New hope for cancer patients

Biotechnology: New hope for cancer patients

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Biotechnology

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RESprotect has developed combination preparations for use in cancer treatment. They have been designed to prevent cells from becoming resistant to chemotherapy and radiation therapy. In animal tests, clear improvements compared with conventional treatment of tumours have been achieved.

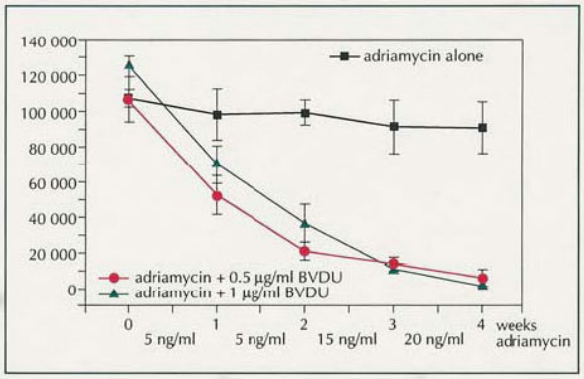
RESprotect GmbH is a Dresden research company specialising in the development of anti-recombinogenic drugs for the treatment of chemotherapeutic drug resistance and radiation therapy resistance. These drugs are used in combination with conventional therapies. RESprotect GmbH Dresden have applied for patents for these products. The company is located close to the clinics of the University of Dresden and the Max-Planck-Institut für Molekulare Zellbiologie und Genetik.

Successful chemotherapy with less side effects

Cancer is the second leading cause of death in Europe and North America. RESprotect is focusing on the prevention of chemoresistance against cytostatic treatment. This is supposed to increase the recovery chances and to reduce the side effects of chemotherapy.

Resistance to chemotherapy is a common symptom associated with cancer treatment. It occurs in association with various cytostatic agents. This resistance is the main reason for the failure of chemotherapy. Because of the high and increasing incidence of cancer, an improvement in the use of chemotherapy as a cancer treatment method has a high ethical, social and economic significance.

Gene amplification and the recombination (new combination of genes) of many chromosomal regions is the cause of altered gene expression in a variety of human tumours. The amplification and overexpression of the amplified target genes produces a selective advantage for tumour cells, thereby playing an important role in the pathogenesis and prognosis of cancer disease. Often tumour cells which are resistant to chemotherapy have been affected by the amplification of a small group of genes which are responsible for this resistance. For this reason, an obstruction of the gene amplification process during the progression phase could lead to an improvement in chemotherapy.



Treatment of mouse erythroleukemia F4-6-wt cells (drug sensitive, no expression of mdr-genes) for 4 weeks with gradually enhanced doses of adriamyin, or adriamycin + BVDU. The anit-recombinogenic substance (E)-5-(2-bromovinyl)-2'-deoxyuridine (BVDU) prevented adriamycin-induced mdr-1 gene amplification and expression in mouse leukaemia cells in vitro. (For details see Anti-Cancer Drug Design, currently being published)

Resistant tumours often share a similar characteristic, i.e. some of their genes have multiplied (amplified) themselves. These are mostly oncogens (cancer producing genes) or genes which pass on resistance against several cytostatic agents (multi-drug resistance genes = MDR). These MDR genes produce a protein (P glycoprotein) which removes foreign or cytostatic substances from the cell. If the MDR genes reproduce themselves, then they will produce a similar increased amount of P glycoprotein. Consequently, the drugs are driven out the cancer cells, thereby losing their effectiveness. The tumour can thus grow unchecked. Since it has been discovered that the first steps of gene amplification are based on a recombination mechanism, research has been concentrating on developing anti-recombinogenic substances which are active in dosages which can be applied to humans. Some of the 5'-substituted nuncleosides meet both requirements. They suppress the formation of gene amplification by an antineoplasitic drug and inhibit the induction of gene amplification mediated multi-drug resistance (MDR) by adriamycin in tumour cells of mice in vitro. Previous results have shown that they suppress gene amplification not only in vitro but also in rat tumours.

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View of the laboratory in which gene amplification and expression are being measured.

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