ORIGINAL ARTICLES

# Spanish Productivity in Smoking Research Relative to World and European Union Productivity From 1999 Through 2003, Analyzed With the Science Citation Index

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**OBJECTIVE: To analyze Spanish scientific productivity from 1999 through 2003 in the area of smoking research, in comparison with world and European Union research, based on data in the Science Citation Index (SCI).**

**MATERIAL AND METHODS: This bibliometric study was carried out by searching the title field of the Science Citation Index Expanded. Descriptive statistics with 95% confidence intervals (CI) were compiled.**

**RESULTS: Two-hundred ninety-two documents on smoking by Spanish authors were located. The most productive subspecialties were the group comprised of public health, education and health economics with 57 articles, and areas of the respiratory system, experimental research, and internal medicine with 36 articles each. The journals that published the largest number of articles located were *Medicina Clínica,* with 35 articles (12%) and *Archivos de Bronconeumología* with 20 (6.8%). International collaboration was undertaken with institutions in the United States of America and other European Union countries. The mean (SD) number of citations received was 5.12 (8.6) (range, 59-0). Spain contributed 8.34% of the SCI-indexed smoking research overall and 12.85% of SCI-indexed smoking research from the European Union.**

**CONCLUSIONS: Smoking research is developing appropriately in Spain and has high impact, even though output is modest. Factors associated with increased citation are international collaboration, language (being written in English), and having a non-Spanish first author.**

**Key words:** *Smoking. Bibliometrics. Scientific information. Science Citation Index.*

## Producción española en tabaquismo a través del Science Citation Index (1999-2003). Situación en el contexto mundial y de la Unión Europea

**OBJETIVO: Analizar a través del Science Citation Index la producción científica española en tabaquismo entre 1999 y 2003, situando a nuestro país en el contexto mundial y de la Unión Europea.**

**MATERIAL Y MÉTODOS: Se ha realizado un estudio bibliométrico mediante la búsqueda en el campo "título" del Science Citation Index Expanded. El análisis estadístico fue descriptivo (intervalo de confianza del 95%).**

**RESULTADOS: Se recopilaron 292 documentos sobre tabaquismo publicados por autores españoles. Las subáreas más productivas fueron las siguientes: salud pública, educación y economía de la salud con 57 documentos, seguidas de las subáreas de respiratorio, investigación experimental y medicina interna con 36 artículos cada una. *Medicina Clínica*, con 35 artículos (12%), y ARCHIVOS DE BRONCONEUMOLOGÍA, con 20 (6,8%), fueron las revistas con un mayor número de documentos. La colaboración internacional se realizó con instituciones de la Unión Europea y EE UU, y la media ± desviación estándar de citaciones recibidas fue de 5,12 ± 8,6 (intervalo: 59-0). España aporta a la producción mundial en tabaquismo el 8,34%, y a la de la Unión Europea el 12,85%.**

**CONCLUSIONES: La investigación en tabaquismo en España se desarrolla adecuadamente, con una alta repercusión, aunque la aportación es discreta. La colaboración internacional, el hecho de que el artículo esté escrito en inglés y que el primer firmante sea extranjero son las variables que aumentan el número de citas.**

**Palabras clave:** *Tabaquismo. Bibliometría. Información científica. Science Citation Index.*

## Introduction

Smoking is the main public health problem in Western societies, and the importance smoking-related topics have acquired over the last several decades is undisputed. Because of the great interest smoking has awakened among scientists, productivity in a variety of existing lines of research has increased.[1,2] Smoking research is multidisciplinary, explaining why a large range of medical specialists participate, alongside professionals from other health care disciplines and further afield. Many hospitals and other institutions are involved. It is unsurprising,

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therefore, that lines of research will be widely dispersed, considering that smoking research takes place in nearly all the biomedical and health care areas that have most stepped up the pace of their publication.[3,4]

Bibliographic databases are the main source of information for bibliometric studies. Bibliometric analysis in biomedical areas can be conducted through databases specialized in medicine, such as the Spanish medical index (Índice Médico Español), MEDLINE, or Excerpta Medica, or through multidisciplinary databases covering all scientific areas, such as the Science Citation index (SCI).[5] The SCI (http://www.isinet.com/), which belongs to the Institute for Scientific Information (ISI, owned by Thomson Scientific & Healthcare, a division of Thomson Corporation, http://scientific.thomson.com/aboutus/) in the United States of America, began to publish their reports in the early 1970s, based on entries dating from 1945.[6] ISI covered nearly 5200 journals in 31 different languages at that time, whereas some 5700 source journals are now covered by the group's best known products—the SCI, the Social Science Citation Index (SSCI), and the Arts & Humanities Citation Index (A&HCI). These databases are used to compile the Journal Citation Report (JCR), published annually in separate editions to include SSCI- and A&HCI-indexed journals as well as those in the SCI itself. The JCR is where the well-known journal "impact factors" are published. In spite of its limitations, the SCI facilitates searching and bibliographic alerting services to a greater degree than other lists of scientific literature. It is widely accessible, tracks groups of authors, articles and journals around which a topic of interest develops, and it is the only database that catalogs citations.[3,5,7]

The SCI is used to analyze scientific activity because it is multidisciplinary (covering all scientific and technological fields) and because it tracks citations to calculate an impact factor reflecting use by journals in the JCR.[8-11] In addition, as the institutional affiliations of all authors are included, it is possible to study collaboration between institutions. That aspect cannot be measured through other bibliographic databases such as MEDLINE.[12]

Bibliometry can be defined as the science that interprets numerical data arising from scientific publication.[12] The main objectives of bibliometry are to study the number and distribution of scientific documents and their growth and to investigate the structure and dynamics of groups who produce and consume the documents and the information they contain.[1,5,12]

The aim of this study was to analyze Spanish productivity in the area of smoking research for the 5-year period of 1999 through 2003, using the tools provided by the SCI. We sought to ascertain the place of Spain in relation to worldwide and European Union (EU) centers.

## Material and Methods

### *Bibliographic Search*

The literature search was carried out on November 25, 2005 through the SCI Expanded (SCIE) database on the ISI Web of Knowledge platform provided by ISI-Thomson. The search encompassed the years 1999 through 2003. Search terms were as described by our group for the topic of smoking within the area of respiratory system research.[13] The title field of the SCIE interface was searched, given that a search in the subject field retrieved numerous nonrelevant articles because smoking research shares descriptors with many other unrelated topics. The decision to search only the title field assured maximum relevance of the results. The search was limited to original research articles, reviews, letters to the editor, editorials, and guidelines. The word Spain had to appear in the address field. The data collected for Spanish authors were compared with those retrieved for all European authors using the same search strategies and for the same study period. For each retrieved item the information recorded included authors and their specialty, title of the article, journal, article type, topic area, key words, language of publication, abstract, institutional affiliations, and the journal's international standard serial number. All were checked manually to assure relevance to the research topic.

### *Data Collection and Variables Analyzed*

The following variables were analyzed for each article: year of publication, title, authors, institutional affiliations, authors' specialties, subfield topics (within the JCR subject categories), disciplinary category,[14] journal, journal language, document type, collaboration, and number of citations by SCI-indexed journals.

### *Bibliometric Indicators*

To calculate indicators of productivity we analyzed output by year, language, journal, subfield topic, discipline, article type, author specialty, and institutional affiliation. The number of citations received each year was also calculated.

### *Statistical Analysis*

Data were input to a database designed specifically for this study in Microsoft Access 2003 (Microsoft, Redman, Washington, USA). Statistical analysis was carried out with the Statistical Package for the Social Sciences (SPSS Inc, Chicago, Illinois, USA) version 11.0.

Quantitative variables in the descriptive analysis were expressed as the arithmetic mean (SD). The $\chi^2$ test was used to compare proportions. Analysis of variance (Dunnet post-hoc *t* test for multiple comparisons) was used to compare the means of continuous variables between more than 2 groups. To explore the relationship between various independent variables and the dependent ones, multiple regression analysis was used. The level of statistical significance was set at a value of *P* less than .05 (95% confidence interval [CI]).

## Results

### *General Description*

A total of 292 publications about smoking by Spanish authors in SCI-indexed journals were retrieved: 46 (15.8%) from 1999, 52 (17.8%) from 2000, 71 (24.3%) from 2001, 63 (21.6%) from 2002, and 60 (20.5%) from 2003. Of those 292, a total of 211 (72.3%) were published in English, 80 (27.4%) in Spanish, and 1 (0.3%) in French. Two hundred forty-two (82.9%) were original articles, 31 (10.6%) were letters to the editor, 11 (3.8%) were editorials, 7 (2.4%) were reviews, and 1 (0.3%) contained consensus guidelines.

Table 1 shows the distribution by subfields. The most productive subfield was public health, education, and health economics with 57 publications (19.5%). Sharing second place were the subfields of respiratory system, experimental research, and internal medicine with 36 publications (12.3%) each. A classification of publications by discpline,[14] showed that 151 (51.7%) were in the category clinical medicine, 77 (26.4%) were in social medicine, and 64 (21.9%) were in basic medical science.

The publications appeared in a great variety of journals. The 2 individual journals that published the largest number were *Medicina Clínica* with 35 (12%) and *Archivos de Bronconeumología* with 20 (6.8%). *International Journal of Cancer* (n=8), *Cancer Causes and Control* (n=6), *Psicothema* (n=6), *Preventive Medicine* (n=5), and *Journal of Epidemiology* and *Community Health* (n=5) were the journals that published 5 articles or more each during the study period; all were published outside Spain except *Psicothema.*

The most productive provinces were Barcelona and Madrid, with 94 (32.2%) and 52 (17.8%) publications, respectively. Next came the provinces of Granada (n=19, 6.5%), Valencia (n=16, 5.5%), and La Coruña (n=13, 4.5%). Table 2 shows the Spanish institutions producing 5 or more publications on smoking indexed by the SCI. Table 3 gives the distribution of articles according to author specialty; in some cases, more than 1 specialty per article was reported. Thirty-four of the articles published in the period under study were about treatment of smoking addiction, and 15 of those 34 (44.1%) were by pneumologists.

An important indicator of the international projection of Spanish research is the number of articles published in collaboration with others. Eighty-six articles (29.5%) were written with international co-authors, especially from institutions in the USA or the EU. Collaboration was also evident within Spain, as 33 articles were signed by authors from more than one Spanish institution. The first authors of 45 articles (15.4%) were based outside Spain.

The mean number of citations received for all publications in the study period was 5.12 (8.6) (95% CI, 59-0).

### *Annual Trends*

No annual trends could be discerned from analysis of the data collected. There were no significant differences between years in subfields, disciplines, journals, languages, article types, provinces, collaboration, or specialties or national affiliations of the first authors. On the other hand, the mean number of total citations decreased each year, with significant differences between 1999, 2000, and 2001 with respect to 2003 ($P<.05$). That trend is understandable given that older articles had been accumulating citations for a longer period of time.

### *Comparison Between Medical Disciplines*

Comparison of citations between the 3 medical disciplines showed significant differences with regard to distribution in different journals ($P<.0001$), language ($P<.0001$), and type of article ($P<.0001$, as only original articles were published in basic medical science), province ($P<.0001$, as basic medicine predominated in Granada and Madrid and clinical medicine in Barcelona and Madrid), and author specialty ($P<.0001$). However, no significant differences between the 3 biomedical disciplines were found with regard to patterns of collaboration or nationality of the first author.

TABLE 1
**Distribution of Articles by Subfields**

| Subfield | Number | Percentage |
|---|---|---|
| Public health, education, and health economics | 57 | 19.5 |
| Respiratory system | 36 | 12.3 |
| Internal medicine | 36 | 12.3 |
| Experimental medicine | 36 | 12.3 |
| Neurology, neuroscience, and psychiatry | 27 | 9.2 |
| Oncology | 25 | 8.6 |
| Clinical psychology | 20 | 6.8 |
| Biochemistry, molecular biology, and chemistry | 15 | 5.1 |
| Cardiology | 10 | 3.4 |
| Endocrinology | 7 | 2.4 |
| Pharmacology | 7 | 2.4 |
| Allergy | 3 | 1 |
| Pediatrics | 3 | 1 |
| Virology | 3 | 1 |
| Toxicology | 2 | 0.7 |
| Dentistry, oral surgery | 2 | 0.7 |
| Dermatology | 1 | 0.3 |
| Surgery | 1 | 0.3 |
| Genetics | 1 | 0.3 |
| Total | 292 | 100 |

TABLE 2
**Spanish Institutions With at Least 5 Articles About Smoking in Journals Included in the Science Citation Index in the 5-Year Period of 1999 Through 2003**

| Institution | Number | Percentage |
|---|---|---|
| Instituto Catalán de Oncología | 18 | 6.2 |
| Universidad de Granada | 16 | 5.5 |
| Consejo Superior de Investigaciones Científicas (CSIC) | 15 | 5.1 |
| Universidad de Santiago de Compostela | 13 | 4.5 |
| Universidad de Barcelona | 13 | 4.5 |
| Universidad Autónoma de Madrid | 9 | 3.1 |
| Instituto Municipal de Investigaciones Médicas | 9 | 3.1 |
| Universidad de Valencia | 9 | 3.1 |
| Universidad de Córdoba | 8 | 2.7 |
| Universidad de Zaragoza | 7 | 2.3 |
| Universidad Complutense de Madrid | 6 | 2.1 |
| Hospital Clínico de Salamanca | 6 | 2.1 |
| Hospital Clínico de Barcelona | 6 | 2.1 |
| Hospital de La Princesa de Madrid | 5 | 1.7 |
| Instituto Municipal de Salud Pública de Barcelona | 5 | 1.7 |
| Hospital Germans Trias i Pujol de Badalona, Barcelona | 5 | 1.7 |
| Universidad Pompeu Fabra de Barcelona | 5 | 1.7 |

TABLE 3
**Distribution of Articles by First Author's Specialty**

| Specialty | Number | Percentage |
|---|---|---|
| Public health, preventive medicine, and health economics | 99 | 33.5 |
| Pneumology | 36 | 12.2 |
| Psychology | 26 | 8.8 |
| Biochemistry, chemistry, and industrial chemistry | 20 | 6.8 |
| Biology | 19 | 6.4 |
| Pharmacology | 13 | 4.4 |
| Agricultural engineering | 10 | 3.4 |
| Primary care | 10 | 3.4 |
| Internal medicine, general medicine | 9 | 3.1 |
| Pediatrics | 7 | 2.4 |
| Psychiatry | 5 | 1.7 |
| Physiology | 5 | 1.7 |
| Genetics | 5 | 1.7 |
| Endocrinology | 4 | 1.4 |
| Neurology | 4 | 1.4 |
| Cardiology | 4 | 1.4 |
| Allergology | 3 | 1 |
| Dentistry, oral surgery | 3 | 1 |
| Science, technology, and documentation | 2 | 0.7 |
| Intensive care | 2 | 0.7 |
| Nephrology | 2 | 0.7 |
| Forensic medicine | 2 | 0.7 |
| Dermatology | 1 | 0.3 |
| Vascular surgery | 1 | 0.3 |
| Mathematics | 1 | 0.3 |
| Oncology | 1 | 0.3 |
| Hematology | 1 | 0.3 |
| Total | 295 | 100 |

The most productive specialties in clinical medicine were public health, preventive medicine, and health economics in first place and pneumology on the other. Among the basic medical sciences, the most productive were biochemistry, chemistry and industrial chemistry, and biology. Social medicine disciplines that were most active were public health, preventive medicine, and health economics and psychology.

The number of SCI citations did not differ between basic medical science, clinical medicine, and social medicine.

### *Factors Related to a Higher Citation Rate*

The factors associated with receiving more citations were English language ($P<.0001$), international collaboration ($P<.0001$ in comparison with no collaboration and $P<.001$ in comparison with national collaboration), and non-Spanish nationality of the first author ($P<.0001$). The variable year was removed from this model given that more recent articles would obviously have had less time to accumulate citations, as noted above.

### *Spain's Rank in Worldwide and EU Smoking Research Productivity*

For the 5-year period from 1999 to 2003, the search of the SCIE database retrieved 3499 titles about smoking. Of those, 3338 (95%) were original articles and 161 (5%) were review articles. The 15 countries forming the EU in 2004 (EU-15) published 2225 articles, whereas the 25 countries of the enlarged community (EU-25) published 2272 (Table 4). The remaining 1227 articles were published from the rest of the world. Two hundred ninety-two articles were by Spanish authors, accounting for 8.34% of world production and 12.85% of the indexed articles were written by EU-25 authors during the study period. The articles were published in journals from 35 countries. US journals published the largest number (n=299, 31.02% of the total), followed by the United Kingdom (n=280, 29.05%), Germany (n=89, 9.23%), and the Netherlands (n=87, 9.02%), although 34.47% of the articles appeared in journals published in the UK and 29.04% in journals from the US. In Spain, with no discernible trends over the period studied, 13 journals published articles about smoking, accounting for 1.35% of the total amount of smoking research published, although 1.6% (n=56) of the articles appeared in those Spanish journals. Spanish is in second place among languages used for the publication of articles about smoking, with 1.60% of the titles, ahead of French (1.51%) and German (1.37%).

As for the distribution of productivity by journals (considering original articles only) and per year of publication, the position of *Archivos de Bronconeumología* was outstanding. Only recently included in the SCI, the journal published 6 articles each year from 2001 through 2003, while *Medicina Clínica* published 3 articles in 1999, 4 in 2000, 5 in 2001, 4 in 2002, and 2 in 2003—giving a total of 18 articles for each journal.

## Discussion

Smoking is a concern in nearly all biomedical sciences and health care specialties, to the extent that it has become a research priority for the next 5 years. Research on smoking has increased considerably throughout the world, its impact has increased, and Spain has been no exception to this trend.[1,2] The most important finding from our study was probably the high impact of SCI-indexed articles on smoking published by Spanish authors in the 5-year period from 1999 through 2003. Output held steady, meaning that each article on smoking received 5 citations on the average. That figure was only slightly below the mean number of citations per article obtained by Spanish research overall[4,15] and reveals the high impact of productivity in this area.

Camí et al[3,4,16] conducted an exhaustive analysis of Spanish productivity in biomedical and life sciences from 1994 through 2002, comparing those years with earlier periods (from 1981). They found that Spain quadrupled the number of publications, whereas EU countries only doubled output over the 21 years studied. Spain was in 11th position among the 20 most productive countries in the world and the seventh among EU countries. Spain maintained a rank of 17th internationally in the comparison of the mean number of citations per title or percentage of titles not cited; this is to say, Spain published more but did not reach the world average impact per document.[4] Spanish productivity generally does not tend toward

TABLE 4
**Published Articles and Journals of Publication From Spain, From EU-15, EU-10 and EU-25 Countries, and From All Countries***

| | 1999 | | | 2000 | | | 2001 | | | 2002 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. of Articles | % of Articles | % of Articles | No. of Journals | No. of Articles | % of Articles | No. of Journals | No. of Articles | % of Articles | No. of Journals | No. of Articles | % of Journals |
| Spain | 3 | 6 | 0.89 | 4 | 8 | 1.11 | 5 | 16 | 2.22 | 5 | 13 | 1.84 |
| EU-15 | 212 | 413 | 61.55 | 220 | 454 | 63.23 | 224 | 479 | 66.53 | 225 | 441 | 62.46 |
| EU-10 | 6 | 7 | 1.04 | 9 | 11 | 1.53 | 11 | 13 | 1.81 | 5 | 7 | 0.99 |
| EU-25 | 218 | 420 | 62.59 | 229 | 465 | 64.76 | 235 | 492 | 68.33 | 230 | 448 | 63.46 |
| Rest of world | 139 | 251 | 37.41 | 142 | 253 | 35.24 | 132 | 228 | 31.67 | 137 | 258 | 36.54 |
| Total | 357 | 671 | 100.00 | 371 | 718 | 100.00 | 367 | 720 | 100.00 | 367 | 706 | 100.00 |

*EU indicates European Union.

TABLE 5
**Distribution of Articles by Language and Year of Publication**

| Language | 1999 | 2000 | 2001 | 2002 | 2003 | Total | Percentage |
|---|---|---|---|---|---|---|---|
| English | 636 | 692 | 681 | 664 | 650 | 3.323 | 94.97 |
| Spanish | 6 | 7 | 16 | 15 | 12 | 56 | 1.60 |
| French | 14 | 9 | 12 | 9 | 9 | 53 | 1.51 |
| German | 11 | 8 | 9 | 10 | 10 | 48 | 1.37 |
| Czech | | 1 | | 1 | 1 | 3 | 0.09 |
| Danish | | | 1 | 1 | 1 | 3 | 0.09 |
| Hungarian | 1 | 1 | | 1 | | 3 | 0.09 |
| Italian | | | | 3 | | 3 | 0.09 |
| Chinese | 1 | | | 1 | | 2 | 0.06 |
| Polish | 2 | | | | | 2 | 0.06 |
| Swedish | | | 1 | | 1 | 2 | 0.06 |
| Dutch | | | | 1 | | 1 | 0.03 |
| Total | 671 | 718 | 720 | 706 | 684 | 3499 | 100 |

biomedical disciplines,[4] and it is the life science disciplines that receive the largest number of citations according to these data. When we analyzed smoking research output by disciplinary categories,[14] we found that 51.7% (n=151) of titles were in clinical medicine, 26.4% (n=77) were in social medicine, and 21.9% (n=64) were in basic medical science. That pattern differed little from the distribution for biomedical and life sciences reported by Camí and colleagues.[4] The explanation for the pattern probably lies in the multidisciplinary nature of smoking research, and this might also explain the high impact of research in this field. For good reason, smoking research is among the areas of science that have increased their output, visibility, and importance.[3,4,14] Effectively, a closer look at the 10 most productive fields within clinical medicine (by decreasing number of titles: surgery and transplantation, general and internal medicine, oncology, gastroenterology, cardiovascular diseases, urology and nephrology, infectious diseases, and the respiratory system[16]) shows that smoking research figures in all of them, as it did in the earlier study period.[14,16]

All disciplines have subfields that are among the most productive, and it is notable that basic biomedical fields only publish original research articles. It is unsurprising that most clinical research on smoking is done in Barcelona and Madrid (given that those provinces hold most of the hospitals that are best equipped in all senses) or that Madrid (with a high density of publicly supported research centers[4]) stands out for basic medical research; it is noteworthy, however, that the province of Granada stands out in the field of basic biomedical research in terms of absolute numbers.

Another important finding was that the variables associated with a higher number of citations were publication in English, international collaboration, and having a non-Spanish author in first position. The gradual increase in collaboration between Spanish and international authors in biomedical and life sciences research has been documented,[4,14] and this important factor that attracts citations is not distributed equally across different types of institutions. The sectors that traditionally collaborate most are publicly or privately supported research centers, which receive an appreciable percentage of the citations. On the other hand, although collaboration undertaken by university researchers is proportionally less, the percentage of citations such collaboration attracts does not differ much from that received by the aforementioned research centers. Thus, although fewer collaborative studies are done in the health care sector, the ones undertaken do accumulate a high percentage of citations. Our findings are consistent with earlier observations; that is to say, international collaboration is a factor that attracts citations.

Camí and colleagues[4] found that international collaboration most often involved EU-15 countries, the

| | 2003 | | | Total | | | |
|---|---|---|---|---|---|---|---|
| | No. of Articles | No. of Journals | % of Articles | No. of Journals | No. of Journals | No. of Articles | % of Articles |
| | 7 | 13 | 1.90 | 13 | 1.35 | 56 | 1.60 |
| | 225 | 438 | 64.04 | 564 | 58.51 | 2225 | 63.59 |
| | 7 | 9 | 1.32 | 26 | 2.70 | 47 | 1.34 |
| | 232 | 447 | 65.35 | 590 | 61.20 | 2272 | 64.93 |
| | 138 | 237 | 34.65 | 374 | 38.80 | 1227 | 35.07 |
| | 370 | 684 | 100.00 | 964 | 100.00 | 3499 | 100.00 |

USA, and Canada and that it was increasingly common to see researchers from several countries working together. Our findings for smoking research were similar: most collaboration was with EU countries or groups in the US, probably explaining why the other variables that increased citations were publication in English and having a non-Spanish first author. We did not see that collaboration within Spain or between Spanish regions increased the likelihood of citation, consistent with previous reports.[4] This bibliometric phenomenon—that articles with international collaboration are cited more—has also been observed in US studies.[17,18] We found that 86 articles (29.5%) were produced in collaboration with international researchers, a percentage that was slightly higher than that observed by Camí et al[4] for Spanish biomedical and life sciences publication overall. The number of authors is known to correlate positively with funding, given that the fact of large investment in science favors the formation of adequate research teams. The mean number of signers of an article has also been seen to correlate positively with an author's productivity.[19]

It is important to stress that Spanish ranked second as a language of publication, although with a much smaller percentage of publications than English. It outranked other languages that perhaps have a longer tradition of research publication. This may be related to Spain's increasing international visibility and to the fact that some of the most productive journals are published in Spain and in Spanish. *Medicina Clínica* ranked first in number of original articles in the study period and it is noteworthy that *Archivos de Bronconeumología* attained a position of leadership in spite of entering the SCI only in 2001. That position of pneumology journal may be due to the considerable productivity of that specialty in the area of smoking research.[20]

Regarding institutional sources of titles retrieved, 46.57% (n=136) were from universities, 25.34% (n=74) from clinical care settings, and the rest (27.39%) from privately and publicly funded research laboratories, the central government, and private enterprises. These observations once again underscore the multidisciplinary nature of smoking research: it is clinical medicine researchers that stand out when biomedical and life science publications are studied according to Camí et al,[4] whereas if we take into consideration all Spanish scientific production, including the basic science subfields, agriculture, and the environment, it is university research groups that take the lead in terms of the percentage of publications they account for. We found that smoking research follows that same multidisciplinary pattern.

Although Spain entered the field of smoking prevention and treatment of addiction late, research here has increased considerably in recent years.[1,2] SCI-indexed titles from Spain in the study period accounted for 8.34% of world publication and 12.85% of the output of the EU-25 countries. It is important that Spain, with no evident time trend, published articles in 13 different journals, accounting for 1.35% of the total. Given the clear hegemony of English-language countries in this area, these data speak well of our publishers. We have already remarked on the high impact of articles on smoking from Spanish authors in the 5-year period analyzed.

We can conclude that Spanish smoking research, with its evidently multidisciplinary nature, is developing appropriately over time in terms of output, even though there is no discernible trend, and that Spanish authors' publications enjoy high impact. International collaboration, publication in English, and a first author from outside Spain are variables that increase citation. Even though Spanish contributions to world and EU smoking research are modest—taking into consideration that Spain joined late—the output is appropriate to the research level in the country as a whole. It is important to conclude by mentioning the key roles of the journals *Medicina Clínica* and *Archivos de Bronconeumología* in this field, probably the fruit of Spanish researchers' own interest in smoking addiction. The role of *Archivos de Bronconeumología* in publishing smoking research will probably be maintained or even become stronger, given the journal's growing impact within Spain[21] and abroad.[22]

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