



## Special Article

# Practical Advice for South Korean Medical Researchers Regarding Open-Access and Predatory Journals

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In recent decades, the volume of scholarly literature worldwide has increased significantly, and open-access publishing has become commonplace. These changes are even more dominant in South Korea. Comparing the periods of 1981-2000 and 2001-2020, the number of medical articles produced in Korea increased by 16.8 times on the Web of Science platform (13,223 to 222,771 papers). Before 1990, almost no open-access articles were produced in South Korea, but in the last 10 years open-access publications came to account for almost 40% of all South Korean publications on Web of Science. Along with the expansion of literature and the development of open-access publishing, predatory journals that seek profit without conducting quality assurance have appeared and undermined the academic corpus. In this rapidly changing environment, medical researchers have begun contemplating publication standards. In this article, recent trends in academic publishing are examined from international and South Korean perspectives, and the significance of open-access publishing and recent changes are discussed. Practical methods that can be used to select legitimate publishers, including open-access journals, and identify predatory journals are also discussed.

**Key words** Open access, Predatory, Medical research, Directory of Open Access Journals, Open Access Scholarly Publishers Association, Beall's list

## Introduction

Prior to the 1990s, the medical doctors in South Korea (hereafter referred to as Korea), who were affiliated with the academic institutes and/or teaching hospitals, used to be more responsible for the role as clinicians rather than as researchers. For example, the number of scientific articles published by the Korean medical doctors in Scientific Citation Indexed (SCI) journals, an index of internationally qualified academic journals, was merely 700 in total from 1981 to 1990, which ranked in the 53rd place internationally [1]. In comparison, the economic consumption of health care goods and services per capita, during the relevant period, was comparatively higher, which ranked in the 24th place [2]. However, the situation in Korea has changed rapidly since after the 2000s. As in the United States and Europe, the biggest change occurred with the growth of the baby boomer generation after World War II, followed by the proliferation of a well-educated population and surges in demand for the academic positions [3]. In addition, along with the economic growth, the differences in income decreased between the medical doctors who ran their own private-practice clinics and those who worked for the fixed salary [4]. Moreover, the level of professionalism of medicine in Korea increased significantly. The Korea medical

doctors used to adopt and apply the up-to-date knowledge and technologies developed in the Western world in the past, and, however, have now reached the stage where they actively develop the latest medical advances and extend the bounds of knowledge (Table 1) [1,5]. These are partly correlated with the increased demand for the academic positions. However, the increasing rate of this demand has not kept up with the capacity of academic publications on the existing journals, while the number of publications have been an important indicator for the competitive academic positions. In other words, the era of “publish or perish” has arrived in Korea.

The number of average number of scholarly publications per year was only 13,223 between 1981 and 2000 on the Web of Science (WoS) platform among the top 30 medical categories of the Journal Citation Report (S1 Table), and ranked the 27th place among worldwide countries. However, 222,771 articles were published on WoS between 2001 and 2020, which ranked in the 12th place and was 16.8 times more than the previous 20 years (Table 1).

Of course, all researchers would hope to publish their works in the descent academic journals related to their specialties. Generally, the major journals are typically affiliated with the global academic societies, and are preferred by the scholars. However, publication in these journals has been

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**Table 1.** Number of Web of Science documents by country and time

1981-2000			2001-2020		
Rank	Countries	No. of documents	Rank	Countries	No. of documents
1	USA	1,501,446	1	USA	3,015,897
2	UK, England	666,362	2	UK, England	1,404,315
3	Germany	252,604	3	China	701,848
4	Japan	247,547	4	Germany	647,609
5	France	195,172	5	Japan	540,387
6	Canada	153,733	6	Italy	457,286
7	Italy	144,873	7	Canada	408,191
8	Netherlands	85,913	8	France	393,043
9	Sweden	76,647	9	Australia	292,840
10	Australia	74,961	10	Netherlands	276,470
20	India	29,791	12	South Korea	222,771
22	China	25,397	16	India	153,303
27	South Korea	13,223	22	Russia	101,401

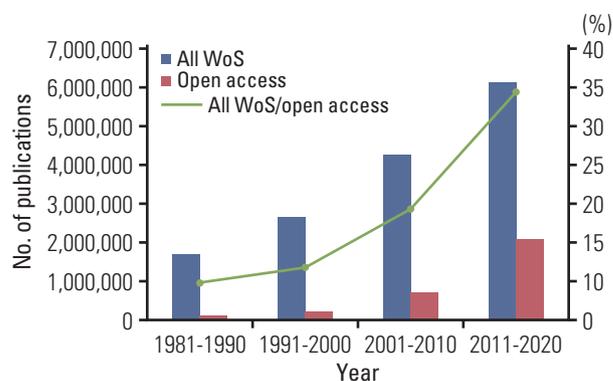
JCR, Journal Citation Reports. \*Categories: oncology; neuroscience; surgery; clinical neurology; optics; cardiac & cardiovascular systems; public, environmental & occupational health; radiology, nuclear medicine & medical imaging; psychiatry; gastroenterology & hepatology; immunology; endocrinology & metabolism; medicine, research & experimental (all medical categories among top 30 JCR categories).

extremely competitive, as they tend to publish the articles written by the renowned scholars from the developed countries, especially Western ones. Furthermore, the Korean medical researchers, more or less, struggle with the difficulty of writing in English. All these unmet needs, related with the remarkable growth of academic output in the East Asia and the limited capacity by the conventional journals, seemed to have affected the appearance and growth of the open-access (OA) publishers, which are less competitive in article publishing by the researchers. Young Korean scholars, who feel pressured because of the requirements to promote into and to maintain their academic positions, could easily become the prey by the “predatory journals,” which usually pursue profit-making much more than minding the value of academic research. In this review, I would review the changing trends in academic publishing and provide a few practical advices to find the suitable target journals and thereby to avoid the perils of problematic submissions.

## Consideration of OA Publishing

### 1. Global development of OA publishing

In conventional journals, the cost for publication is usually covered by the subscription fee paid by the subscribers is reimbursed by the academic organizations, and the copyright is transferred from the authors to the publishers when a manuscript has been approved before the actual publication. The OA journals apply contrasting concepts: the authors should pay the publication fee to the publishers and could



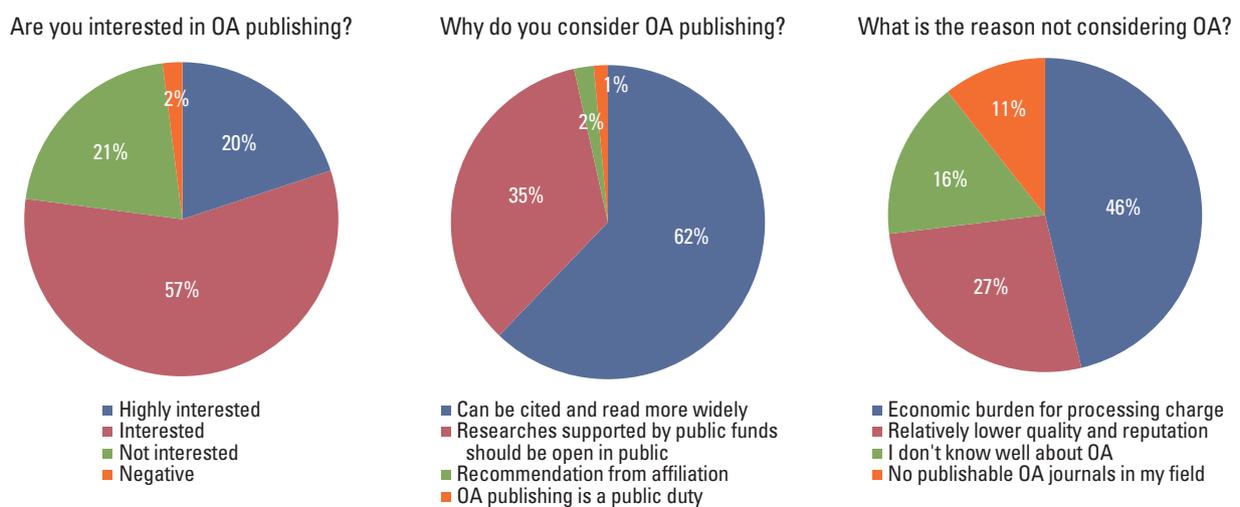
**Fig. 1.** Number of total and open-access publications in Web of Science (WoS) between 1981-2020 [1]. \*Categories: oncology; neuroscience; surgery; clinical neurology; optics; cardiac & cardiovascular systems; public, environmental & occupational health; radiology, nuclear medicine & medical imaging; psychiatry; gastroenterology & hepatology; immunology; endocrinology & metabolism; medicine, research & experimental (all medical categories among top 30 JCR categories). JCR, Journal Citation Reports; WoS, Web of Science.

maintain the copyrights (Gold OA: the most common form of OA). Anybody can get access to the articles without paying any cost and the reuse of them, with academic or commercial purpose, is permitted depending on the copyright extent. The OA journals may be sub-classified according to the subject of publication, payment method, or the copyrights. In platinum/diamond OA journals, the publishers pay for the publication cost and provide the literature to

**Table 2.** Trends in open-access publishing in Korea

Subject	1981-1990	1991-2000	2001-2010	2011-2020
All publishing (No. of WoS articles)	694	12,529	70,118	152,653
Country ranking	53rd	26th	12th	12th
OA publishing (No. of WoS articles)	37	1,058	13,329	57,072
Country ranking	45th	23rd	14th	11th
Ratio of OA publishing (Korean OA/total publishing) (%)	5.3	8.4	19.0	37.4
Occupation among global OA publishing (Korean OA/global OA publishing) (%)	0.04	0.52	1.91	2.76

UK and England were counted as one country. OA, open access; WoS, Web of Science.



**Fig. 2.** Graphical summary of the study interviewing 1,275 experienced researchers in Korea (Graphical figures drawn by the author and numerical data was referenced from the study by Kim [9]). OA, open access.

the readers at no cost, in which they are often supported by the external funding for the public purposes. In green OA journals, the authors can self-archive their publication in the websites or another repository to provide their literature. In bronze OA journals, a similar concept to gold OA ones except for the restricted copyright, where the reuse is not fully permitted. Along with the marked increase in the number of medical publications during the recent years, the OA publishing has grown much faster than the conventional ones. Between 1981 and 1990, 1,672,389 articles were published on WoS in the major medicine categories (S1 Table), among which, only 89,774 (5.4%) were published in the OA journals. However, between 2011 and 2020, about one-third (2,069,772 among 6,133,274 articles, 33.7%) was published in the OA journals (Fig. 1). When the OA journals were initially established, their main aim was to share the up-to-date knowledge widely, especially for the developing countries where the researchers have difficulty paying the subscription

fees. In 2008, the National Institute of Health in the US stated that all research results, supported by the Institute, should be submitted to PubMed Central or be published in the OA journals [6]. In 2017, the Bill and Melinda Gates Foundation announced that it would separately create an OA publication at its own expense, when the research results supported by the foundation were published [7]. All projects supported by the European Commission's Horizon 2020 fund were also mandated to publish their research results in the OA journals [8]. In fact, OA publishing has helped meet the explosive demand of the academic publications that the traditional subscription journals have been unable to accommodate.

## 2. OA publishing in Korea

Similarly, OA publishing has exhibited a steep surge in Korea. Between 1981 and 1990, only 37 articles were published in OA settings on WoS. This occupied only 5.3% of all Korean articles on WoS, and merely 0.04% of global OA pub-

**Table 3.** Selected criteria useful for medical researchers from Beall's criteria [10]

Category	Contents
Editor and staff	The journal does not identify a formal editorial/ review board. No academic information is provided regarding the editor or board members. There is little or no geographical diversity among editorial boards, especially for journals that claim to be international in scope or coverage.
Business management	Provides insufficient information or hides information about author fees, offering to publish an author's paper and later sending an unanticipated "surprise" invoice.
Integrity	Falsely claims that journals have actual (Thomson-Reuters) impact factors, or advertises impact factors assigned by fake "impact factor" services, or uses some made-up measure (e.g., view factor), feigning/ claiming an exaggerated international standing. The publisher falsely claims to have its content indexed in legitimate abstracting and indexing services or claims that its content is indexed in resources that are not abstracting and indexing services.
Other	Operates in a Western country chiefly for the purpose of functioning as a vanity press for scholars in a developing country (e.g., utilizing a mail drop address or PO box address in the United States, while actually operating from a developing country).

lishing. On the contrary, between 2011 and 2020, the number of OA-published Korean articles was 57,072, occupying 2.7% of global OA publishing and ranked in the 11th place among all countries. More than one-third (37.4%) of WoS articles from Korea have been published in the OA journals (Table 2).

According to a recent study by Kim [9], wherein 1,275 experienced Korean researchers and authors were interviewed, 77% of the respondents stated that they were interested in publishing their works in the OA journals. Two common reasons were (1) "OA articles can be cited and read more widely (93%)", and (2) "Research supported by the public funds should be open to the public (52%)." Meanwhile, two major reasons for not considering OA publishing were (1) "Economic burden of processing charges (57%)", and (2) "Relatively lower quality and reputation (33%)" (Fig. 2). Most authors still preferred publishing in the conventional "Big 3" companies: Elsevier (74%); Springer (57%); and Wiley (31%), respectively. Relatively preferred OA publishers included Nature Publishing Group (15%), Multidisciplinary Digital Publishing Institute (MDPI, 13%), and Public Library of Science (PLOS, 12%), respectively.

## Issue of Predatory Publishing

### 1. Personal experience of publishing in a typical predatory journal

Spam invitations from the predatory journals are typically overly polite and flattering in tone (e.g., starting with, "Dear respectful professor"). I have an experience of being trapped by a predatory journal, when I did not have any idea on this. After writing a 500-word manuscript, it was accepted quickly with enveloped invoice charging 500 USD. Though I of-

ficially requested that I did not want publication in that journal, however, the article was published in 3 months. Since then, they have sent me invoices every 3 to 6 months, up to 3 years later.

### 2. Definition of predatory journals and how to avoid them

A predatory journal can be conceptually defined as one that primarily pursues profits without applying the methodology to ensure the academic quality. Beall's criteria [10] are frequently used, which are somewhat long and have more than 20 items. Based on my personal experience, I have selected several categories that would be useful for the medical researchers (Table 3). The easiest way to avoid predatory journals is to submit manuscripts to the esteemed journals affiliated with the relevant expert societies. If alternative way of choosing the OA journals is considered, it is recommended to reference so-called "white lists", supported by the Directory of Open Access Journals (DOAJ, available at: <https://doaj.org/>) or Open Access Scholarly Publishers Association (OASPA, available at: <https://oaspa.org/>). These are the associations of the major OA publishers supporting the librarians to ensure the quality and reputation. Currently, the DOAJ council includes Emerald publishing, MDPI, Frontiers Media, and librarians from the Royal Danish library, the University of Florida, and Virginia Tech. The OASPA boards include the Taylor & Francis group, PLOS, Hindawi, MDPI, eLife, The Royal Society, The Royal Society of Chemistry, and DOAJ. The web site named "Think, check, submit" (available at: <https://thinkchecksubmit.org/>) provides the guidance in choosing the legitimate journals in an easy-to-understand manner. This is a non-profit organization founded to help the researchers, and was cofounded by the publishers and the organizations including BioMed Central, Springer Nature,

**Table 4.** Checklist: think, check, submit**Checklist**

Do you or your colleagues know the journal?

- Have you read any articles in the journal before?
- Is it easy to find the latest papers in the journal?

Can you easily identify and contact the publisher?

- Is the publisher's name clearly displayed on the journal's website?
- Can you contact the publisher by telephone, email, or post?

Is the journal clear about the type of peer review it uses?

Are articles indexed in services that you use?

Is it clear which fees will be charged?

- Does the journal's site explain what these fees are for and when they will be charged?

Do you recognize the editorial board?

- Have you heard of the editorial board members?
- Do members of the editorial board mention the journal on their own websites?

Is the publisher a member of a recognized industry initiative?

- Do they belong to the Committee on Publication Ethics (COPE) ?
- If the journal is open access, is it listed in the Directory of Open Access Journals (DOAJ) ?
- Is the journal hosted on one of INASP's Journals Online platforms (for journals published in Bangladesh, Nepal, Sri Lanka, Central America, and Mongolia) or on African Journals Online (AJOL, for African journals)?
- Is the publisher a member of another trade association?

Think, Check, Submit. Checklist to assess the journal or publisher. Available from: <https://thinkchecksubmit.org/sample-page/check/> [11].

the Committee on Publication Ethics (COPE), Asian Council of Science Editors, Association of European Research Libraries, DOAJ, and OASPA. Their checklist is highly practical and convenient (Table 4).

Most Korean universities require their faculty to publish research work in the indexed journals as the measurement of their academic achievement. According to the aforementioned study by Kim [9], two most important factors in selecting the journals were (1) whether they were indexed in the established indexing (84%), followed by (2) the level of impact factor (67%). A nationwide investigation of 27 Korean universities [12] revealed that publishing in the SCI/SCIE-listed and Scopus-listed journals were 2-2.4 times and 1.2-1.4 times more influential than in the Korean citation index (KCI) journals. Accordingly, most Korean medical researchers are eager to publish their works in the SCI/SCIE-indexed journals. The librarians from the University of Barcelona reported that, among 944 journals which were regarded as "predatory" in Beall's list, the proportions of being indexed in SCIE, ESCI, and Scopus were 0.95% (9 journals), 2.97% (28 journals), and 5.93% (56 journals), respectively [13]. Considering this, selecting journals based on SCIE indexedness (SCI and SCIE are no longer reported separately from 2020) seems a practical and valid option to avoid the predatory journals. It is worth noting that some predatory journals lure the authors using a fake "impact factor" or a made-up measure [14]. Hence, the authors should

check whether the target journal is indexed in Journal Citation Reports (JCR) with valid impact factors via the official website (<http://www.webofknowledge.com>), or ask for the librarians' assistance whenever suspicious.

Other practical advice includes the consideration of article processing charges (APC). The predatory journals usually charge lower APCs than the legitimate journals to lure the authors. Shen and Bjork [15] reported that the authors paid an average APC of 304 USD (range, 98 to 605 USD) for the predatory journals in Beall's list. However, a recent study interviewing a large number of experienced Korean researchers found that the most common APC was 2,000 USD (the mean was 1,442 USD) [9]. It should be noted that exceptions exist. Some domestic journals, published and supported by the established associations, tend to charge much cheaper APCs than the foreign OA journals, for the benefit of their society members. For example, the APCs of a few Korean journals, as of in August 7, 2020, are between 500 and 1,000 USD: 500 USD for The Korean Journal of Internal Medicine (available at: <https://www.kjim.org/authors/authors.php#8>); 600 USD for Cancer Research and Treatment (available at: <https://www.e-crt.org/authors/authors.php>); and 850 USD for Journal of Korean Medical Science, respectively. In addition, if publication in the OA journals is considered, it is recommended to choose the major OA publishers, some of which are the councils or founders of the DOAJ or OASPA, as mentioned above.

If you have been invited to submit a manuscript by a certain journal, and it is suspicious whether the journal is legitimate, you are highly recommended to disregard this invitation. The legitimate journals typically ask the highly esteemed researchers only for their invited articles. If you are a researcher with this level of recognition, you would have enough insight to distinguish whether the journal is legitimate or not.

## Gray Zone: between Academia and Business

### 1. Are all OA publishers greedy? Disputes after the initiative of Beall's list

Beall's initiative and list have had a significant impact in calling our attention to the issue of predatory journals that have undermined "academia," while OA publishing has thrived. Beall seems to have a fundamentally skeptical perspective on OA publishing. In his review article [3], he stated, "OA businesses are set up to publish manuscripts rejected by top publishers, functioning like a lender of last resort" and "whitelists (e.g. JCR or DOAJ) promote the creation of predatory pay-to-publish journals to make a fortune."

The Beall's list has been empowered by an intriguing experiment in OA publishing performed by *Science* correspondent, John Bohannon [16]. In 2013, Bohannon drafted an intentionally flawed paper and submitted it to 304 fee-charging OA journals: 167 were listed in the DOAJ; and 121 were on the Beall's list [17]. Among the 255 papers for which decision processes were completed, 157 journals accepted the paper while 98 rejected it. Among the publishers in Beall's list, 82% of the journals accepted the bogus paper, while 45% of the DOAJ listed journals accepted it. This approach was heavily criticized, especially by the researchers who support OA publishing. Michael Eisen, a biologist at UC Berkeley and a co-founder of PLOS, pointed out that Bohannon's experiment lacked a control group, and, hence, it could not be justified to interpret OA publishing as unreliable. He also indicated that the journal *Science*, which is highly esteemed, also accepted his own deeply flawed paper about arsenic in bacterial DNA [18]. Nevertheless, Bohannon's experiment significantly affected the OA journal society. The DOAJ decided to review its list and tighten the criteria for inclusion, purging a number of journals that had accepted the fake paper [19]. The OASPA formed a committee to investigate the journals that accepted the bogus paper and dismissed two publishers from their membership (Dove Medical Press and Hikari Ltd.) [20]. The Beall's list has been also criticized for being overly harsh, especially on OA publishers from developing countries [21]. The publishers founded or based in China, including MDPI, and an Egyptian OA publisher,

Hindawi, were included in his list. Frontiers media is another major OA publisher included in the Beall's list, though it is based in Lausanne, Switzerland. These publishers appealed heavily and were consequently excluded by the Beall's list, and all of them serve as council members or founders of the DOAJ and OASPA.

In 2015, another experiment was conducted targeting the predatory journals by applying for a job as an editor with an intentionally faked profile. While 33% of the predatory journals in the Beall's list accepted the application, encouragingly, 93% of DOAJ and all SCI indexed journals were not caught in the trap [22]. The Beall's list has been closed since January 2017, partly due to the pressure from his affiliation and the legal issues raised by some OA publishers [3].

### 2. Conventional publishers are also under pressure

In the past, until before the era of widespread electronic publishing became possible, the publishers were responsible for the copyediting, proofreading, typesetting, printing, and distribution of the hard copies, and, therefore sharing one's research results with others was slow and difficult. However, in modern times, the Internet and electronic processing has simplified this time-consuming processes. Simultaneously, the volume of publishing has markedly increased during the recent decades, leading to overall cost increase, which subsequently raised disputes between the librarians, researchers, and the major conventional publishers.

In 2019, 10 universities, affiliated with the University of California in the United States, whose scholarly outputs composed about 10% of all from the United States, raised a negotiation against the large Dutch publisher Elsevier for the reduction of subscription and OA publishing fees. Their perspective was, "*Many professors are Editors and work for publishers without economic rewards. The copyright is taken by the publishers at the time of publication. Published papers should be subscribed with a fee from universities, some of them are supported by national taxes. If researchers are helping to publish and paying the article subscription fee separately, this is an unfair case of double payment. In addition, publishers do not incur much publishing costs due to the advancement of electronic publishing.*" [23]. This negotiation between two large organizations drew great public attention, but ultimately failed. In a similar vein, the academic institutions in various countries are trying to redefine the subscription contract with the major publishers to reduce their economic burden, and to widen the academic exchange. Some publishers are proposing new forms of OA publishing that apply lower cost to selective regions or organizations [23]. In Korea, the Association of Korean University Libraries has also struggled to handle this economic burden issue, and published a statement calling for a government-level response to solve these issues in 2018 [23,24].

## Conclusion

Until a decade ago, the perspectives of Korean researchers were conservative and similar to that of Beall. Many thought that OA publishing was merely a non-academic and greedy business. The researchers often considered it shameful to include OA articles in their Curriculum Vitae. Nevertheless, the perspectives on publishing trends have changed rapidly. In the last 10 years, about one-third of all WoS literature and nearly 40% of all SCIE-indexed articles from Korea were published as OA format. The DOAJ and OASPA have continuously strengthened the bylaws and sought to expel the deceptive journals [19,20].

I would summarize my practical advices. It is a valid option, for the researchers with not enough experience, to reference the SCIE index regarding the credibility to help career development. In case when considering OA publishing, it is recommended to reference the lists from the DOAJ and OASPA and to collaborate with known major publishers. The researchers with high level of experience are

encouraged to cooperate with the developing publishers, including legitimate OA publishers, for mutual development and promotion. For example, competent researchers could enhance the quality of the OA journals by launching special issues focused on their academic interests. In addition, experienced researchers are recommended to show more interest in the evolution of academic publishing and to actively express their opinions to ensure a better future direction for academia.

### Electronic Supplementary Material

Supplementary materials are available at Cancer Research and Treatment website (<https://www.e-crt.org>).

### Conflicts of Interest

Conflict of interest relevant to this article was not reported.

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