Stimulation of thyroid cell growth by thyrotropin and epidermal growth factor in isolated porcine thyroid follicles

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[3H]thymidine incorporation during culture of thyroid follicles isolated from porcine glands (Schatz et al. 1983, 1986) can be taken for estimating thyroid growth stimulating immunoglobulins (TGI) (Drexlhage et al. 1980; Chiovato et al. 1983; Valente et al. 1983). In this study we wanted to characterize our assay system in order to answer the question whether TSH itself was responsible for stimulation of [3H]thymidine incorporation observed when using TSH as standard in our experiments. Furthermore, the effect of TSH and epidermal growth factor (EGF) (Eggo et al. 1983; Westermark et al. 1985) should be tested both without and with anti-TSH serum or anti-EGF serum present in the medium.

Material and Methods

After pre-culture for 1 day of the freshly isolated (broken) thyroid follicles from porcine glands (using 10% foetal calf serum [3H]thymidine incorporation was estimated after another 2 day's culture period of the (reconstituted) follicles in the presence of standard TSH (0.001 to 10 mU/ml \( \Delta 5 \times 10^{-11} \) to \( 5 \times 10^{-7} \) mol, from bovine pituitary, Sigma) or epidermal growth factor (EGF, \( 10^{-9} \) to \( 10^{-7} \) mol, from mouse submaxillary glands, Sigma) alone or together with anti-TSH serum or anti-EGF-Serum (both from the rabbit, 1:200) (for details, see Schatz et al. 1986).

Results

TSH stimulated [3H]thymidine incorporation yielding a bell-shaped dose-response curve with the maximum at 1 mU/ml TSH (Fig. 1). EGF also proved to be a potent stimulator of thyroid cell growth with a maximal effect at \( 10^{-7} \) mol (Fig. 1).

Anti-TSH serum abolished the stimulatory effect of TSH but not that of EGF (Fig. 2). On the other hand, in the presence of anti-EGF serum the 'basal' thymidine incorporation was somewhat but not significantly depressed (Fig. 3). The stimulatory action of EGF was almost blocked by anti-EGF serum, TSH, however, still provoked a significant increase in thymidine incorporation also in the presence of anti-EGF serum.

Conclusions

TSH can promote the growth of thyroid follicles cells isolated from porcine glands. Since the effect of EGF was blocked by anti-EGF serum, but not the effect of TSH, the growth-promoting action of TSH does not necessitate the involvement of (e.g. locally produced) EGF, which however, is a potent stimulator of thyroid growth itself.
Effect of TSH and EGF on [³H]thymidine incorporation into reconstituted porcine thyroid follicles during culture for 48 h (± SD, N = 12 and 24, respectively).

[³H]thymidine incorporation during 48 h into isolated porcine thyroid follicles in the presence of TSH or EGF alone (●—●) or together with anti-TSH serum (○—○).
[\textsuperscript{3}H]thymidine incorporation during 48 h into isolated porcine thyroid follicles in the presence of TSH or EGF alone (●——●) or together with anti-EGF serum (final concentration 1:200, (○——○)).

References


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