the gonadotropin caused a 70% decrease in the serum thyroxine level as compared with the controls, whilst the TSH's decreasing effect was as 'little' as 40%. At the same time, in adult age the gonadotropin did not influence the TSH-receptors; it was not able to modify them in neonatal age in such an adequate way that they would have become capable to respond to it by evoking iodine-hormone production.

As shown by the results, the adult control animals can perform a precise distinction between TSH and gonadotropin. This distinguishing capacity evolved, probably, in the course of the phylogenesis, since in bony fishes, for example, TSH and gonadotropin exert the same effect[8].

As it seems, in neonatal age this distinguishing capacity is not yet developed; therefore the gonadotropin can be bound and can deform the receptors, which are easy to shape.

We do not know why the TSH given in neonatal age decreased the receptor sensitivity. Based on literary data[9], we think it possible that the TSH would participate in the thyroid gland's regulation only later and also its too early appearing damages the receptor's structure, though in a lesser degree than the gonadotropin does. Elucidation of this problem needs further experiments.

These observations may have some importance for human pathology seeing that certain hormone analogues which occasionally found entrance into the foetus, could cause endocrine disturbances by changing the receptors.

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Time Function of Corticosteroid Levels in the Blood Plasma of Rats under the Influence of ^{222}Rn Inhalation

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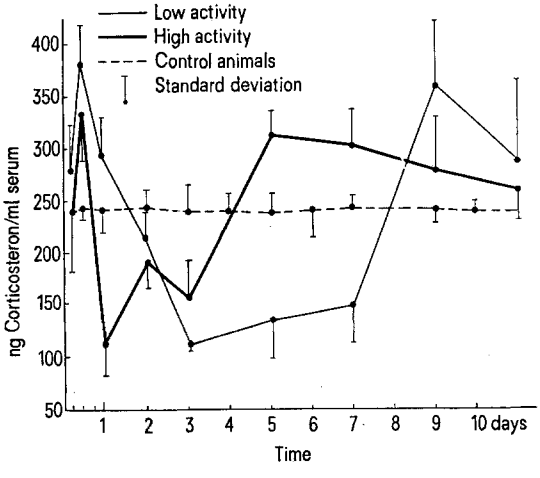
Summary. The time function of corticosteroid level in plasma of rats under two different ^{222}Rn concentrations was investigated. Both curves show a maximum after 8 h. Whereas the higher activity of ^{222}Rn produces a second maximum after 5 days, the lower activity reaches its second maximum not before 9 days. From both time functions, a two-step mechanism in the intracellular control can be concluded.

In some places the inhalation of ^{222}Rn (radon) and its decay products is used for therapeutical treatments. Especially in the treatment of all diseases of the rheumatic group, vascular diseases, disorder of endocrine organs and metabolic disorders, as well as gerontal complaints, success is being reported. However, there is no knowledge about the biochemical mechanisms which could explain such therapeutic effects. HENN[1] suggests a stimulated production of corticosteroids but no direct proof was possible. We have tried to detect this in in vivo experiments with rats.



Concentration of corticosteroid level in the plasma of rats during inhalation of ^{222}Rn.

Experimental techniques. Male Wistar-rats of 200 g body weight were kept on a standard diet. We have used a climatized inhalation chamber of 13.5 m^3 where the ^{222}Rn concentration and decay product ratio were kept constant. Two series of measurements with different ^{222}Rn concentrations were carried out with 45 animals each over a period of 12 days; Within the same period, control animals were kept under the same environmental conditions in a radon-free atmosphere.

The corticosteroid level in the blood was determined in groups of 5 rats each after defined periods of ^{222}Rn inhalation. Blood samples were taken from the veins of the tongue under weak halothan narcosis. The corticosteroid concentration was determined by the methods of FIORELLI et al.[2], using the kit for cortisol assay of CEA-IRE-SORIN, Centro Ricerche Nucleari, I-13040 Saluggia (Vercelli).

The dose resulting from the inhalation of ^{222}Rn and its decay products is very different for each organ. On the base of experimental techniques and calculations from POHL[3] and POHL and POHL-RÜHLING[4], the dose rate was determined for several organs (Table).

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Distribution of the dose rate in mrad/h in several organs of rats

Organ	Dose rate in mrad/h	
	Series 1 Rn: 12.5 nCi/l RaB/Rn: 0.25	Series 2 Rn: 110 nCi/l RaB/Rn: 0.33
Blood	1.07	11.9
Liver	0.64	6.9
Kidney	3.50	40.2
Adrenal glands	0.62	6.0
Red marrow	0.35	3.6
Muscle	0.75	8.2

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Results. The Figure represents the corticosteroid concentrations as time-functions for both series of measurements. In both curves a first peak appears after 8 h, a second maximum with the higher ^{222}Rn concentration after 5 days, with the lower concentration after 9 days. Both maxima are statistically significant. One can see that the hormone production is stimulated as an impulse, followed by a typical 'tail', as is observed in certain stress situations[5]. Especially interesting is the occurence of a second increase. The following decrease, however, is not statistically significant and would require prolonged inhalation studies. Both curves show the occurrence of a perturbation in the corticosteroid level as a response to the radiation effects. The differences between the high and the low dose could probably be interpreted as the appearance of a phase difference in an re-equilibration process. The 2 maxima of the corticosteroid level indicate, moreover, that the intracellular controls are switched in 2 steps. Further studies on this problem are in progress.

Hormonal Induction of Glutamate Dehydrogenase in Rat Liver[1]

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Summary. Glutamate dehydrogenase rapidly increases in microsomes and appears in the cytoplasm after administration of cortisone, cAMP, hydrocortisone-acetate. Prolonged administration of ACTH maintains high level of enzyme in the mitochondria and microsomes. Hydrocortisone-acetate, insulin and corticosterone decrease drastically enzyme in mitochondria.

Glutamate dehydrogenase (GDH) (EC 1.4.1.3), though a mitochondrial enzyme, is synthesized in the ribosomes. SOLOMON[2] reported that enzyme activity in embryonic chicken liver could be found only in the cytoplasm. It began to increase in the mitochondrial fraction after the 12th day of incubation and diminished drastically in the supernatant after 16 days of incubation. Recently, GODINOT and LARDY[3] measured enzyme activity in isolated rat liver microsomes and identified the enzyme by using antibodies against GDH and polyacrylamide gel electrophoresis. It was suggested also that glutamate dehydrogenase is transported into mitochondria in combination with cardiolipin[4]. Previous studies on GDH induction by hormones are summarized in Table I. These

Table I. Survey of the literature on induction of glutamate dehydrogenase in rat liver homogenate

Hormone or treatment	Effect on GDH level	Reference
Starvation	+	6,7
	0	3
Protein-free diet	+	8,9
High protein diet	+	7
High glucose diet	—	10
Alloxan diabetes	+	11
	0	12
Alloxan diabetes + insulin	+	11
Alloxan diabetes + glucagon	+	11
Adrenalectomy	—	10, 13–15
Adrenalectomy + cortisol	0	11
Adrenalectomy + cortisol + D-aldosterone	0	15
Hypophysectomy	—	16–19
Glucagon	+	11
Cortisol	+	10
Corticosterone	+	10
Deoxycorticosterone	0	10

Enzyme activity measured in crude homogenates (supernatant after $900 \times g$) suspended in water. +, increase in enzyme level; —, decrease in enzyme level; 0, no effect on enzyme level.

[1] Supported by N.I.H. grant Nr. PR 0806-02.

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