

Recent Developments in Knee Prosthesis Technology: A Patent Analysis

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INTRODUCTION

Knee replacement through prosthesis is considered the most effective intervention for severe osteoarthritis and other bone diseases. On average, the growth rate of knee replacement surgeries increased nearly 50% over the past decade in the 34 OECD countries. According to this organization, Germany and the United States had the highest rates of knee replacement in 2011, having 213 knee replacement surgeries per 100 000 population, each (OECD, 2011).

Through a patent analysis, we intend to detect the main trends in the technology used for knee prosthesis development. The main technology classifications, inventors, assignees and countries will be identified in this approach.

METHODOLOGY

Planning

To perform the search, we used Patent iNSIGHT Pro, which is a patent research, analysis, mapping and visualization software. Developed in India in 2004, the software program provides global services to industries such as energy, electronics, medical devices, etc. Among their main customers are Johnson & Johnson Medical, Coopervision, and Intuitive Surgical, to name a few. The software program enabled us to collect, process and analyze patent data efficiently.

A search strategy was developed as follows:

- **Search terms:** knee/"knee joint" prosthesis.
- **Database:** ESPACENET Patent Database.
- **Period:** 2009 – August 27th, 2013.

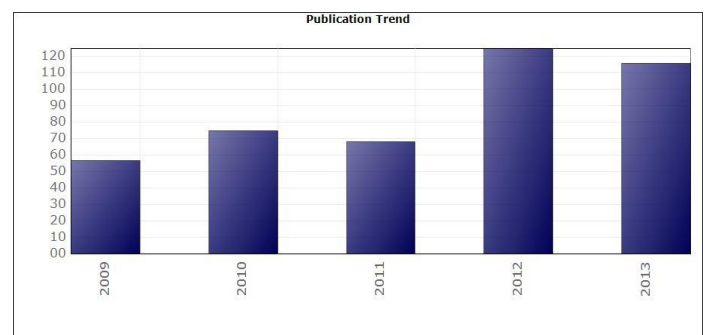
Information processing

Once we obtained all patent documents, we proceeded to filter and clean up Assignees and Inventors fields from the patents with missing or repeated information. In this stage we also generated keywords of the Title, Abstract and Claims from the patent documents; these keywords were later used for the information analysis stage.

We obtained the following results of granted patents:

- **Patents:** 441
- **Assignees:** 221
- **Inventors:** 485
- **IPC 4 digits:** 9
- **IPC Full digits:** 65
- **UPC 3 digits:** 7
- **UPC Full digits:** 6

Fig. 1. Patent Publication Trend



Information analysis

Fig. 1 represents the Patent Publication Trend by year. Before 2012 growth was lowly stable; but there was a strong patent increment between 2011 and 2012 of 83%.

Fig. 2 shows Top 8 Assignees where the first three are: Depuy Products Inc., Zimmer Inc., and Biomet Manufacturing Co., all three from US.

Fig. 2. Top Assignees

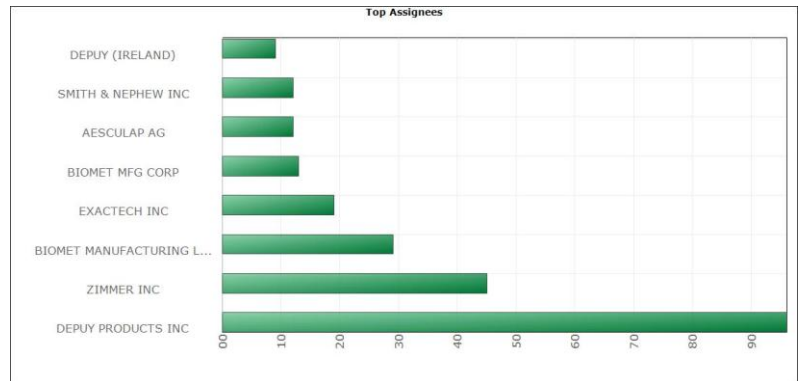


Fig. 3 shows Top 10 Inventors. The three inventors with at least 25 patents are: Jordan (Depuy Products Inc), Metzger (Biomet) and Wyss (Depuy Products Inc.).

Fig. 3. Top Inventors

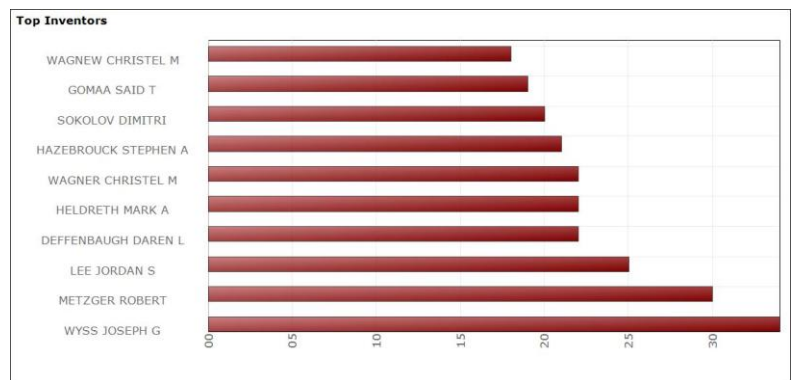
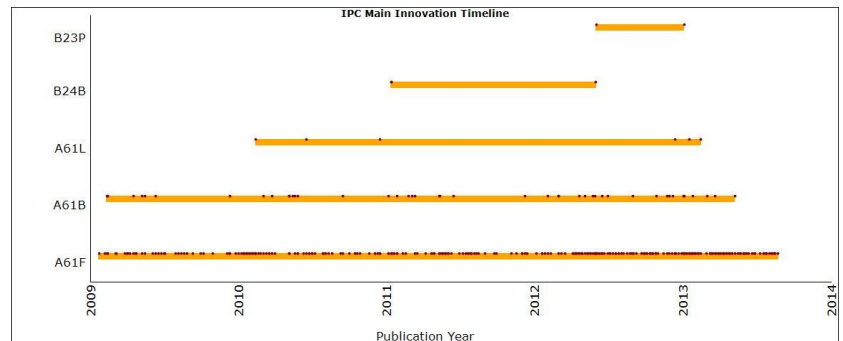


Fig. 4 shows Top IPC Main Innovation Timeline. The IPC with more patents is A61F, related to prosthesis, devices providing patency, implantable filters, etc.

Fig. 4. Top IPC Innovation Timeline



CONCLUSION

For this first phase we identified key inventors, organizations and main IPCs on the field of knee prosthesis. The information presented in our research could add value to the strategic decision making process not only for biomedical companies, but also for research institutes and other stakeholders. For further research, it is convenient to analyze detailed technical issues like processes, materials, and applications.

REFERENCES

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