

by vitamin K. The 2-methyl group also is essential for vitamin K-like activity and perhaps serves to anchor the vitamin K molecule to the apoenzyme⁶. While the methyl group and the chlorine atom have similar shapes, they differ in their polar resonance and inductive effects. The replacement of the 2-methyl group by a chlorine atom can result in an analogue which is sufficiently similar to occupy the free receptor sites on the surface of the apoenzyme in the coumarin anticoagulant treated animal but which is unable to elicit the biological effects of vitamin K.

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Zusammenfassung

Die Wirkung von Vitamin K₁ auf mit Coumarin behandelte Kaninchen wird durch 2-Chloro-3-Phenyl-1:4-Naphthochinon gehemmt.

Uptake of ³⁵S Labelled Sulfate in the Exorbital Lacrymal Glands of Adult and Newborn Rats under Different Hormonal Treatment

Previous experiments have shown that testosterone treatment in normal and castrated male rats results in morphological changes of the exorbital lacrymal glands (Loewenthal glands), i. e. appearance of a tubular structure with mucous secretion and increase of the nuclear volumes (CAVALLERO and MORERA¹). An additional research has been now undertaken in order to show whether or not testosterone, in comparison with other hormones, is capable of affecting the uptake of ³⁵S labelled sulfate by the glands both in adult and newborn rats.

In a first experimental series, adult male castrated rats were used. Four animals without hormonal treatment and four treated with testosterone propionate (1 mg daily subcutaneously for 10 days) were injected intraperitoneally with ³⁵S labelled Na₂SO₄ at a dosage of 0.3 µC/g body weight. 18 h after the injection they were sacrificed, their exorbital lacrymal glands were carefully dissected, weighed, and dissolved in 0.5 cm³ of conc. hydrochloric acid. The solution was then dried with infrared rays and the radioactivity of the dry material evaluated with a Geiger counter (mica-end-window weighing 2.6 mg/cm²). The radioactivity was expressed as counts/min/mg wet weight.

From this first experiment, it was found that the ³⁵S-uptake was higher for testosterone-treated glands; the mean count/min/mg was 11 for the control glands, whereas 27 impulses were counted with the testosterone-treated glands, the difference being highly significant.

In a second experimental set, two-days old rats were used, partly untreated and partly treated with various hormones, as reported in the Table. Hormonal treatment lasted three days; thereafter radiosulphate, 1 µC/g of body weight, was injected. Other procedures were identical to those of the first series. The data were analyzed statistically by the analysis of variance technique. Statistical significances were assessed at 1% level.

³⁵S uptake in the exorbital lacrymal glands of 2-days old rats under different hormonal treatment.

No. animals	Treatment	Daily dose	Net counts/min/mg
8	Controls	—	33
5	Testosterone	0.1 mg	36
5	TTH (Organon)	0.2 mg	43 ^a
6	Thyroxine (Roche)	0.01 mg	37
5	Cortisone	0.1 mg	17 ^a
4	Insulin	0.1 I. U.	30
4	Glucagon (Lilly)	0.1 mg	20 ^a

^a Differs significantly from control group.

From this Table, it appears that in newborn rats no change occurs in the ³⁵S uptake by the glands after testosterone, thyroxine, and insulin treatment; on the other hand, there is an increase following thyrotropin and a decrease after both cortisone and glucagon treatment. Our results with thyrotropin are similar to those obtained by WEGELIUS *et al.*² on other lacrymal glands (ventral and Harderian glands) of the guinea pig, where hormonal treatment actually increased ³⁵S uptake.

Histological studies on adult Loewenthal glands have shown that testosterone treatment results in important morphological changes; i. e. appearance of a tubular structure with collection of mucous material in the lumina, associated with increased ³⁵S uptake. On the other hand, histological examination of the Loewenthal gland in newborn rats showed evidence of a conspicuous structural immaturity; in addition, the treatment with testosterone did not elicit the structural modifications seen in the adult, nor cause any change in the uptake of ³⁵S.

We can thus conclude that Loewenthal glands of the newborn animal are not sensitive to testosterone action, while being quite responsive to the action of TTH, or, more precisely, to the ophthalmotropic activity of the complex thyrotropic hormone, behaving like the other lacrymal glands. Moreover, there seems to be a close relationship between mucous changes of the glands and increased ³⁵S uptake.

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Zusammenfassung

Die Verfasser weisen nach, dass die Testosteronbehandlung in der äusseren Orbitaldrüse (Nebenhörspeicheldrüse; Loewenthalsche Drüse) der erwachsenen Ratte die Aufnahme von ³⁵S steigert. Gleichzeitig wird eine tubuläre Veränderung der Drüse mit schleimiger Sekretion beobachtet. Diese Erscheinungen sind beim neugeborenen Tier nach Testosteron nicht nachweisbar, hingegen wird hier durch Thyrotropin die ³⁵S-Aufnahme gesteigert.

¹ C. CAVALLERO and P. MORERA, *Exper.* 16, 285 (1960).

² O. WEGELIUS, S. NEUMANN, and R. BRUNISH, *Acta endocrinol.* 30, 53 (1959).