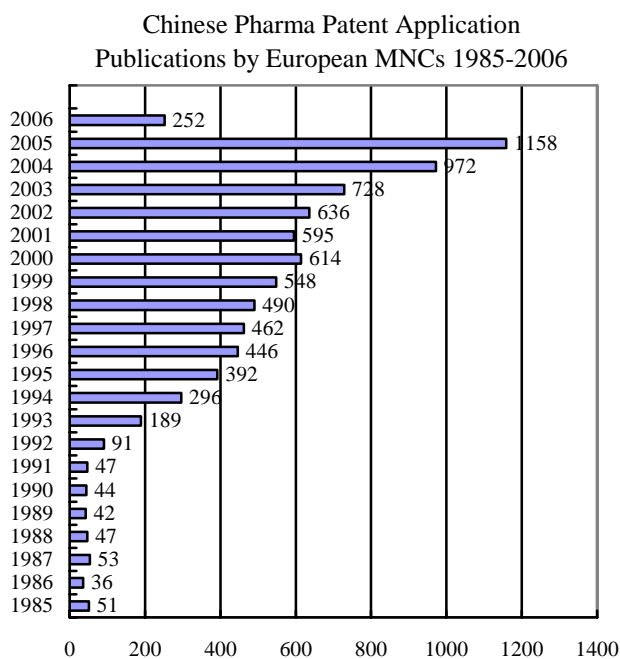


Review of Chinese patent applications by European Pharma MNCs between 1985 and 2006

According to a source from www.lingdunwang.com, the largest Chinese portal for patent information, the United States leads all other foreign countries in the number of Chinese patent application publications in the pharmaceutical area between 1985 and 2001. The US is followed by Japan and then by Germany in the same period.

The following chart tracks the trend of pharmaceutical patent applications by 11 major European multinationals in China, including Merck, Roche, AstraZeneca, Novartis, Sanofi Aventis, Janssen, Boehringer Ingelheim, Novo Nordisk, Bayer, Abbott (editor: Abbott may be incorrectly categorized as a European company) and Sandoz, between 1985 and 2006.



Source: www.lingdunwang.com

It is observed that the number of Chinese pharma patent application publications by European MNCs grew slowly between 1985 and 1992 reflecting the limited attention on China by foreign companies then. The number took a big leap forward in 1993 and had continued to grow rapidly in the following years until reaching a plateau in 2000. Unprecedented sharp growth was observed again between 2003 and 2005, and then the number of patent applications fell off the cliff in 2006 just as the trend for US-based companies. The source article did not identify the reason for the sharp fall in 2006, and it is likely to be related to certain strategic issues such as the upcoming revision of the Chinese patent law.

The trend of Chinese patent applications between European and US-based pharma MNCs are quite similar with the exception during the period of 2003 and 2005, that number of applications by European MNCs took a big leap forward while that of

US-based MNCs already started to decline.

The following table shows the total number of Chinese pharma patent application publications by European pharma MNCs so far by IPC classes.

Chinese Pharma Patent Application Publications by US MNCs by IPC Classes

| IPC Class | Brief Description | # of publications |
|------------------|--|--------------------------|
| A61K31 | Medicinal preparations containing organic active ingredients | 4,502 |
| C07D401 | Heterocyclic compounds containing two or more hetero rings, having nitrogen atoms as the only ring hetero atoms, at least one ring being a six-membered ring with only one nitrogen atom | 1,007 |
| A61P25 | Drugs for disorders of the nervous system | 642 |
| A61P35 | Antineoplastic agents | 562 |
| C07D405 | Heterocyclic compounds containing both one or more hetero rings having oxygen atoms as the only ring hetero atoms, and one or more rings having nitrogen as the only ring hetero atom | 531 |
| C07D403 | Heterocyclic compounds containing two or more hetero rings, having nitrogen atoms as the only ring hetero atoms, not provided for by group | 519 |
| C07D413 | Heterocyclic compounds containing two or more hetero rings, at least one ring having nitrogen and oxygen atoms as the only ring hetero atoms | 517 |
| A61K9 | Medicinal preparations characterized by special physical form | 505 |
| C07D417 | Heterocyclic compounds containing two or more hetero rings, at least one ring having nitrogen and sulfur atoms as the only ring hetero atoms, not provided for by group C07D 415/00 | 501 |
| C12N15 | Mutation or genetic engineering; DNA or RNA concerning genetic engineering, vectors | 425 |
| A61K38 | Medicinal preparations containing peptides | 422 |
| C07D409 | Heterocyclic compounds containing two or more hetero rings, at least one ring having sulfur atoms as the only ring hetero atoms | 411 |
| C07D471 | Heterocyclic compounds containing nitrogen atoms as the only ring hetero atoms in the condensed system, at least one ring being a six-membered ring with one nitrogen atom, not provided for by groups | 381 |
| C07D213 | Heterocyclic compounds containing six-membered rings, not condensed with other rings, with one nitrogen atom as the only ring hetero atom and three or more double bonds between ring members or | 379 |

| | | |
|-------|---|-----|
| | between ring members and non-ring members | |
| A61P3 | Drugs for disorders of the metabolism (of the blood or the extracellular fluid) | 395 |

Source: www.lingdunwang.com

Based on this table, Chinese patent applications by European pharma MNCs between 1985 and 2006 is dominated by pharmaceutical formulations in A61K and C12N15 classes totaling 5,854, among them 847 are biopharmaceutical formulations (C12N15 and A61K38). In addition, applications in A61P class, which totals 1,599, may also be for pharmaceutical formulations.

4,246 of the application publications in this period were for pharmaceutical active ingredients or pharmaceutical related new chemical entities (NCEs - C07D class).

According to China's State Intellectual Property Office, the US, Japan, and Germany were the applicants with the most medical patents approved by Chinese authorities from 1997 to 2007.

The applications were focused on drugs targeting the cardiovascular, immune, and nervous systems, as well as antibiotics, anti-HIV, anti-tumor, anti-inflammatory, analgesic, diabetes, and obesity drugs.