Role of prostaglandins in reactions of cellular immunity

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In vivo studies indicate that prostaglandins (PGs) are involved in Type IV allergic reactions (delayed hypersensitivity, cellular immunity), since PG-like material is released into subcutaneous tissue perfusate during contact sensitivity in man (Greaves, McDonald-Gibson & Søndergaard, 1971) and since injected PGs potentiate the increased vascular permeability of tuberculin reactions in the guinea-pig (Williams & Morley, 1973). In such reactions PGs may act as effector cell stimulants, affecting increased vascular permeability, vasodilatation, production of pain and cellular accumulation. However they may additionally serve to regulate the expression of the immune response, for it has been proposed, largely by analogy with Type I (anaphylactic) reactions, that histamine, β-adrenergic catecholamines and prostaglandins will inhibit secretion of mediators by lymphocytes in Type IV reactions (Bourne, Lichtenstein, Melmon, Henney, Weinstein & Shearer, 1974).

Lymph node lymphocytes or peritoneal exudate cells (containing approx. 10% lymphocytes) have been incubated with antigen as an *in vitro* model of Type IV hypersensitivity (Bloom & Bennett, 1971). Within 24 h, action of antigen on sensitized cells causes the culture fluid to acquire several properties (including macrophage migration inhibition, mitogenicity and inflammatory actions), that are regarded as indicating the presence of mediators of Type IV reactions. In the present experiments this system has been used, (a) to ascertain if such cells produce PGs in response to antigen stimulation, and (b) to determine if the production of mediators by lymphoid cells in response to antigen is affected by addition of PGs.

In a series of culture fluids, PG-like activity was demonstrable both by bioassay on the rat stomach strip and by radio-immunoassay as PGE_1. Maximum concentrations observed were 16.9 and 14.0 ng PGE_1/ml from 10^6 cells. PGs were either undetectable (< 1 ng/ml) or present at lower concentrations (1.0-10.6 ng PGE_1/ml from 10^6 cells) in cultures from cells in the absence of antigen, and were undetectable from comparable concentrations of culture fluid derived from continuous cell line culture of human lymphoid cells.

Macrophage migration inhibition was used as an indicator of mediator secretion. PGE_1, PGE_2, and $PGF_{2\alpha}$ (up to 1 μg/ml) do not markedly influence macrophage migration nor do they modify the inhibition produced by the antigen induced mediator (lymphokine). However PGE_1 (0.1 and 1.0 μg/ml) will significantly reduce the inhibition of macrophage migration following addition of antigen to sensitized peritoneal exudate cells. This finding is consistent with an inhibitory effect of PGs on mediator secretion by lymphocytes in Type IV reactions. It suggests that PGs can act in the expression of delayed hypersensitivity in a manner analogous to their modulatory roles in other physiological systems (Bergström, 1967).

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