

Vienna: The Human Genome on 6 x 4 cm - Symposium on Molecular Diagnostics

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The importance of molecular diagnostics for cancer treatment is set to increase significantly in coming years, according to a symposium held yesterday in Vienna. The reason for organising the symposium was the acquisition of a cutting-edge microarray analyser as part of the EU OVCAD (Ovarian Cancer Diagnosis) project. The device provides what is currently the most sensitive technology for analysing the activity of all human genes and therefore enables the type and progress of cancers to be determined with previously unattainable levels of accuracy.

Tumour cells differ from the body's normal cells in that they exhibit altered genetic activity. Identifying this activity provides a basis for making an early and accurate clinical diagnosis, but the key is knowing what to look for – not such an easy task given that the human body contains approx. 30,000 genes. Nonetheless, the EU OVCAD project, being coordinated at the Medical University of Vienna, has made a major breakthrough in the molecular diagnosis of ovarian cancer by acquiring the world's most sensitive device for comparing the genetic activity of all human genes. The potential offered by this technology was discussed at the symposium.

30,000 Genes on 4 x 6 cm

One benefit of the device – the 1700 Chemiluminescence Microarray Analyzer from US company Applied Biosystems – that stood out in particular was its ability to measure profiles of the gene activity of all 30,000 human genes with unrivalled sensitivity. In actual fact, the device is capable of measuring the activity of almost 8,000 more genes than similar devices – and all within a unique dynamic measuring range. This state-of-the-art technology provides a clear clinical benefit because any gene whose activity differs between cancerous and healthy cells can be identified without the need for prior knowledge of which genes are to be analysed.

However, Professor Robert Zeillinger, Head of the "Molecular Oncology" Working Group at the Medical University of Vienna and Coordinator of OVCAD, believes the system holds even greater potential: "We intend to analyse genetic activity in tumour cells in patients with ovarian cancer as part of the EU OVCAD project. We are interested in particular in differences between patients who are responding to chemotherapy and those for whom this standard treatment is not working. Analysing these differences will enable predictions to be made about the potential success of chemotherapy at the time of diagnosis rather than a number of months later when the tumour has grown significantly, as was previously the case."

But this in no way exhausts the potential offered by microarray analysis. For instance, Eva Obermayer, a member of Zeillinger's working group, is evaluating the possibility of using this technology to find evidence of individual scattered cancer cells which can contribute to the recurrence of the cancer even after successful treatment of the primary tumour. Combining use of the technology with a highly efficient method for amplifying nucleotide sequences enables these individual cancer cells to be detected in blood samples, assuming the relevant altered gene activity is known. Information that can also be obtained with the 1700 Chemiluminescence Microarray Analyzer.

3D Diagnosis

Zeillinger is convinced that such possibilities herald a new era for cancer diagnosis where, thanks to the detail of information it provides, diagnosis forms an integral part of treatment. Whereas diagnosis previously took a more one-dimensional approach, focusing on detecting the existence of an already-established tumour, the molecular approaches add a further two dimensions to diagnosis by providing details on tumour biology and the success of treatment. This will enable earlier and more specific treatment. At the end of the symposium, participants agreed that findings from the OVCAD project will undoubtedly also contribute to improved diagnosis of other forms of cancer.

Background: OVCAD - OVarian CAncer Diagnosis - is a Specific Targeted Research Project (STREP) into cancer diagnostics under the umbrella of the EU's Sixth Framework Programme. The project aims to identify molecular markers that enable conclusions to be made about the future success of ovarian cancer treatment at the time of diagnosis. OVCAD comprises 11 academic and 4 industrial partner groups from France, Belgium, the Netherlands, Israel, Germany and Austria. The project will run for three years and is receiving Euro 4.26 million in funding from the EU. It is being coordinated by the Department of Obstetrics and Gynaecology at the Medical University of Vienna.

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