

## Medicines cure diseases and save money

**Well-executed pharmacotherapy cures diseases and alleviates symptoms, maintains a person's ability to work and function, and prolongs his or her life. Pharmacotherapy often reduces the total costs of treatment and shifts the focus of care from hospital or institutionalised to outpatient care. In the future, the focus of pharmaceutical research and pharmacotherapy is expected to shift from the alleviation of symptoms and curing of diseases towards their prevention.**

The health of the Finnish population has improved continuously in the last hundred years. Premature mortality due to infectious diseases was the first problem to be overcome; in this advance, the contributing factors were sufficient nutrition, improved hygiene and living standards and, finally, vaccinations and antibiotics. As life expectancies increased, coronary artery disease, disorders of the cerebral circulation, chronic pulmonary diseases and cancer became the biggest problems. This negative trend was reversed by changing people's habits, especially smoking and unhealthy diets. During the last 30 years, people's health has improved first and foremost thanks to medicine. Effective pharmacotherapies have played a key role in this development.

### The triumph of pharmacotherapy

Drugs have revolutionised the treatment of infectious diseases, cardiovascular diseases, cancer and serious psychiatric illnesses. In developed countries, vaccines and antibiotics have eliminated premature mortality caused by infectious diseases. Pharmacotherapy is helping us to gain control over the HIV epidemic.

The cardiovascular disease mortality rate among people of working age has fallen by 80% from its level in the 60s. At first, this decline was the result of healthier nutrition and the reduction in smoking, but in the last 20 years the main reason has been pharmacotherapy. Efficient drugs with low side effects profiles are available for hypertension, dyslipidaemia and thrombosis. These drugs prevent myocardial infarctions, heart failure, cardiac deaths and disorders of the cerebral circulation.

Medication is critical in the treatment of psychiatric illnesses. Pharmacotherapy of schizophrenia and bipolar disorder has radically changed the prognosis of these diseases and enabled the transfer from expensive institutionalised care to the markedly more humane and economical outpatient care. New antidepressants are one of the reasons for the rapid decline in suicides in the last 25 years.

Pharmacotherapy of cancer is developing rapidly, as part of the overall care of cancer. Most patients with lymphoma, testicular cancer or leukaemia are cured using cytotoxic agents. In the case of many other forms of cancer, cytotoxic agents alleviate the symptoms and increase the patient's life expectancy. Adjuvant therapies often improve the prognosis of other forms of cancer. It is partly thanks to cancer drugs that cancer mortality is decreasing, even though the incidence of cancer is increasing.

In three decades, drugs have reduced asthma mortality to a fraction of what it used to be. Asthma patients have fewer symptoms and their quality of life has improved dramatically. Nowadays, asthma patients are treated in outpatient care – hospital care is rarely needed.

Modern anaesthetics are the cornerstone of effective and safe surgery and intensive care. The development of anaesthetics and methods of anaesthesia have accelerated the shift towards day surgery. Eradication of *Helicobacter pylori* infections with antibiotics has also eliminated the need for ulcer surgery.

### Pharmacotherapy saves on care costs

Pharmacotherapy generates savings in many ways. Correctly executed pharmacotherapy reduces the need for hospital care and expensive procedures, tests and examinations. A good example of this is rheumatoid arthritis. Thanks to new antirheumatic drugs, the costs associated with hospitalisation, surgery, and rehabilitation have rapidly decreased. Pharmacotherapy of dyslipidaemias and hypertension is reducing the need for PTCA and bypass surgeries, as well as the requirement for hospitalisation due to an acute myocardial infarction.

Pharmacotherapy is continuously changing the framework of health care services. The Finnish Hospital for Rheumatoid Arthritis Patients was shut down because the complications caused by rheumatoid arthritis can now be prevented using efficient drugs. Treatment of cardiovascular diseases now mainly consists of primary and secondary prevention in outpatient care. Disturbances of the cerebral circulation can be prevented with antihypertensives and antithrombotics, reducing the need for institutionalised care and other assistance. As a result, more and more elderly people are able to live at home up to the very last weeks or days of their lives.

### What does the future hold?

In addition to the treatment of cancer, the emphasis of pharmacological research and development is shifting towards the treatment of psychiatric, neurological and inflammatory diseases. Among psychiatric illnesses, particularly interesting targets for pharmacotherapy are schizophrenia, panic disorder and drug addictions. In the field of neurology, such diseases include dementia, Parkinson's disease and multiple sclerosis. A breakthrough in the prevention and treatment of dementia would generate enormous savings for society.

Vaccines and various immunomodulators may revolutionise pharmacotherapy in the 2020s. Many chronic illnesses could turn out to be immunological processes triggered by microbial diseases. In the future, such diseases could be primarily prevented and treated with vaccines and drugs that affect immunological processes. The importance of vaccines will also increase if the rapidly spreading resistance to antibiotics cannot be contained.

It has been predicted that future pharmacotherapies will increasingly seek to prevent diseases. Targeted diseases may include type 1 or type 2 diabetes, dementia and many forms of cancer. However, the difference between prevention and treatment is not a sharp one.

Pharmacotherapy of mild dyslipidaemia and slight hypertension is in fact a form of prevention, although the sickness insurance system classifies it as treatment of a disease. Prevention with drugs is indicated when a patient is at major risk of falling sick. If pharmacotherapy is used to prevent disease, in every case it must be administered in a way that ensures that the benefits outweigh any adverse reactions.

Lately, there have been discussions of the dangers associated with using pharmacotherapy to prevent and treat symptoms and abnormalities that do not meet the traditional definition of a disease. This practice has been called disease mongering. What can be considered an elevated level of cholesterol or glucose in the blood, and when should drugs be used to treat it? Is obesity a disease, and if so, at what point does it become one? Does a boy who cannot sit still and is continuously involved in pranks suffer from an attention deficit disorder that warrants pharmacotherapy, or is he simply an energetic and lively child? Answers to these questions must be sought, both at the level of individual patients and the whole of society.

### Research is the key

Future pharmacotherapies can only be developed if sufficient resources are allocated to pharmaceutical research. Fortunately, the methods used in drug development are improving. New methods (such as genomics, proteomics and lipidomics) help us to understand how the effects of drugs relate to the pathogenesis of a disease. New methods reduce failures in both the early and late phases of research.

With increasing accuracy, pharmacogenetics is helping us to identify the patient groups that would benefit from pharmacotherapy. This development will lead to pharmacotherapy being directed towards those patients who will benefit from it. However, it will also require new diagnostic methods, which will in turn indirectly increase the costs of pharmacotherapy. Most new products to be introduced in the near future will not be general drugs intended for large groups of patients. Instead, we will see highly specific (and more expensive) drugs tailored to variants of diseases and increasingly smaller patient groups.

Too little research is being conducted on pharmacotherapy's effects on overall health care and social costs. A good example is the current discussion on new anticoagulants. Due to the high price of this drug, the basic refund afforded by sickness insurance is limited to patients for whom warfarin therapy is unsuitable. Estimates of the costs of pharmacotherapy do not take sufficient account of pharmacotherapy's benefits.

#### **Conclusion**

Effective pharmacotherapy is always part of a comprehensive whole. Meeting the goals of therapy requires a careful assessment of the need for pharmacotherapy, continuous patient guidance and close co-operation with the physician or nurse and the patient. Replacement of pharmacotherapy with non-pharmacological therapy may, at times, be the best form of care – healthy nutrition and sufficient exercise are often a better solution than an antihypertensive or anticholesterol drug.

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[Go back](#)