

# Cancer: The Major Medical Challenge in Europe Today (Cancer Cures Made in Austria)

Austria is at the forefront in the fight against cancer in Europe and plays a leading part in the worldwide campaign with several pioneering initiatives. Be it innovative immunotherapy, novel molecular targets or radiation therapy, researchers and oncologists throughout Austria are working to develop and commercialise diagnostics and treatments.

## Primary Research: The Frontiers of Oncology

At the core of Austrian cancer research are multidisciplinary research networks bringing industry, healthcare and primary research together. It is these networks that have arguably helped Austria lead Europe in the fight against cancer.

For instance, the Comprehensive Cancer Center Vienna (CCC) established by the General Hospital, the Medical University of Vienna, seeks to discover mechanisms leading to cancer development and progression with the goal of improving the prevention, diagnosis and therapy of malignant diseases, and reducing morbidity and mortality from cancer. Another example is the Austrian Breast & Colorectal Cancer Study Group (ABCSG), an important Austrian organisation that performs internationally successful clinical trials in breast and colon cancer. A radical treatment initiative for breast cancer patients with small tumours and non-affected lymph nodes in ABCSG hospitals resulted in a remarkable 80% breast preservation. This is three times better than the similar statistic for Austria 25 years ago, and even exceeds preservation rates seen in the USA. There are currently 23,000 women participating in ABCSG studies, which is an astonishing number considering a small country like Austria.

There are several pioneering research institutes in Austria that combine basic medical research and industrial partnership. One of them is the Institute of Molecular Biotechnology (IMBA), a basic research institute of the Austrian Academy of Sciences. There, an international team of scientists conducts

primary research to study molecular mechanisms of biological processes and to address questions in modern life sciences and biomedicine. The aim is to understand the elementary mechanisms of health and disease. To reach this goal, a wide array of model organisms, as well as advanced technologies in cell biology, structural biology, biochemistry, genomics and genetics are used.

The CeMM Research Centre for Molecular Medicine is a flagship research institute of the Austrian Academy of Sciences which is pursuing a new medical focus. Driven by medical needs, CeMM integrates basic research and clinical expertise to pursue innovative diagnostic and therapeutic approaches focused on cancer, inflammation and immune disorders. The goal of CeMM is to assist in preparing the predictive, preventive and personalised medicine of the future.

The Children's Cancer Research Institute (CCRI) is nationally and internationally renowned for its multi-disciplinary approach to decoding pathogenesis mechanisms and for improving diagnosis, prognosis and treatment of cancers in children and adolescents.

The Biobank Graz comprises population-based and disease-focused collections of biological material, covering a huge variety of diseases. It is one of the world's largest biobanks, containing more than 5 million samples from about 1.5 million patients. Its unique value comes from its collection of unselected pathological samples and clinical data from the entire Styrian population of the last 30 years, representing all detected diseases at their natural frequency of occurrence, such as common metabolic disorders like diabetes as well as cancer and non-cancer diseases from all organs and all age groups. Tumour material is available for further research and biomarker development, enabling rapid scientific progress in the fight against cancer.

In addition, Boehringer Ingelheim is pioneering innovative approaches to cancer therapy in Austria alongside its

research powerhouse, the Research Institute of Molecular Pathology (IMP) and industrial biotech partners. These collaborations support Boehringer Ingelheim's team of 240 scientists in Vienna, enabling the company to be a key player in cancer research. Boehringer Ingelheim is also one of the leading companies for contract development and GMP production of biopharmaceuticals. The IMP, in particular, is a world-renowned research facility, generating high-impact peer-reviewed research and attracting top scientists to focus on cellular growth regulation and the complex biological processes underlying disease.



## Diagnosing and Screening for Cancer

As with all cancers, early screening and diagnosis are vital for selecting an optimal treatment regime. Really accurate diagnostic tests that can pinpoint the disease in its very earliest stages can be critical to a positive outcome. Add to

that companion diagnostics that can help detect patients who are likely to benefit from a treatment, and it is easy to see that cutting-edge diagnostic and screening technologies for common cancers can therefore really save lives! Austria has long been an engine of innovation in cancer diagnostics.

Finding a way to tell which patients will benefit from a treatment and which will not, i.e. "personalised medicine", is an important goal worldwide and a key driver behind the research of a consortium of scientists at Oncotyrol. This Centre for Personalised Medicine is using cutting-edge research to provide answers as to why cancer treatments work with some patients but not others. The efforts of the consortium are being further strengthened through its collaboration with the newly-established Austrian Drug Screening Institute (ASDI), where expertise is applied to both basic and translational research, with the aim of tailoring



therapies to treat tumour patients. For example, the department for Medical and Pharmaceutical Biotechnology at the FH-IMC University of Applied Science Krems is very well recognised in the identification of predictive biomarkers and personalised medicine, carrying out state-of-the-art research in 3-dimensional

organotypic tumour modelling, cell-based assays, high-throughput screening and biomarker identification. The Department for Health Sciences and Biomedicine at the Danube University Krems is working in Health Service and Management. Furthermore it is working in clinical medicine with a special focus on internal medicine and regenerative medicine, including orthopaedics, sports medicine and complementary medicine. A privately-owned company with an innovative approach to an extremely quick and accurate cancer screening is Signalomics. Their proprietary technology allows for the highly-sensitive visualisation of tumour tissue and cancer cells by combining ligands specifically developed for this purpose with light-emitting nanoparticles called Quantum Dots. The resulting product is unique to Signalomics and is currently in advanced preclinical development for visualising colon cancer and the surrounding lymph nodes.

### **New Treatment Approaches**

In the last 50 years, cancer therapy has advanced considerably, but there is still much work to be done in order to find treatments that can improve quality of life and outcomes with minimal side-effects. The following examples span a whole series of disciplines and detail where Austrian doctors, scientists and

businesses have been leading the way in the fight against cancer.

Vaccines and immunotherapeutic approaches are important ways to combat cancer and to stop the spread of the disease within the body. APEIRON Biologics is an Austrian company developing innovative immunotherapeutics, signing, amongst others, an agreement with Merck KGaA on the rights to develop and commercialise a novel biological treatment for neuroblastoma and other cancers (currently in Phase III trial).

Both Activartis Biotech, a spin-off from the CCRI, and CELLMED Research with its spin-out LifeResearch Technologies, are specialists in tumour-immunotherapy and are developing therapeutic cancer vaccines for unmet cancer needs. The approach is based on the use of antigen-presenting IL-12 dendritic cells which help the immune system to recognise and destroy tumour cells. Activartis, a subsidiary of AOP Orphan, is a specialist in cancer immune therapy. The company has developed a proprietary cancer vaccine technology using antigen-presenting IL-12 secreting dendritic cells which instruct the immune system to recognise and destroy tumour cells. Activartis' technology is currently part of a randomised clinical Phase II efficacy trial with about 90 metastatic brain cancer patients.



CELLMED Research, founded in 2006, is an Austrian Life Science Company focused on research and development of cellular therapies, in particular on the manufacturing and clinical application of cellular immunotherapy for the treatment

of solid tumours. A clinical study in Phase I / IIa on the safety of PROCURE® for the treatment of ovarian cancer is underway.

While vaccines and other immunotherapeutic methods are important, there need to be treatment

options for patients with more advanced stages of the disease. Chemotherapy and anti-cancer drugs will therefore continue to play an important and integral role in many cancer treatment regimes. New or modified anti-cancer molecules with improved potency and efficacy as well as reduced side-effects and toxicity are being discovered and developed by companies like Tube Pharmaceuticals who are cultivating powerful anti-cancer drugs called cytolytins. This new class of natural substances has demonstrated outstanding potency against dividing cells, including cancer cells in initial proof-of-concept studies by conjugations towards small molecule, polymers, peptides, proteins and antibodies.

MedAustron is one of the most advanced centres for ion beam therapy and research in Europe and is based in Wiener Neustadt. The irradiation therapy will be performed with carbon ions or protons. The technical test operating will start in 2013 with the first treatments carried out by 2015. In the full operational phase, up to 1400 patients per year will benefit from this innovative treatment option.

Overall, Austria offers both world-class primary cancer research and dynamic therapeutic as well as diagnostic innovation and development. Considering the high quality of Austrian hospitals, it is perhaps unsurprising that Austria is leading Europe in the battle against cancer.

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2009. Previously she worked as Account Manager at the European Commission, mainly in charge of marketing telecommunications policies to the European public. The most important campaigns were for the newly established roaming regulation and telecom reform. Before the European Commission, she worked for a major Brussels-based European public affairs consultancy, and also had short stints with the European Parliament and with trade federations. She speaks German, English and French.

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