324	44	CARDIAC & CARDIOVASCULAR SYSTEM -ENDOCRINOLOGY & METABOLISM - NUTRITION & DIETETICS
<i>OFIOLITI</i>				1.077	3.055	40							GEOLOGY
<i>Q J NUCL MED</i>	1.910	6.857	25	2.125	7.879	26	1.903	5.624	33	2.222	6.192	24	RADIOLOGY, NUCLEAR MEDICINE & MEDICAL IMAGING
<i>RIV NUOVO CIMENTO</i>	1.000	12.774	11	1.333	12.762	9	1.565	23.672	8	1.696	28.172	3	PHYSICS, MULTIDISCIPLINARY
<i>SARCOIDOSIS VASC DIF</i>	1.690	5.443	29	2.365	5.956	30	2.831	6.567	30	3.000	8.876	31	RESPIRATORY SYSTEM
<i>DIGEST LIVER DIS</i>							1.303	13.440	156	1.463	12.718	159	GASTROENTEROLOGY & HEPATOLOGY

ISI, Institute of Scientific Information.

Table 2
Number of journals and socio-economic parameters in the European Union countries

	Number of journals				% of Journals				Researchers × 1000 workforce		Total R&D expenditure in % of GDP	
	2000	2001	2002	2003	2000	2001	2002	2003	2001	2003	2001	2003
UK	1128	1139	1204	1219	44.39	45.09	46.50	46.85	5.54	5.49	1.87	1.84
Netherlands	572	565	565	567	22.51	22.37	21.82	21.79	5.05	5.21	1.94	1.94
Germany	433	432	431	425	17.04	17.10	16.65	16.33	6.07	6.55	2.46	2.50
France	161	148	150	147	6.34	5.86	5.79	5.65	6.14	6.55	2.17	2.20
Italy	73	69	67	65	2.87	2.73	2.59	2.50	3.33	2.82	1.04	1.07
Denmark	58	60	59	61	2.28	2.38	2.28	2.34	6.46	6.86	2.07	2.40
Spain	28	26	26	29	1.10	1.03	1.00	1.11	3.77	4.52	0.90	0.96
Austria	23	25	24	23	0.91	0.99	0.93	0.88	4.86	4.88	1.78	1.94
Sweden	19	18	17	17	0.75	0.71	0.66	0.65	8.44	10.10	3.70	4.27
Ireland	19	16	18	21	0.75	0.63	0.70	0.81	5.12	4.98	1.39	1.17
Belgium	13	13	13	12	0.51	0.51	0.50	0.46	6.11	6.95	1.98	2.17
Finland	10	11	11	12	0.39	0.44	0.42	0.46	10.62	13.77	3.30	3.49
Greece	4	4	4	4	0.16	0.16	0.15	0.15	2.57	3.30	0.51	0.67
Portugal	0	0	0	0	0.00	0.00	0.00	0.00	3.27	3.51	0.78	0.77
Luxembourg	0	0	0	0	0.00	0.00	0.00	0.00	NA	8.78	NA	1.71
Europe	2541	2526	2589	2602								
USA	2184	2220	2257	2267								
Total	5686	5752	5876	5907								

See refs. [1,2].

NA, not available; USA, United States of America; UK, United Kingdom; GDP, gross domestic product.

of researchers compared with countries with longstanding high publishing standards and traditions are no doubt partly to blame for its poor performance in scientific publishing [1] (Table 2). Although it is a standing member of the G8 group of nations, Italy was late to develop industrially, and it has done little at an institutional level to establish itself at the forefront of advanced research fields. Compared with European countries with strong publishing traditions (UK, Germany, France, the Netherlands), Italy's R&D expenditure is dangerously low, and during the four years under observation grew too little, from 1.04 to 1.07; its researcher workforce is small and shrank even more, from 3.33 to 2.82 researchers per 1000 workers, and public funding has not significantly increased over the last six years. The shortcomings of Italian science can be traced to a number of factors, namely fragmentary legislation, inefficient state bureaucracy, political patronage, poor co-ordination and management of financial and human resources, and insufficient dialogue and co-operation between academia and industry. Nonetheless, the chief culprit for Italy's poor showing is chronic "under investment" in science and technology.

With the advent of new technologies (telecommunications, biotechnology, nanotechnology, to name just a

few), it has become evident that social and economic development will increasingly rely on knowledge and the way it is produced, acquired and used. Italy, however, is apparently oblivious to this, and the general disinterest in science and its future displayed by political and industrial forces does not bode well.

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