

Guest Editorial

Health Technologies at Johnson Matthey

In celebration of the 2017 year of “Sustainability” we here present the first of a series of Themed issues, this one focusing on the role of products and services, including many supplied by Johnson Matthey Plc, on human health.

Innovation and Long Term Value in Healthcare

With life expectancy on the rise and rapid urbanisation taking place in the developing world the prevalence of chronic, non-communicable disease (NCD) such as cardiovascular disease and diabetes has grown as a major societal cost. Once thought to be a malady primarily of the industrialised world, changing diets and lifestyles have led to a disproportionate increase in NCD prevalence in developing economies.

As costs rise, provider systems are looking to the benefits of delivering therapy with the help of single use devices that often have greater one-time payments, but are able to reduce the overall price of treating a chronic disease. In a surprising twist, many of the medical devices being developed to treat NCD in the most cost-effective manner have incorporated platinum and platinum group metals (pgm) selected over alternate lower-cost materials because of their unique combination of chemical, physical and mechanical properties. Another surprising material is the alloy known as Nitinol, a nickel titanium alloy with shape memory properties that make it uniquely suitable for medical applications.

Stroke is the world’s second leading cause of death behind heart disease, and is the leading preventable cause of disability. Platinum is at the heart of devices that are being used by neurovascular surgeons to radically improve outcomes for patients either through the revascularisation of a diseased vessel (ischemic stroke) or by preventing the rupture of weakened blood vessels (haemorrhagic stroke).

A second area where pgms are performing a critical role is within devices used to treat the cardiovascular condition of atrial fibrillation (AF) where disordered electrical signals in the heart lead to poor blood flow. These radiofrequency ablation catheters take advantage of the electrical, biocompatible and radiopaque features unique to platinum alloys to improve patient quality of life, without the need for long term pharmaceutical use.

One of the most exciting emergent uses of pgms in medical devices is their application in neurostimulation devices. Many systems within the human body, including the central and peripheral nervous systems, are regulated *via* the transmission of electrical signals through and between the brain and the rest of the body. Innovative neurostimulation devices take advantage of pgm-based electrode arrays to make the critical connection between implantable pulse generators and parts of the body including the deep brain and the spinal cord.

Peripheral arterial disease is a growing problem in which normal blood flow is impaired due to narrowing of the artery. It often affects the lower limbs and is associated with the growth in incidence of diabetes, high blood pressure and obesity worldwide. Endovascular treatment for this condition *via* stenting restores blood flow through the affected artery. Due to its flexibility and crush resistance, Nitinol is used to make self-expanding stents for such applications.

As society is looking towards exerting greater control over rising health costs, while at the same time delivering high quality care, a shift towards the use of medical devices for the treatment of NCD is gaining favour. Because of the unique properties of materials like pgm and Nitinol, they have become central components in many of the devices being introduced to treat these diseases in a cost effective, sustainable way.

Johnson Matthey's Pharmaceutical Products and Services

Johnson Matthey has a long history with the pharmaceutical industry, and many readers of this journal are likely to be familiar with our background in platinum-based active pharmaceutical ingredients (APIs) such as cisplatin and carboplatin which are used in cancer therapies (and can be read about in this issue of the journal). However the scope and scale of our current pharmaceutical activities now reaches far beyond these specialised precious metal based drugs.

Johnson Matthey now has a wide range of products and services applied across the pharmaceutical industry. We partner with companies which are investigating and developing novel therapies that will address significant unmet medical needs of patients with debilitating and degenerative diseases.

We also have significant activity in the supply of products which are no longer under patent protection, the so-called generics industry. These generic APIs are extensively used to provide cost effective medical care all over the world.

In addition to pharmaceutical actives, we are also a major supplier of catalysts to the pharma industry.

Our offerings that support the pharmaceutical industry can be summarised as follows:

- **Custom Manufacturing:** This is a service offering to innovative pharmaceutical companies developing novel drugs. Many of these customers do not have their own manufacturing facilities and they typically partner with Johnson Matthey to take advantage of our chemistry expertise and manufacturing assets to help develop and commercialise their products.
- **Controlled Substances:** A specific class of APIs that are used, for example, in pain management, psychiatric disorders and other disease management. Because of their nature and potential for illicit use, they are subject to stringent government controls which restrict their manufacture and distribution. This requires additional expertise and capabilities for manufacture and supply.

- **Other APIs:** This is Johnson Matthey's wider product offering of APIs (that are not controlled substances). We identify new products that we can competitively make, manufacture and supply to the pharmaceutical industry. We supply products used in a wide range of therapies including cancer, Parkinson's disease and glaucoma.

- **Catalysts:** A cornerstone of Johnson Matthey's reputation in the pharmaceutical industry is our ability to develop and supply highly effective and efficient chemical process catalysts. As well as conventional pgm-based catalysts, we have invested in a range of novel technologies such as biocatalysts (see previous issues of this journal).

These products and services are underpinned by core Johnson Matthey capabilities and technologies. For example, utilising our expertise in materials science we carefully control the physical form and morphology of APIs to enhance their performance. We employ large scale advanced chromatographic techniques such as supercritical fluid chromatography (SFC) and preparative high-pressure liquid chromatography (HPLC) to purify highly complex materials.

So from origins based around our heritage skills in pgms, Johnson Matthey has significantly expanded its reach within the health industries. Using our core scientific capabilities, manufacturing excellence and focus on sustainability we now help support the development of novel products and the cost effective provision of healthcare.

JOHN F. X. MORLEY

Global Commercial Manager - Medical Components,
Johnson Matthey Inc., West Whiteland, USA

Email: john.morley@jmus.com

NICHOLAS JOHNSON

Strategic Marketing Director,
Johnson Matthey Fine Chemicals, Edinburgh, UK

Email: nicholas.johnson@matthey.com