Interferons

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Interferons are a group of inducible secretor.y glycoproteins of moleculor weight 15,000-20,030 daltons (Vilcek et al., 1977) synthesized by eukaryotic cells in response to viral infections and other stimuli e.g., mitogens and antigens. The ability to synthesize interferons is present in all vrertebrates and virtualiy all nucleated cells are capable of it; the only requisite being that the cells are metabolically active and that they are stimulated by an appropriate inducer, e.g., viruses (Vilcek et ., 1969), synthetic polynucleotide complexes (Field et ., 1967) and mitogens (Gresser, 1961). There are two major types of Interferons which are distinguished on the basis of resistance to low pH. Virally inducted, leucocyte, lymphoblastoid and fibroblast interferons are resistant to pH_2 and are termed as Type I. Interferons produced by mitogen or antiyen stimulated lymphoid cells are labile at pH_2 and designated as Type II and these are antigenically different from Type I (Youngner and Salvin, 1973).
Interferons have a variety of biological properties. They block the replication of a large variety of viruses in cells. These include single and double stranded RNA viruses, DNA containing viruses, lytic and transforming viruses (Friedman, 1977). The exact mechanism of this blocking effect is not certain however both virus-specific primary transcription and translation of virus RNA can be inhibited in Interferon treated cells (Joklik, 1977).
Interferons also affect the cell surface propertes. Their treatment enhances the absorption of alloantibody on the surface of leukaemic cells (Lindahi et al., 1973) and the expression of histocompatibility antigens on tumour cells, thymocytes and splenocytes (Lindahi et al. 1973; Yignaux and Gresser, 1977). Interestingly interferon induced changes have been shown to be diametrically opposed to the changes associated with viral induced transformation (Pfeffer et al, 1981).
Interferons have an inhibitory effect on cell growth. They inhibit the growth of both normal and transformed cells (Paucker et al., 1962). This effect also occurs invivo in regenerating liver cells (Frayssinet et al., 1973) and transplanted tumour cells (Gresser et al., 1977). Interferon treated cells do not appear to be blocked in any particular phase of their cell cycle but exhibit a proportional lengthening of each phase (Balkwill and Tayler, 1978).
The most important biological effect of luterferous is on the Immune system. In lymphoid cells the interferon induced phenotype includes a decrease in the rate of cell multiplication during the proliferative phase of the Immune response and an enhancement of antibody secretion and cytotoxicity during the non-proliferative phase of the response. These can result in either an inhibition or enhancement of an Immune response (Epstein, 1977). Interferons also inhibit delayed type hypersensitivity reactions to various antigens (DeMaeyer et al., 1975), they delay graft rejection (DeMaeyer, 1973) and graft-versus host reaction (Hirsch et al., 1973). They enhance the number of phagocytic macrophages and phagocytosis in vivo (Gresser et al., 1977) and enhance cell mediated cytotoxicity (Lindahl et al., 1972).
A natural cell mediated cytotoxicity has been described in man which is capable of causing in vitro lysis of virus infected and tumour cells. It is mediated by small lymphocytes which are without adherent properties, have Fc receptors but no surface markers for T and B cells and which differentiate from Bone marow precursor cells, the Natural Killer or NK cells. In vivo mouse Interferon is capable of inhibiting the growth of in vitro interferon resistant tumour cells (Gresser et al., 1972). Increased NK cell activity has been observed in animals injected with interferon inducers (Ochier et al., 1978; Herberman et al., 1977), Viruses and tumour cells (Trinchicri et al., 1977). It is now believed that the antitumour effect of Interferon is through the enhancement of NK cell activity (Senik et al., 1979).

Hence enhancement of the NK cell activity has also been reported in cancer patients under treatment with leukocyte interferon (Einhorn et al., 1978; Hudolestone et aI., 1979).
The vaned projerties of Interferons, interaction with the Immune system and their involvement in recognition and defence against virus infected and cancer cells has resulted in enthusiastic research towards their role in cancer therapy which has started to give encouraging results.

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