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Context Analysis of Top Seven Retracted Articles: Should Retraction Watch Revisit the List?

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Abstract:

*Significant and serious scientific misconduct in a research article leads to its retraction. Citing such articles further perpetuates the erroneous work. An article unknowingly builds on false claims of a retracted article, the new and unsuspecting article may compromise the integrity of the scientific literature. This type of implicit dependency on a retracted article can be highly risky and harmful. Thus the focus of the study is to identify the journals citing the retracted articles with emphasis on the examination of context of citations received by top seven highly cited retracted papers identified and listed by Retraction watch. In-depth analysis of the context of the top seven highly cited retracted articles was conducted. The retracted articles are cited and used by the authors in the positive context as the study found that **41.4%** citations were affirmative. However it is worth to notice that the selected articles were also negatively cited in the literature **21.6%**. Thus citing authors, who cite the retracted articles in the negative context, are putting forth the argument against retracted article. Thus the retraction watches needs to revisit the list while deeming and ranking the retracted articles as highly cited. The retraction watch blog should incorporate the context in which the retracted articles were cited by the authors. The study further found that the peer reviewed and high impact factors journals are citing the retracted literature which highlights the implicit dependency on the retracted articles that can erode the scholarly landscape. A systematic screening method is required to prevent the citation of fraudulent or retracted papers by the journals.*

Keywords: Scholarly communications, Research misconduct, Retractions, context analysis, Retraction watch.

INTRODUCTION

The loss of ethics, delinquency or fraud in research indicates the lack of dedication and honesty of knowledge-seeking behavior of a researcher/scientist. Scientific misconduct includes multiple practices such as falsification of results, plagiarism, inconsistency in data, image duplication and compromised peer review. The identification of research misconduct in a research article leads to its retraction (**Greitemeyer, 2014**). **Noorden (2011)** defines retraction as “science’s ultimate post-publication punishment: retraction, the official declaration that a paper is so flawed

that it must be withdrawn from the literature”. Prior to retraction an article with slight error or incorrect information might be sent an alteration message or in a more acute case “expression of concern” may be issued (**Grieneisen& Zhang, 2012**). Even though retractions are uncommon, a number of studies suggest that retractions are on the rise with reference to overall growth in scientific literature (**Marcus &Oransky, 2014**). The growing rate of retracted scientific articles is an alarming trend. Any retraction speaks to an enormous misuse of scientific assets and the publication of retracted literature can erode the faith of public in science (**Fang &Casadevall, 2011**). Retraction of an article can take many years from the time of its publication till retraction depending on the reason of retraction. Articles involving misconduct take longer time to be retracted than erroneous papers (**Steen, 2011; Fang, Steen &Casadevall, 2012; Moylan &Kowalczyk, 2016**). However, studies suggest that articles continue to be cited even after their retraction (**da Silva &Dobranszki, 2017; da Silva & Cimenti,2017**). Citations to flawed research propagates error and can be dangerous particularly in medical literature where patients are put to risk by flawed research (**Steen,2011**). When researchers approvingly cite erroneous articles a number of problems arise. First, such citations make erroneous paper credible. Second, approvingly citing erroneous research to defend a claim implies that evidence for the claim is good. Finally, a reader may go on to write other articles prompted by the invalid point, citing the flawed article for support, or share the point as fact with other people, propagating the error (**Sood& Cor, 2017**). In order to find out type of propagation of error the study is initiated to find out the context in which the citing authors/ articles quote the retracted information. This study is therefore, an attempt to focus on the number of post retraction citations received by top seven highly cited retracted articles with particular reference to the nature of post retraction citations to these articles.

PROBLEM

Since it is deemed by many studies that citing the retracted article propagates the false signs. The study is based on context analysis of post- retraction citations to top seven highly cited retracted articles to carefully examine the exact mention of the retracted article within the text. Each mention was classified as follows: *Positive* and *Negative*

citation. A positive citation indicates that the retracted article was cited as legitimate prior work and its findings used to support the author/s current study. A negative citation indicates that the authors mentioned the retracted article as such and its findings inappropriate. Thus, the study reveals that every citation to a retracted article is not necessarily in positive context, a negative citation will help other authors to become more cautious about using the citation in future and validate their study in more strong way by highlighting intentional or unintentional scientific fraud.

SCOPE

The scope of study is confined to top seven highly cited retracted articles as ranked by the Retraction Watch. These articles received altogether 1736 citations. However, analysis is based on 1097 citing papers as rests were in accessible as full text.

OBJECTIVES

- To find out the journals citing retracted articles.
- To examine the context of retracted paper within citing article.

METHODOLOGY

In this study the list of highly cited retracted articles where retrieved using “Retraction Watch”, a renowned blog developed by Adam Marcus and Ivan Oransky in 2011 which is devoted to the examination of retracted articles as “a window into scientific process”. This blog provides a comprehensive list of top ten highly cited retracted articles and information about the title, authors, source, year of publication, year of retraction and number of pre-and post-retraction to these articles. Thus, the pre-retraction citations and time interval between the year of publication and year of retraction to seven highly cited retracted articles were also calculated using this blog. The titles of the seven highly cited retracted articles were individually searched in WOS database and the post retraction citations were obtained for each article. Moreover, search filters were used for excluding the citations in the year of retraction. For each article metadata including journal name, document title, authors, published date, author institution, times cited were used. In order to access the full text, each document title was searched in the Google Scholar. The content analysis of the citing

articles was further done to find their positive and negative nature. A total number of 1097 citations to top seven retracted articles were computed.

REVIEW OF LITERATURE

Gabehart (2005) analyzed the citations to retracted articles, the context to these citations. Choosing Medline with the time span ranging from 1990 to 2000, it was seen that 30% of the citations to articles were post retraction and out of 137 of total citations to articles only five were negative.

Bar-Ilan and Halevi (2017) conducted a study of 15 retracted articles using Elsevier based on the context of post retraction citations. The study analyzed 238 citing papers and found that 198 citations (83%) were positive, 28 citations (12%) were neutral and only 12 citations (5%) were negative.

Redman, Yarandi and Merz (2008) analyzed 315 retracted articles in PubMed from 1995-2004 and found that these articles were cited 3942 times before retraction and 4501 times post retraction. When compared to the earlier study of retractions (**Budd, Sievert and Schultz, 1998**), this study found a very higher rate of retraction. Secondly, a decrease in the meantime from publication to retraction. The study demonstrated that the studies highly cited before retraction remained highly cited after retraction, with those in higher impact journals more highly cited after retraction.

Charisse, Madlock Brown and Eichmann (2014) studied the lack of impact of retraction on citation network and were accomplished with the categorization of retracted articles more completely than the earlier published work. Medline database was used to identify all the retractions from 2003 to 2010 and these retractions were divided into 9 Categories. The authors observed that retractions of published works are rising due to misconduct and scientific error (**Cokol, Ozbay and Esteban, 2008; Steen, 2011**) and also a positive correlation between citations

to retracted work before retraction and similarly after retraction (**wager and Williams 2011**).

Da Silva and Cimenti (2017) studied the problem of post retracted citations articles and traced various works that have observed that articles continue to be cited post retractions almost similarly as they were cited before retraction (**Budd, Sievert & Scoville, 1999; Couzin and Unger, 2006; Neale, Northup, Dailey & Abrams, 2007; Vander vet and Nijveen, 2016**). Further the post retraction citation of a scientific article is due to lack of awareness regarding retracted literature and they also believe that it is the responsibility of journal editors to correct or to retract the doubtful literature.

Da Silva and Dobranszki (2017) examined the 10 highly cited retracted papers published by founder of retraction watch Oransky in 2015 and compared their existing pre-and post-citation values. These papers included the retraction year and official statements of the reason for retraction but they continue to be cited in their respective fields post retraction. The possible reason of citation of these articles may be that some authors may believe that the methodology, findings or conclusion continue to be valid despite retraction of the papers.

Budd, Sievert, Schultz and Scoville (1999) studied 235 retracted articles using MEDLINE, Science Citation Index and abridged index Medicus and looked at the reasons for these retractions. The results of this study strongly indicate that although retraction of a publication is clearly visible, researchers continue to use retracted work and make references to them.

Wager and Williams (2011) studied the reasons for retraction of articles while using the similar method as used by **BuddSievert, Schultz and Scoville (1999) and Nath, Marcus and Druss(2006)**). They extracted all the Medline retractions from 2005 to 2008 and studied a total of 312 retractions. The proportion of retractions has increased ten times from early 1980 to 2008 which included honest error and

misconduct. They found that the policies of the journals are not uniform i.e. some journals do not quote reasons for retractions and clearly fail to differentiate misconduct from honest error.

Grieneisen and Zhang (2012) studied the scope and characteristics of retracted articles across the full scope of scholarly disciplines by observing 42 of the largest bibliographic databases for major scholarly fields and publisher websites. The results showed that retractions due to apparent publishing misconduct (47%) were more in number than those due to apparent research misconduct (20%). The study further deduced that retracted articles occur across the full spectrum of scholarly disciplines, most retracted articles do not contain flawed data and the authors of most retracted articles have not been accused of research misconduct.

Sheth and Thaker (2014) reveal that the real explanations behind the rising tide of retractions might be the thorough post publication editorial process and also the utilization of different plagiarism detection softwares such as iTenticate. The study further explains that the outcomes of scientific retractions are the inappropriate citations of retracted articles. Continuous citations to retracted literature show the insufficiency of the present methods of notification. Institutions should develop a culture of liability, supporting authors to provide good articles. Further retraction notices should be publicized both in print and electronic media

Nath, Markus and Druss (2006) studied intentional and unintentional retractions with focus on unintentional mistakes. Using Medline, all the retractions from the year 1982 to 2002 were extracted and the reasons for their retraction were classified into misconduct which consisted of falsification, fabrication and plagiarism and other category included unintentional mistakes of data analysis and sampling errors. Out of 395 articles 107 were categorized as scientific misconduct and a much larger proportion of articles (244) were categorized under unintentional mistakes. Thus, it was found that the retractions in the biomedical literature were mostly due to unintentional mistakes (twice the proportion) than scientific misconduct.

Fang, Steen and Casadevall (2012) did a detailed review of all 2047 biomedical and life-science research articles indexed by PubMed as retracted on May 3, 2012. The findings revealed that 21.3% of retractions accounted for error while 67.4% of retractions accounted for misconduct, fraud or suspected fraud (43.4%), duplicate publication (14.2%) and plagiarism (9.8%). The study also noticed that retractions due to fraud took longer time to be retracted and most articles that are retracted for fraud publish from countries with well-established research infrastructure and are mostly associated with high impact journals. Similarly, plagiarized and duplicate literature mostly publishes from countries that have weak research infrastructure and are associated with low impact journals.

Decullier, Huot, Samson and Maisonneuve (2013) examined 244 retractions published in Medline over a year to describe their compliance with retraction guidelines as well as the reasons for retraction and their spread across countries, the impact factor of the journal and the mention of retraction on the original article were discovered. The mostly found reasons were mistakes (28%), plagiarism (20%), fraud (14%) and overlap (11%). The authors suggest that original articles should remain available with a clear mention of the retraction in the notice.

Moylyan and Kowalczyk (2016) conducted a study to evaluate why articles are retracted from BioMed Central Journals and if retraction notices complied with Committee on Publication Ethics (COPE) guidelines. The study observed that majority of the retractions accounted for misconduct (102 articles, 76%), which included, compromised peer review (44 articles, 33%), plagiarism (22 articles, 16%), data falsification/fabrication (10 articles, 7%), honest error (17 articles, 13%) out of which 10 articles (7%) were published in error.

Da Silva (2016) in his essay portrays that retractions represent failure and hypothesizes the reasons of retraction. One of the reason included retractions due to authorship i.e. the cultural differences of the different authors working in collaborators research and other reason consisted duplications caused by poor

supervision or advisory body. Retractions caused by manipulation of citations by notable citation holders have a deal to cite each other to increase their impact factor or other phenomenon of citation stacking (**Heneberg, 2016**) involving authors and editors.

Shuai, Rollins, Moulinier, Custis, Edmunds and Schilder (2017) studied how retractions affect scholarly impact. Almost 2,659 retracted articles were extracted and primary reasons for retraction were classified as scientific misconduct, Plagiarism, Falsification or Fabrication, Violation of rules, Errors, and Others. It was found that scientific misconduct accounted for more than 50% of retractions and accidental errors comprised around 24%. Of all retractions because of scientific misconduct, plagiarism and fabrication and falsification occurred most frequently.

Kochan and Budd (1992) studied the influence and persistence of papers published by Darsee and his coauthors. There occurs fraud in fabricating significant portion of research in the case study and revealed that there have been plentiful apparent errors in their published papers. Thus, the study shows that after considerable amount of time, some of the Darsee's papers continue to be cited positively post retraction and have the greater negative implication, particularly in the field of cardiology.

Davis (2012) investigated MEDLINE and Mendeley to find out the extent of publicly accessible copies of retracted articles on the public Internet and in the personal libraries of scholars. The author deduced that a large no. of articles which were retracted were found in different educational websites, commercial websites, advocacy websites, non- publisher websites etc. The articles which were published by most prestigious scientific journals were found most frequently in the personal libraries. The author suggested that the benefits of dispersed access to scientific articles may be responsible in promoting incorrect, invalid, or untrustworthy science. Automated methods to provide status updates to readers may reduce the persistence of error in the scientific literature.

Casadevall, Steen and Fang(2014) focused on a part of retractions for which no misconduct was found, and identified the main causes of error using PubMed database. A total of 439 articles were recognized and classified into 8 categories: irreproducibility, laboratory error, analytical error, contamination, control issues, programming problems, control problems, or other. Analysis of the retraction notices for these articles revealed that the most common reasons of error-related retraction were laboratory errors, analytical errors, and irreproducible results.

Ven der Vet and Nijveen (2016) studied the problem of how errors are propagated through citations by studying the entire citation network of a widely cited paper“Naryana paper” which was published in 2012 and later on retracted from the journal Nature. The paper was retracted in 2014 when certain groups complained that they cannot reproduce its findings (**Newton et al., 2014**). However, the article was being cited directly and those papers which cite this paper indirectly had no trace of retracted results.

Gasparyan, Ayyazyan, Akhazhanov and Kitas (2014) examined the mistakes and misconduct in multidisciplinary and specialized biomedical journals. Using PubMed filters errata, duplicate and retracted publications were retrieved and most frequent duplicate and retracted article types were recorded. Both country-based h-index values and the total number of publications across countries were found to have a strong association with duplicate and retracted items.

Steen (2011) evaluated 788 retracted papers from PubMed between 2000-2010. The results of this study differed from the earlier study (**Nath, Marcus and Druss, 2006**) which had concluded that retracted papers have comparatively few co-authors. However, this study produced enough evidence to disagree with **Nath et al** as the number of authors per retracted paper ranged up to 26. Nearly 7% of the retracted papers were written by a single author but 18% of the retracted papers had 8 or more than 8 authors and six retracted papers had more than 20 authors. The

study concludes that retraction due to data fabrication or data falsification by authors is a deliberate attempt to deceive and authors of fraudulent retracted papers target journals with high impact factor.

Gewin (2017) in his study stressed on the time-span of retractions and suggested that article retractions should be fast, transparent and open, to evade undesirable consequences on a researcher's career. He classified the methods to rectify the literature into four categories: correction (erratum), expression of concern, partial retraction, or retraction in order to evade the future use and citation of the retracted work.

Steen and Fang (2013) studied the reasons behind the increase of scientific retractions using PubMed. An average span of 32.91 months was identified to exist from the time of publication to retraction. While correlating the time of retractions with journal's impact factors, it was seen that the journals with high impact factors retract articles more quickly with increased assessment in peer review process.

Cokol, Iossifov, Esteban and Rzhetsky (2007) found that all the articles that should be retracted do not undergo retraction because the standard of scientific article depends on things such as effort and time dedicated to control their quality. The study states that high impact journals are accountable to more retraction than the low impact journals indicating that high impact journals are either more vulnerable to publishing incorrect manuscripts or inspected much more thoroughly than low impact journals.

Trikalinos, Evangelou and Ioannidis (2008) examined characteristics and authors of papers retracted due to falsification in high-impact journals and compared these retracted articles with matched non-retracted articles in the same journals. Retracted articles didn't differ from matched non-retracted papers in citations received within 12 months, number of authors, country, funding, or field, but were two-fold more likely to have multinational authorship. It was suggested that retractions due to

falsification can take a large amount of time, especially when senior researchers are concerned.

Steen (2011) conducted a study to see the impact of flawed research on the medical literature and its consequences on the life of patients. The study found that retracted papers received 5503 citations, of which 5143(93%) were research related and 851 (15%) were prospective clinical studies involving patients who received treatment. Overall 28,783 subjects were enrolled and 9189 patients were treated in 180 primary studies that were eventually retracted. Approximately 445064 subjects were enrolled and 70501 patients were treated in 851 secondary studies which cited a retracted paper. The study concluded that a large number of patients are put to risk by flawed research reflecting that ideas propagated in retracted papers can have an impact on subsequent research.

Budd, Seivert and Schultz (1998) examined the impact of retracted articles on biomedical communication by identifying the characteristics of retracted publications in the biomedical literature. The data was gathered by search of MEDLINE from 1966 through August 1997 for these articles. It was deduced that retracted articles were continuously cited by researchers of the biomedical field as valid work in the subsequent literature and these posed problems for biomedical science.

Bilbrey, Dell and Creamer (2014) created a rubric or a procedure for rating and determining the quality of retraction notices. The present quality of retraction notices of 171 retracted articles from different 15 journals was studied and each retraction notice was rated on a scale, according to this refined rubric. It was found that the quality of retraction notices had not improved since last 50 years and these varied both between and within journals. Further, the notices were found to be dependent on the field of science, the author of the retraction notice, and the reason for retraction.

Chen, Hu, Milbank and Schultz (2013) aimed to raise the awareness of the potential threats of retracted articles and demonstrated a visual analytic study of these articles with reference to the rest of the literature. The studies have shown that the rate of retraction is increasing; many retracted articles are highly cited with hundreds of citations, retracting these articles alone is unlikely to eliminate the risk of false data, and new visual analytic tools provide a useful support for verifying validity of such citation trails.

Resnik, Wager and Kissling (2015) conducted the study by contacting top 200 scientific journals by email about their retraction policies. Almost 147 (74%) journals responded and out of these responding journals 94 had retraction policies and it enabled the editors of these journals to retract articles without the permission of the author. It was found that the journal editor did not ask author's consent before retracting their work as all of the authors might not agree with that of the journal policies and it would create problems.

Foo (2011) highlighted the potential shortcomings of the present editorial and peer-review process in handling fraudulent publications, assessed the ratio of single-authored articles to the total journal publications being retracted and evaluated the possible time lag difference for a fraudulent publication to be retracted before and after 2000. Using PubMed database 303 retracted publications from 44 authors were analyzed. The results showed that only 6.60% of the retracted publications were single-authored and the discovery of fraudulent publications had reduced from 52.24 months (before 2000) to 33.23 months (after 2000). It was also found that, with the widely accessible public databases like PubMed, fraudulent publications can be detected more easily.

DATA ANALYSIS AND INTERPRETATION

Table 1- Top Seven Highly Cited Retracted Articles as Reported By Retraction Watch

ARTICLE NAME	ARTICLE CODE	YOP	YOR	CITATIONS RECEIVED	PRE-RETRACTION CITATIONS	POST-RETRACTION CITATIONS
Visfatin: A protein secreted by visceral fat that mimics the effects of insulin.	A1	2005	2007	1089	243	846
Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children.	A2	1998	2010	1003	640	363
An enhanced transient expression system in plants based on suppression of gene silencing by the p19 protein of tomato bushy stunt virus.	A3	2003	2015	1010	890	120
Purification and ex vivo expansion of postnatal human marrow mesodermal progenitor cells.	A4	2001	2009	812	589	223
TREEFINDER: a powerful graphical analysis environment for molecular phylogenetics.	A5	2004	2015	804	739	65
Viral pathogenicity determinants are suppressors of transgene silencing in <i>Nicotiana benthamiana</i> .	A6	1998	2015	788	769	19
Combination treatment of angiotensin-II receptor blocker and angiotensin-converting-enzyme inhibitor in non-diabetic renal disease (COOPERATE): a randomised controlled trial.	A7	2003	2009	667	567	100

*YOP= Year of Publication

*YOR= Year of Retraction

Table 1 above lists 7 highly cited retracted articles and it is observed that articles have received continuous citations post retraction. Some studies have shown that retracted articles that received a high number of citations pre-retraction are more likely to receive more citations post retraction (da Silva and Cimenti, 2016). The table shows that article A1 has received the highest number of post retraction citations while article A6 has received the least citations. Thus, the number of post retraction citations varies from 19-846 in these articles. However, it is a disconcerting fact that retracted articles continue to be cited years post retraction propagating false work (J Budd, Sievert & Schultz, 1998).

Table 2- List of top ten journals citing retracted articles along with their frequency, impact factor and subject area

JOURNAL	FREQUENCY	IMPACT FACTOR	SUBJECT AREA
PLOS ONE	44	2.806	AGRICULTURE AND BIOLOGICAL SCIENCE, BIOCHEMISTRY, GENETICS, MOLECULAR BIOLOGY AND MEDICINE
VACCINE	24	3.235	GENETICS AND MOLECULAR BIOLOGY, IMMUNOLOGY AND MICROBIOLOGY, MEDICINE AND VETERINARY SCIENCE
FRONTIERS IN PLANT SCIENCE	11	4.298	AGRICULTURE AND PLANT SCIENCE
HUMAN VACCINES & IMMUNOTHERAPEUTICS	10	3.643	IMMUNOLOGY AND MICROBIOLOGY, MEDICINE, PHARMACOLOGY, TOXICOLOGY AND PHARMACEUTICS.
NEPHROLOGY DIALYSIS TRANSPLANTATION	10	4.47	MEDICINE, NEPHROLOGY
PLANT JOURNAL	9	5.901	AGRICULTURE AND BIOLOGICAL SCIENCE, BIOCHEMISTRY, GENETICS AND MOLECULAR BIOLOGY
JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM	8	5.455	BIOCHEMISTRY, GENETICS AND MOLECULAR BIOLOGY AND MEDICINE
INTERNATIONAL JOURNAL OF OBESITY	8	5.337	MEDICINE AND NURSING
JOURNAL OF ENDOCRINOLOGICAL INVESTIGATION	8	2.633	BIOCHEMISTRY, GENETICS AND MOLECULAR BIOLOGY AND MEDICINE
NATURE COMMUNICATIONS	7	12.124	BIOCHEMISTRY, GENETICS AND MOLECULAR BIOLOGY, CHEMISTRY, PHYSICS AND ASTRONOMY

Table 2 reveals that journals with an established editorial board like *PLOS ONE*, *VACCINE AND NATURE COMMUNICATIONS* cited retracted articles 44, 24 and 7 times respectively. This shows that even good Impact factor journals cite retracted articles on frequent basis and propagate retracted work to a large extent.

Table 3- Articles arranged according to the descending order of their positive post retraction citations

ARTICLE code	POSITIVE CITATIONS	NEGATIVE CITATIONS	INACCESSIBLE CITATIONS	TOTAL CITATIONS
A1	359	131	356	846
A4	157	0	66	223
A3	112	0	8	120
A5	44	0	21	65
A7	29	21	50	100
A2	13	223	127	363
A6	8	0	11	19
TOTAL	722 (41.4%)	375 (21.6%)	639 (36.8%)	1736

Retracted articles continue to be cited post retraction and majority of these articles are likely to be cited in a positive context in comparison to articles which are being cited in negative context (**Bar-Illan& Halevi 2017; Garfield & Dorof1999; Gabehart 2005**). Table 4 provides information about post retraction citations of 7 highly cited retracted articles and these articles are arranged according to the number of positive citations received by each article. Article A1 has received most number of positive citations and article A6 has received the least number of positive citations. On analyzing the context of citations of 7 highly cited retracted articles, it was observed that out of 1736 citations, 722 citations were found to be positive , 375 citations were found to be negative and 639 articles were inaccessible as full text, thus the context of the citation could not be determined. It also concludes that 41.60% of articles were cited positively by different authors. It shows that a large number of retracted works are still used positively even after retraction. The reason behind the fact that these articles continue to be positively cited is that the citing authors may deem that the conclusion, findings or methodology of a retracted article are still valid and can be cited despite the retraction of the paper examples include article A1 written by (**Fukuhara et al, 2005**) where conclusion was still considered to be valid, or article A3 written by **Voinette, Rivas, Mestre and Baulcombe (2003)** has been retracted of

image manipulation but according to the retraction statement its methodology is still valid, same is the case with article A6 (**Brigneti G et al, 1998**). Other article A5 written by **Jobb, Haeseler and Strimmer (2004)** where finding(s) is still considered to be valid. Article A7 written by **Nakao et al (2003)** despite retracted where methodology is still considered to be valid. However, articles A3, A4, A5 and A6 were not cited in negative context at all i.e. they were cited 100% positively.

FINDINGS AND CONCLUSION

The study premeditates on the post retraction citations to top 7 highly cited retracted articles. The data regarding citations is provided by Retraction Watch but there is a difference in the number of post retraction citations provided by the blog and this study. Also, the blog provides only data about the total number of pre-and post-retraction citations but not the nature of these citations i.e. in which context the retracted works are cited. It is evidently concluded from this study that if a retracted article is cited, it may not always be cited in a positive context but sometimes it is cited in a negative context in order to quote the example of a highly publicized paper in a subject area or just by mentioning the name of retracted paper without being judgmental or replicating its findings. Besides positive citations to top 7 highly cited retracted articles some mainstream articles cite them in a negative context just to exemplify the cases of scientific misconduct or to alert the scholarly community by creating awareness about the retracted status of these articles. Retracted articles should not be cited particularly in the positive context as citations are the building blocks of a work and if a research work is built on fraudulent work it will not only nullify the concerned findings but also falsify other papers propagating it. Citations to retracted articles affect the scientific record in a harmful way so it is important that these retractions be more effectively communicated.

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