

A Critical Review on Platinum Bone-Implants

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Abstract

Platinum is a widely used metal for ortho implants. The review analysis had been conducted to understand the active authors, organizations, journals, and countries involved in the research domain of “Platinum bone-implants”. All published articles related to “Platinum bone-implants” from “Scopus”, were analyzed using the Meta Analysis to develop analysis tables and visualization maps. This article had set the objective to consolidate the scientific literature regarding “Platinum bone-implants” and also to find out the trends related to the same. The leading Journals were the Gynecologic Oncology, Journal of Clinical Oncology, and Dalton transactions. The most active country was the United States of America. The leading organization engaged in the research regarding Platinum-based bone implants was the University of Texas, United States of America. The most active authors who had made valuable contributions related to Platinum-based bone implants was Marigottan N.

Keywords: Platinum, Bone-implants, Material engineering, Review analysis, Meta Analysis,

1. Introduction

Bone implants are one of the popular types of implants used to replace the none performing, or damaged bones in the body. Different types of metals including platinum are used to create bone implants. A diversified set of bone implants can be made by the platinum Multiple health issues were associated with Platinum bone implants. It includes allergic reactions of platinum implants (Lykissa and Maharaj, 2006b)(Lykissa and Maharaj, 2006a); issues of urinary platinum (Nuttall, Gordon and Ash, 1994). (Schierl *et al.*, 2014). However, there were contradictory studies are highlighting the mis concepts of hypersensitivity and health issues associated with Platinum-based implants(Arepalli, Bezabeh and Brown, 2002)(Lane, 2006)(Brook, 2006)(Wixtrom, 2007).

Monomeric platinum is used for bipyridine back-bone ligand (Chung *et al.*, 2012). Treatment of bone metases is a challenge to the medical world and Platinum can be an ideal alternative for the treatment of bone metases. The Platinum-based drugs for bone metastases can reach the target areas by penetrating the affected bones. Platinum-based drugs are also used for treating bone marrow (De Graaff *et al.*, 1999)(Donato *et al.*, 2004)(Koratkar *et al.*, 1992)

The advances in material engineering and surface engineering can tackle the adversities of toxicity and hypersensitivity of platinum implants. Future research can also be on surface coatings by using, metal implants using Platinum. This review analysis will be a useful platform for future researchers by realizing the top researchers, organizations, and countries involved in research regarding Platinum-implants.

This article is arranged into four sections. The first section is the introduction, followed by the discussion of the methodology by which the research was conducted. The third section deals with results and discussion. The fourth section deals with the conclusion. The following research objectives and research questions were framed for conducting review analysis systematically.

1.1 Research Objectives

- a) To consolidate the literature regarding Platinum-based bone-implants
- b) To find out the trends related to research in Platinum-based bone-implants

1.2 Research Questions

- a) Who are the active researchers working on Platinum-based bone implants?
- b) Which are the main organizations and countries working on Platinum-based bone implants?
- c) Which are the main journals on Platinum-based bone implants?

2. Research Methodology

Scopus files had been used for this article. For the article selection, the Boolean used was TITLE-ABS-(Platinum Bone). This paper had used Microsoft Excel, Meta Analysis, Mendeley and Grammarly for analysis and review of this article. This paper had been inspired by review analysis in its presentation style, analysis, and methodology from the works.

3. Results and discussion

3.1 Results

This first round of search produced an outcome of 947 documents, in 12 languages, out of which 845 documents were in English. The classification of document categories is shown in Table 1. For improving the quality of the analysis, we had selected only the peer-reviewed articles and all other documents had not been considered. Thus after using filters “Article” and “English” the second round search produced an outcome of 734 English articles (both open access and others) and had been used to conduct review analysis and visualization using Meta Analysis. The English research articles in this domain since 1962 had been shown in Table1. Co-authorship analysis of top authors had been shown in Table1. For a better presentation of the analysis, the parameters used were the minimum number of documents of an author as five and the minimum number of citations of authors as one. This combination plotted the map of 27 authors, in 10 clusters. The overlay visualization map of co-authorship analysis plotted in Table1, points out the major researchers with their strong co-authorship linkages and clusters involved. The citation analysis of top authors had been shown in table 1, along with co-authorship links. For the citation analysis, the parameters used were the minimum number of documents of an author as one and the minimum citations of an author as one.

Table 1: Highlights of most active authors

Description	Authors	Documents	Citations	Average citations per documents	Link strength
Authors with the highest publication, citations, and links	Margiotta N.	18	636	35.3	132

In Co-occurrence analysis, we had used all keyword analyses, by keeping the minimum number of occurrences of a keyword as 100. This combination plotted the map of 26 thresholds, in two clusters. The overlay visualization of co-occurrence analysis of keywords has been shown in Table2. The leading organizations engaged in research on “Platinum-based bone-implants” had been found out by the volume of publications and citation analysis, the parameters used are the minimum number of documents of an organization as one and the minimum number of citations of organizations as one. The leading organizations in the research regarding “Platinum-based bone-implants”, with the highest number of publications and citations, were the University of Texas, United States of America (Refer to table 2).

Table 2: Highlights of the most active organization

Organizations	Country	Documents	Citations	Average Citations per document
University of Texas	United States of America	29	1305	45

Co-authorship analysis of the countries engaged in the research on “Platinum-based bone-implants” had been shown in Table3. The overlay visualization map of co-authorship analysis plotted in Table3, points out the main countries with their strong co-authorship linkages and clusters involved. The citation analysis of top countries had been shown in table 3, along with co-authorship links. For the citation analysis, the parameters used were the minimum number of documents of a country as one and the minimum citations of the country as one.

Table 3: Highlights of Active Countries

Description	Country	Documents	Citations	Link strength
The country with the highest publication, citations, and co-authorship links	United States of America	268	10640	97

The most active country in this research domain was the United States of America, with the highest number of publications, links, and citations.

Link analysis and citation analysis were used to identify the most active journal in this research domain. We have taken the parameters of the minimum number of documents of a journal as one and the minimum number of citations of a journal as one for the link analysis and citation analysis. Highlights of the most active and relevant journals related to “Platinum-based bone-implants” are shown in table 4. Table 4shows the journal activity of this research domain through parameters of publication volume, citations, and co-authorship linkages.

Table 4: Analysis of journal activity

Description	Journal details	Documents	Citations	Average citations per documents	Links
Journal with the highest publications	Gynecologic Oncology	27	865	32	15
Journal with the highest citation	Journal of Clinical Oncology	13	1892	145.5	22
Journal with the highest links	Dalton transactions	5	119	24	26

From the above discussion regarding the review patterns in the research regarding Platinum-based bone-implants, this research had observed a gradual increase in research interest regarding Platinum-based bone-implants from the starting of the millennium, and the momentum is going on positively. This points out the relevance and potential of this research domain (Refer to Table 2). The most active authors in this research domain were Marigottan N. with the highest publication, citations, and links (Refer to table 1). The overlay analysis of top countries researching Platinum bone-implants indicates that the United States of America was the leading

country relating to the highest number of publications, citations, and co-authorship links (Refer to Table 5). The top journals of this research domain were identified as the Gynecologic Oncology, Journal of Clinical Oncology, and Dalton transactions. From these wide sources of information, researchers can focus on top journals where they can identify the most relevant and highly cited articles regarding Platinum-based bone-implants.

4. Conclusion

Platinum-implants was an interesting research domain and the most active journals related to this research domain was the Gynecologic Oncology, Journal of Clinical Oncology, and Dalton transactions. The most active country was the United States of America. The leading organization engaged in the research regarding Platinum-based bone implants was the University of Texas, United States of America. The most active authors who had made valuable contributions related to Platinum-based bone implants was Marigottan N. This research domain offers a new avenue for researchers and future research can be on innovations in Platinum bone implants.

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