Letter to the Editor Regarding "Bibliometric and Visualized Analysis of Stem Cells Therapy for Spinal Cord Injury Based on Web of Science and CiteSpace in the Last 20 Years"

Letter:

Guo et al.[1] recently published a paper in *World Neurosurgery* entitled "Bibliometric and visualized analysis of stem cells therapy for spinal cord injury based on Web of Science and CiteSpace in the last 20 years." Guo et al.[1] mentioned in the Methods section that.

A search for articles related to stem cells for SCI was conducted in the WoS Core Collection (SCI-EXPANDED, CPCI-S, CCR-EXPANDED, and IC) on March 30, 2019. The search formula was (TS = ["spinal injur*" OR "spinal cord injur*" OR "spinal cord traum*" OR "spinal traum*" OR paraplegia OR quadriplegia OR tetraplegia]) AND (TS = ["stem cell" OR "stem cells"]). The search period was set from 1999 to 2018, and the document types included articles, reviews, meeting abstracts, and proceedings articles.

For the Web of Science Core Collection, the citation indexes include the following: 1) Science Citation Index Expanded (SCI-EXPANDED) (1900–present), 2) Social Sciences Citation Index (1900–present), 3) Arts & Humanities Citation Index (1975–present), 4) Conference Proceedings Citation Index - Science (CPCI-S) (1990–present), 5) Conference Proceedings Citation Index - Social Science & Humanities (1990–present), 6) Book Citation Index - Science (2005–present), 7) Book Citation Index - Social Sciences & Humanities *2005–present), and 8) Emerging Sources Citation Index (2015–present).

For the Web of Science Core Collection, the chemical indexes include the following: 1) Current Chemical Reactions (CCR-EXPANDED) (1985–present), and 2) Index Chemicus (IC) (1993–present).

The Web of Science Core Collection was initially designed for researchers to find studies, but instead the authors have used it to perform bibliometric studies.[2,3] Only 2 articles were found in the IC. These 2 articles can be also found in SCI-EXPANDED. No publications can be found in CCR-EXPANDED. It is clear that Guo et al.[1] used inappropriate databases for their study. In addition, using all these different levels of databases in the Web of Science Core Collection is inappropriate for bibliometric studies.[2,3] On the other hand, it is also necessary to have pretreated data but not use the original data directly from the Web of Science Core Collection. To find accurate publications from the Web of Science Core Collection to a specific topic for bibliometric studies, a filter named "front page" (including the document title, abstract, and author key words) was proposed by Ho's group and should be considered.[4,5]

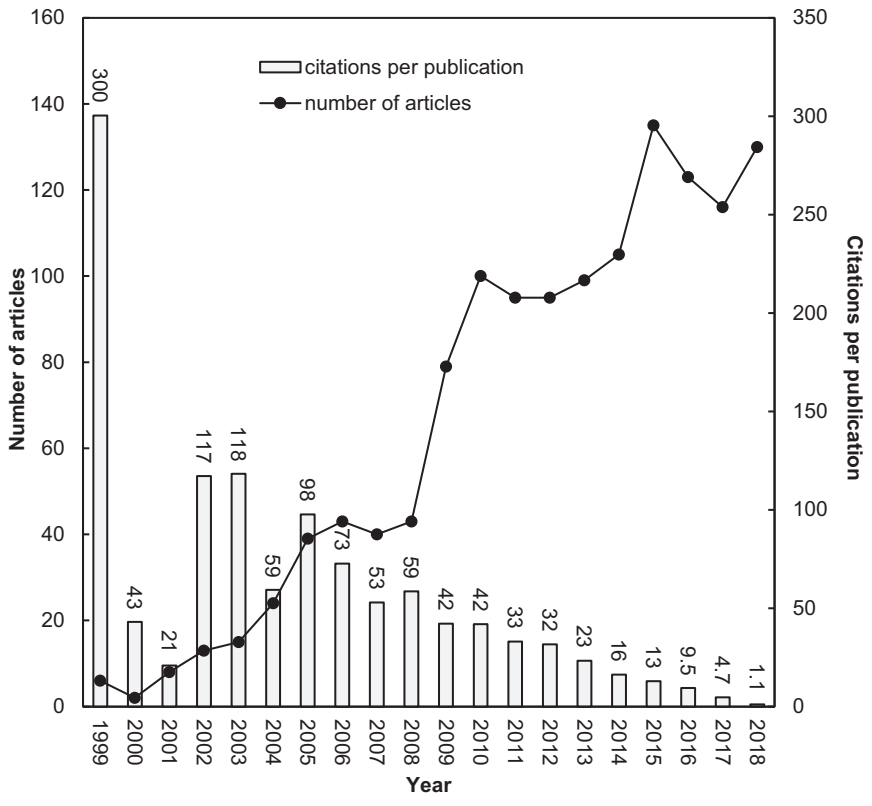

Figure 1. Number of articles and their citations per publication by years.

Table 1. Top 11 Productive Journals

Journals	TP (%)	TC_{2018}	CPP_{2018}	IF_{2018}
Neural Regeneration Research	52 (4)	211	4.1	2.472
Cell Transplantation	48 (3.7)	1494	31	3.477
PLoS One	45 (3.4)	1510	34	2.776
Experimental Neurology	33 (2.5)	2397	73	4.562
Journal of Neurotrauma	31 (2.4)	1211	39	3.754
Brain Research	27 (2.1)	805	30	2.929
Stem Cells	27 (2.1)	1380	51	5.614
Biomaterials	26 (2)	1303	50	10.273
Neuroscience Letters	22 (1.7)	744	34	2.173
Journal of Neuroscience	18 (1.4)	2488	138	6.074
Stem Cells and Development	18 (1.4)	761	42	3.147

TP, total articles; TC_{2018}, total citations from the Web of Science Core Collection since publication to the end of 2018; CPP_{2018}, citations per publication (TC_{2018}/TP); IF_{2018}, journal impact factor in 2018.

In the same section, Guo et al.[1] also noticed that "there were 4188 articles, mainly including 3053 articles, 952 reviews, 157 meeting abstracts, and 99 proceedings articles." A search using the same method in the original paper resulted in 3889 documents including 2776 articles, 816 reviews, 158 meeting abstracts, and 93 proceedings articles. These results show a difference from the results in the original paper. Furthermore, Guo et al.[1]

Table 2. Top 15 Productive Authors

	Total Articles		First Author		Corresponding Author	
Authors	R (TP)	CPP_{2018}	R (FP)	CPP_{2018}	R (RP)	CPP_{2018}
H. Okano	1 (29)	75	45 (2)	10	2 (16)	57
Y.S. Zeng	1 (29)	26	160 (1)	29	1 (22)	28
M. Nakamura	3 (26)	83	N/A	N/A	10 (6)	124
E. Sykova	4 (23)	51	4 (4)	137	10 (6)	129
I. Fischer	5 (20)	65	N/A	N/A	6 (9)	65
Y. Ha	5 (20)	19	160 (1)	47	3 (13)	17
P. Jendelova	5 (20)	43	N/A	N/A	6 (9)	21
Y. Liu	5 (20)	31	4 (4)	32	47 (3)	38
Y. Toyama	5 (20)	104	N/A	N/A	N/A	N/A
D.H. Yoon	10 (18)	22	N/A	N/A	207 (1)	82
M. G. Fehlings	11 (17)	42	N/A	N/A	4 (10)	15
Y. Li	11 (17)	23	45 (2)	15	207 (1)	25
P. Lu	13 (16)	101	1 (6)	220	29 (4)	118
J. W. Dai	14 (15)	10	N/A	N/A	6 (9)	12
X. Zeng	14 (15)	20	4 (4)	41	29 (4)	16

R, rank; TP, total number of articles; CPP_{2018}, citations per publication (TC_{2018}/TP); FP, number of first author articles; RP, number of corresponding author articles; N/A, not available.

Table 3. Top 10 Productive Institutions

Institute	TP	TP R (%)	IP R (%)	CP R (%)	FP R (%)	RP R (%)
Sun Yat Sen University, China	52	1 (4.0)	2 (2.6)	1 (4.6)	1 (3.4)	1 (3.4)
University of Toronto, Canada	36	2 (2.8)	26 (0.70)	2 (3.7)	11 (1.0)	10 (0.84)
Yonsei University, South Korea	36	2 (2.8)	10 (1.2)	4 (3.5)	3 (1.9)	3 (2.0)
Keio University, Japan	34	4 (2.6)	7 (2.1)	5 (2.8)	2 (2.1)	2 (2.1)
University of California San Diego, USA	33	5 (2.5)	78 (0.23)	3 (3.6)	7 (1.3)	8 (1.0)
University of British Columbia, Canada	27	6 (2.1)	10 (1.2)	6 (2.5)	20 (0.69)	18 (0.61)
University of California Irvine, USA	27	6 (2.1)	3 (2.3)	10 (1.9)	4 (1.8)	4 (1.8)
Seoul National University, South Korea	26	8 (2.0)	3 (2.3)	11 (1.8)	5 (1.5)	5 (1.5)
Charles University of Prague, Czech Republic	23	9 (1.8)	78 (0.23)	6 (2.5)	120 (0.15)	78 (0.23)
Drexel University, USA	22	10 (1.7)	3 (2.3)	19 (1.4)	5 (1.5)	5 (1.5)

TP, total number of articles; R, rank; IP, single institute articles; CP, interinstitutionally collaborative articles; FP, first author articles; RP, corresponding author articles.

Table 4. Top 10 Productive Countries

Country	TP	TP R (%)	IP R (%)	CP R (%)	FP R (%)	RP R (%)	SP R (%)
USA	406	1 (31)	2 (23)	1 (59)	2 (22)	2 (22)	1 (28)
China	371	2 (28)	1 (30)	2 (24)	1 (27)	1 (27)	7 (3.1)
South Korea	119	3 (9.1)	3 (8.6)	7 (11)	3 (8.1)	3 (8.1)	3 (9.4)
Japan	107	4 (8.2)	4 (6.7)	4 (13)	4 (6.9)	4 (6.9)	5 (6.3)
Canada	83	5 (6.3)	5 (4.7)	5 (12)	5 (4.4)	5 (4.5)	7 (3.1)
Germany	66	6 (5.0)	9 (1.9)	3 (15)	7 (2.9)	7 (2.9)	7 (3.1)
UK	55	7 (4.2)	9 (1.9)	5 (12)	10 (2.1)	9 (2.3)	3 (9.4)
Spain	43	8 (3.3)	9 (1.9)	8 (7.8)	8 (2.5)	8 (2.5)	7 (3.1)
Iran	39	9 (3.0)	6 (3.4)	22 (1.6)	6 (3.0)	6 (3)	N/A
Italy	38	10 (2.9)	9 (1.9)	11 (6.2)	9 (2.3)	10 (2.1)	N/A

TP, total number of articles; R, rank; IP, single country articles; CP, internationally collaborative articles; FP, first author articles; RP, corresponding author articles; SP, single author articles; N/A, not available.

Table 5. Top Most Frequently Cited Articles with the Total Number of Times Article Cited from the Web of Science Core Collection Since Its Publication to the End of 2018 of More Than 300

Rank (TC_{2018})	Rank (C_{2018})	Article Title	Study
1 (1424)	10 (29)	"Identification of a neural stem cell in the adult mammalian central nervous system"	Johansson et al., 1999[13]
2 (777)	6 (32)	"Human embryonic stem cell-derived oligodendrocyte progenitor cell transplants remyelinate and restore locomotion after spinal cord injury"	Keirstead et al., 2005[14]
3 (673)	8 (31)	"Functional recovery following traumatic spinal cord injury mediated by a unique polymer scaffold seeded with neural stem cells"	Teng et al., 2002[15]
4 (564)	12 (27)	"Neural stem cells constitutively secrete neurotrophic factors and promote extensive host axonal growth after spinal cord injury"	Lu et al., 2003[16]
5 (468)	17 (25)	"Human neural stem cells differentiate and promote locomotor recovery in spinal cord-injured mice"	Cummings et al., 2005[17]
6 (445)	220 (6)	"Recombinant human erythropoietin protects the myocardium from ischemia-reperfusion injury and promotes beneficial remodeling"	Calvillo et al., 2003[18]
7 (440)	3 (38)	"Self-assembling nanofibers inhibit glial scar formation and promote axon elongation after spinal cord injury"	Tysseling-Mattiace et al., 2008[19]
8 (351)	103 (10)	"Transplantation of in vitro-expanded fetal neural progenitor cells results in neurogenesis and functional recovery after spinal cord contusion injury in adult rats"	Ogawa et al., 2002[20]
9 (338)	1 (60)	"Long-distance growth and connectivity of neural stem cells after severe spinal cord injury"	Lu et al., 2012[21]
10 (319)	11 (28)	"Spinal cord injury reveals multilineage differentiation of ependymal cells"	Meletis et al., 2008[22]

TC_{2018}, total number of times article cited from the Web of Science Core Collection since its publication to the end of 2018: C_{2018}, total number of citations of a paper in 2018 only.

mentioned in the Publication Outputs section that "There were 343,555 and 49,011 items on stem cells and SCI, respectively, on the WoS Core Collection. When conducting the logical algorithm of 'AND,' there were 4188 articles, mainly including 3053 articles, 952 reviews, 157 meeting abstracts, and 99 proceedings articles." I found 355,224 and 49,171 items on stem cells and SCI, respectively, in the Web of Science Core Collection (only including SCI-EXPANDED, CPCI-S, CCR-EXPANDED, and IC).

An accuracy bibliometric method, based on searching words in the original paper, including ("spinal injury" or "spinal injuries" or "spinal injured" or "spinal cord injury" or "spinal cord-injured" or "spinal cord injuries" or "spinal cord traumatized" or "spinal cord traumatic" or "spinal cord trauma" or "spinal trauma" or "paraplegia" or "quadriplegia" or "tetraplegia") and ("stem cell" or "stem cells") was searched in Topic using SCI-EXPANDED from 1999 to 2018 (data last updated: April 3, 2020). This resulted in 3863 documents including 2775 articles and 816 reviews. A total of 1991 documents (52% of the 3863 documents) did not include searching words in their front page, for example a highly cited article[6] and a highly cited review.[7] It can be concluded that use of the front page as a filter can improve the bibliometric studies. Similar comments were also published in medical-related journals such as *Toxicology and Industrial Health*,[3] *Cleft Palate-Craniofacial Journal*,[8] *Frontiers in Pharmacology*,[9] and *Chinese Medical Journal*.[10]

As a result, 1872 documents (48% of the 3863 documents) had key words in their front page, whereas 1991 documents (52%) did not include key words in their front page. Eleven document types were found, including 1310 articles (70% of the 1872 documents), 326 reviews (17%), 158 meeting abstracts (8.4%), 43 editorial materials (2.3%), 35 proceedings papers (1.9%), 16 book chapters (0.85%), 15 letters (0.8%), 11 news items (0.59%), 9 corrections (0.48%), and 2 retracted publications (0.11%). Articles were further analyzed because they are the only document type that includes introductions, methods, results, discussions, and conclusions. Total citations of a publication from the Web of Science Core Collection was updated over time. To have invariance data of citations, the total number of times an article was cited from the Web of Science Core Collection since its date of publication to the end of 2018 (TC_{2018}) was used.[11,12] Similarly, citations per publication (CPP_{2018}) (TC_{2018}/total articles [TP]) was also applied. **Figure 1** shows annual number of articles and their citations per publication by years. In total, 1310 articles were published in 394 journals listed in 74 Web of Science categories in SCI-EXPANDED. **Table 1** shows the top 11 productive journals with the journal impact factor (IF_{2018}), TC_{2018}, and CPP_{2018}. *Neural Regeneration Research* published the most articles with a lower CPP_{2018}. *Journal of Neuroscience* had a much higher CPP_{2018}. *Biomaterials* had an IF_{2018} of 10.273. **Table 2** shows the top 15 productive authors. H. Okano and Y. S. Zeng published the most articles with a TP of 29, respectively. D. L. Clarke, C. B. Johansson, S. Momma, and M. Risling published only 1 article with the highest CPP_{2018} of 1424, respectively. P. Lu and D. Cizkova published the most first author articles with 6, respectively. C. B. Johansson published 1 first author article with the highest CPP_{2018} of 1424. Y. S. Zeng published the most corresponding author articles with 22. M. Brines published 1 corresponding author article with the highest CPP_{2018} of 445. **Table 3** shows the top 10 productive institutions with the

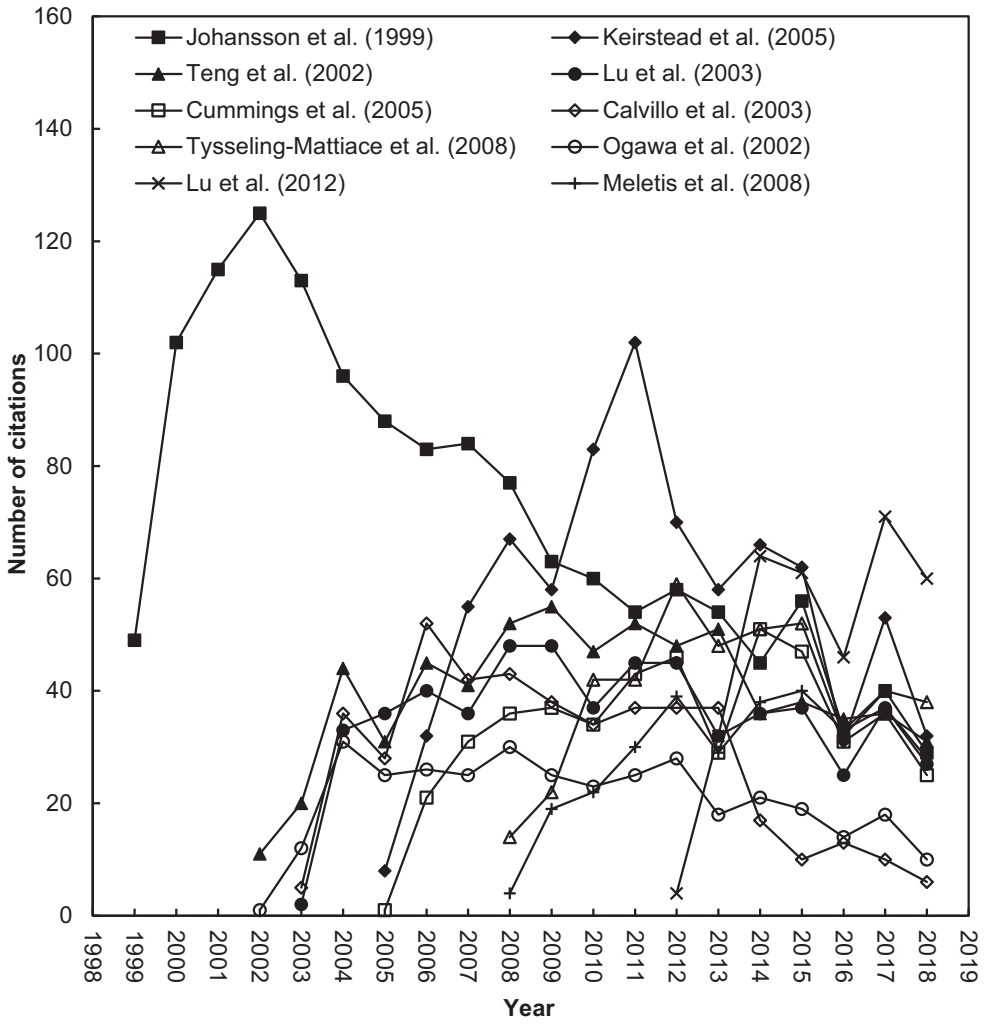

Figure 2. Citation lives of the top 10 more frequently cited articles.

number of total articles, single institute articles, interinstitutionally collaborative articles, first author articles, and corresponding author articles. Sun Yat Sen University in China ranked at the top in number of total articles, interinstitutionally collaborative articles, first author articles, and corresponding author articles, whereas Washington University in the United States published the most single institute articles. **Table 4** shows the top 10 productive countries. The United States ranked at the top in total articles, internationally collaborative articles, and single author articles, whereas China published the most single country articles, first author articles, and corresponding author articles. **Table 5** shows the top most frequently cited articles with $TC_{2018} > 300$. The number of citations in 2018[23] was also applied to compare the impact of articles in 2018. It has been reported that an article impact might not be always high.[24,25] **Figure 2** presents citation lives of the top 10 more frequently cited articles. The recently published article by Lu et al.[21] had great potential, but it did not have a high TC_{2018}. However, it had the highest total number of citations of a paper in 2018 only. When evaluating the most frequently cited articles, citation history of the articles and citation indicator C_{2018} should be considered.

The Guo et al.[1] article was published using an inappropriate method. This may result in misleading readers of the journal.[2,26] It has been pointed out that authors have the duty to use accurate methods in their publications, reviewers have the responsibility to point out the mistakes, and finally, journal editors have to pay more attention to such problems in articles that are being accepted for publication.[27]

Yuh-Shan Ho
Trend Research Centre, Asia University, Wufeng, Taichung, Taiwan
To whom correspondence should be addressed: Yuh-Shan Ho, Ph.D.
[E-mail: ysho@asia.edu.tw]

Conflict of interest statement: The author declares that the article content was composed in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

https://doi.org/10.1016/j.wneu.2020.04.214.

REFERENCES

1. Guo SM, Wang L, Xie Y, et al. Bibliometric and visualized analysis of stem cells therapy for spinal cord injury based on Web of Science and CiteSpace in the last 20 years. *World Neurosurg*. 2019;132:e246-e258.
2. Ho YS. Comment on Chen, J.; Su, Y.; Si, H.; Chen, J. Managerial areas of construction and demolition waste: a scientometric review. Int. J. Environ. Res. Public Health 2018, 15, 2350. *Int J Environ Res Public Health*. 2019;16:1837.
3. Ho YS. Rebuttal to: Su et al. "The neurotoxicity of nanoparticles: A bibliometric analysis," Vol. 34, pp. 922-929. *Toxicol Ind Health*. 2019;35:399-402.
4. Fu HZ, Wang MH, Ho YS. The most frequently cited adsorption research articles in the Science Citation Index (Expanded). *J Colloid Interface Sci*. 2012;379:148-156.
5. Yang ST, Ho YS. Research performance and trends of fluorescent carbon nanoparticles: a science citation index expanded-based analysis. *J Nanopart Res*. 2019;21:202.
6. Couillard-Despres S, Winner B, Schaubeck S, et al. Doublecortin expression levels in adult brain reflect neurogenesis. *Eur J Neurosci*. 2005;21:1-14.
7. Parolini O, Alviano F, Bagnara GP, et al. Concise review: isolation and characterization of cells from human term placenta: outcome of the first international workshop on placenta derived stem cells. *Stem Cells*. 2008;26:300-311.
8. Ho YS. Comment on: "A Bibliometric Analysis of Cleft Lip and Palate-Related Publication Trends From 2000 to 2017" by Zhang et al. (2019). *Cleft Palate-Cran J*. 2019;57:395-396.
9. Ho YS. Commentary: trends and development in enteral nutrition application for ventilator associated pneumonia: a scientometric research study (1996-2018). *Front Pharmacol*. 2019;10:1056.
10. Ho YS. Comments on Research trends of macrophage polarization: a bibliometric analysis. *Chin Med J-Pek*. 2019;132:2772.
11. Chuang KY, Wang MH, Ho YS. High-impact papers presented in the subject category of water resources in the Essential Science Indicators database of the Institute for Scientific Information. *Scientometrics*. 2011;87:551-562.
12. Wang MH, Fu HZ, Ho YS. Comparison of universities' scientific performance using bibliometric indicators. *Malays J Libr Inf Sci*. 2011;16:1-19.
13. Johansson CB, Momma S, Clarke DL, et al. Identification of a neural stem cell in the adult mammalian central nervous system. *Cell*. 1999;96:25-34.
14. Keirstead HS, Nistor G, Bernal G, et al. Human embryonic stem cell-derived oligodendrocyte progenitor cell transplants remyelinate and restore locomotion after spinal cord injury. *J Neurosci*. 2005;25:4694-4705.
15. Teng YD, Lavik EB, Qu XL, et al. Functional recovery following traumatic spinal cord injury mediated by a unique polymer scaffold seeded with neural stem cells. *Proc Natl Acad Sci USA*. 2002;99:3024-3029.
16. Lu P, Jones LL, Snyder EY, et al. Neural stem cells constitutively secrete neurotrophic factors and promote extensive host axonal growth after spinal cord injury. *Exp Neurol*. 2003;181:115-129.
17. Cummings BJ, Uchida N, Tamaki SJ, et al. Human neural stem cells differentiate and promote locomotor recovery in spinal cord-injured mice. *Proc Natl Acad Sci USA*. 2005;102:14069-14074.
18. Calvillo L, Latini R, Kajstura J, et al. Recombinant human erythropoietin protects the myocardium from ischemia-reperfusion injury and promotes beneficial remodeling. *Proc Natl Acad Sci USA*. 2003;100:4802-4806.
19. Tysseling-Mattiace VM, Sahni V, Niece KL, et al. Self-assembling nanofibers inhibit glial scar formation and promote axon elongation after spinal cord injury. *J Neurosci*. 2008;28:3814-3823.
20. Ogawa Y, Sawamoto K, Miyata T, et al. Transplantation of in vitro-expanded fetal neural progenitor cells results in neurogenesis and functional recovery after spinal cord contusion injury in adult rats. *J Neurosci Res*. 2002;69:925-933.
21. Lu P, Wang YZ, Graham L, et al. Long-distance growth and connectivity of neural stem cells after severe spinal cord injury. *Cell*. 2012;150:1264-1273.
22. Meletis K, Barnabé-Heider F, Carlén M, et al. Spinal cord injury reveals multilineage differentiation of ependymal cells. *PLoS Biol*. 2008;6:1494-1507.
23. Ho YS. Top-cited articles in chemical engineering in Science Citation Index Expanded: a bibliometric analysis. *Chinese J Chem Eng*. 2012;20:478-488.
24. Ho YS. Classic articles on social work field in Social Science Citation Index: a bibliometric analysis. *Scientometrics*. 2014;98:137-155.
25. Hsu YHE, Ho YS. Highly cited articles in health care sciences and services field in Science Citation Index Expanded: a bibliometric analysis for 1958-2012. *Method Inform Med*. 2014;53:446-458.
26. Ho YS. Comment on: "A Bibliometric Analysis and Visualization of Medical Big Data Research" Sustainability 2018, 10, 166. *Sustainability*. 2018;10:4851.
27. Ho YS. Some comments on using of Web of Science for bibliometric studies [Environ. Sci. Pollut. Res. Vol. 25]. *Environ Sci Pollut Res*. 2020;27:6711-6713.