scanning. Then the electrophoregrams were cut where both peaks of activity were found. After elution with 2 *N* HCl, an aliquot was evaporated on a glass planchet under an IR-lamp and counted with a thin-window Geiger-Müller counter. The self-absorption corrections were made using a self-absorption curve. In this way the % of radioactivity corresponding to each peak was calculated. The Table gives the experimental values for a series of determinations made in triplicate.

The results show a very good stability to the isotopic exchange for both preparations, being a little more stable than true colloidal solutions. Possibly because of the faster large particle formation, a small amount of ionic phosphate (not removable by dialysis) is occluded into the particles. This phenomenon does not occur with the true colloidal solution.

Résumé. Nous avons étudié la stabilité du phosphate (^{32}P) chromique colloidal, par rapport à l'échange isotopique avec le phosphate ionique. Après 12 jours d'incubation à 37 °C les solutions présentent seulement 6,6% de ^{32}P ionic échangé. Les préparations ont montré une très bonne stabilité.

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Effect of Growth Hormone and Prolactin on Mouse Transplantable Mammary Adenocarcinoma

The role played by growth hormone and prolactin in the development and growth of mammary tumours has not yet been established. Early studies using impure preparations showed that continued administration of growth hormone to normal rats, either male or female, accelerated the development of neoplasms in the lung, adrenal medulla and reproductive organs[1,2]. Transplantation into mice of tumours of the anterior pituitary (MtT) has been found to accelerate the rate of appearance of mammary tumours induced by X-ray, virus or 3-methyl cholanthrene[3–5]. Only a few attempts have been made to study the effect of these hormones on mammary adenocarcinoma in mice[6–8]. The results obtained by these investigators differ from one another, possibly because of the use of insufficiently purified hormone preparations.

The present study was undertaken in order to determine the effect of purer preparations of growth hormone and prolactin, which have only recently become available, on the growth of two kinds of transplantable mammary adenocarcinoma in mice.

Inbred strains of R III and C_{57}BL female mice, weighing from 17–18 g, were used. They were fed Purina chow and water ad libitum. MMC_1A and Eo 771 carcinomas, transplanted for over 100 passages in our laboratory, were employed. For the experiment the tumour was implanted subcutaneously into the right axillary region by a sterile trocar (No. 16). The following hormone preparations were used: bovine growth hormone (Choay, Batch S-407B) and sheep prolactin (Ferring, Batch 31209). The hormones were dissolved in saline with the addition of 0.1 *N* NaOH and injected i.p. in a daily dose of 200 or 300 µg/0.2 ml for 10 days starting 24 h after the implantation of the tumour. Matched control groups were injected with the same volume of solvent. The animals were sacrificed on the 12th day after the transplantation. Both the whole animal and the excised tumours were accurately weighed.

It may be seen that both BGH and sheep prolactin produced enhanced tumour growth in MMC_1A as well as

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Table I. The effect of bovine growth hormone (BGH) and sheep prolactin on the growth of transplanted mammary adenocarcinoma (MMC_1A) in R III female mice

Treatment	No. of mice	Tumour weight mg mean ± S.D.
Saline control	11	1010 ± 489
BGH, 200 µg	14	1525 ± 608
Sheep prolactin, 200 µg	12	1775 ± 400
BGH + prolactin	13	1870 ± 422

Table II. The effect of bovine growth hormone (BGH) and sheep prolactin on the growth of transplanted mammary adenocarcinoma (Eo 771) in C_{57}BL female mice

Treatment	No. of mice	Tumour weight mg mean ± S.D.
Saline control	14	827 ± 420
BGH, 200 µg	15	1485 ± 489
BGH, 300 µg	10	1379 ± 484
Sheep prolactin, 200 µg	13	1183 ± 316

Eo 771 mammary carcinoma. The difference in the tumour weight between the control group and the hormone-treated groups was found to be statistically significant (Student's t test $p < 0.05$).

Zusammenfassung. Verabreichung von bovinem Wachstumshormon oder Schafsprolactin fördert das Wachstum von Adenokarzinom der Brust (MMC_1A) transplantiert in eine weibliche Maus R III oder von Adenokarzinom der Brust Eo 771 transplantiert in eine weibliche Maus $C_{57}Bl$.

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Action of β-Receptor Blocking Sympatholytics and of Catecholamine Depleting Agents on $CaCl_2$-Induced Arrhythmias in Rats

It has been established in earlier experiments[1,2] that the adrenergic β-receptor blocking dichloroisoproterenol derivative: I-06 [1-(3,4-dichlorphenyl)-2-isopropylaminopropanol] displays an antiarrhythmic action in cats, dogs and rabbits, and possesses only a slight initial β-receptor stimulating action. In contrast to the highly effective β-receptor blocking and antiarrhythmic agent propranolol (Inderal), I-06 proved to have also a catecholamine depleting effect on heart and brain when administered for several days[2]. The question arises as to what kind of difference in antiarrhythmic properties can be detected between the catecholamine depleting I-06 and the non-depleting propranolol. It has also been shown that the protecting action of reserpine, an agent with well-known catecholamine depleting effect in digitalis intoxication[3,4], is partly due to its antiarrhythmic action[5]. Thus there is indication of a possible interaction between the antiarrhythmic effect of drugs and their influence on the catecholamine content of the heart. To study these questions, the antiarrhythmic effect of propranolol and I-06, also that of known amine depleting agents such as reserpine[6], guanethidine[7], and prenylamine[8] as well as that of α-methyldopa[9] (an agent inducing partial depletion of the myocardial norepinephrine content by formation of α-methyl-norepinephrine), and that of bretylium[7] (which blocks the release of norepinephrine without altering myocardial catecholamine content), has been investigated.

Arrhythmia was produced by rapid i.v. injection of a 2.5% $CaCl_2$ solution (140 mg/kg dose) to Wistar rats of both sexes and 100–150 g body weight under urethane anaesthesia (1.5 g/kg i.p.). A direct-writing electrocardiograph enabled continuous recording of the cardiac activity. A few seconds after injection, 77% of the animals developed ventricular fibrillation leading to death within 60–90 sec. The remaining animals showed tachycardia of ventricular origin, sometimes transitory but not fatal ventricular fibrillation. In a few animals, $CaCl_2$ injection was followed by a lasting apnea with progressively developing bradycardia and cardiac arrest or fibrillation as a consequence of asphyxia. These experiments were excluded from further evaluation. For statistical analysis of the experimental data, the fourfold contingency test was used[10]. Myocardial norepinephrine content was determined by the spectrophotofluorometric method[11].

Results are summarized in the Table. As can be seen, the adrenergic β-receptor blocking agents I-06 and propranolol reduced significantly the incidence of $CaCl_2$-induced ventricular fibrillation if given immediately prior to the $CaCl_2$. Doses giving optimal protective action are shown in the Table. Prolonged administration for 5 days of these substances, in the highest doses tolerated, has shown propranolol to be ineffective against $CaCl_2$ fibrillation if the latter was administered 24 h after the last treatment, whereas I-06 exhibited under the same circumstances a highly significant protective action, just as in the acute experiments.

Parallel estimation of the myocardial norepinephrine content has indicated no significant change ($P > 0.2$) in the rats receiving prolonged propranolol treatment, whereas a 60% decrease was observed in the I-06 treated animals [NE content fell from 930 ng/g wet tissue ($n = 15$) to 379 ng/g wet tissue ($n = 15$), $P < 0.001$]. Prenylamine, known to possess similar catecholamine depleting action, provided, like I-06, significant protection 24 h after treatment even if given in the form of a sufficiently high single dose. Guanethidine displayed the strongest protective action 6 h after a single dose of the drug, but even after 24 h this effect was still present ($P = 0.02$). Reserpine – equally catecholamine depleting – had only a slight antiarrhythmic effect, in spite of the variation of dosage as well as of the time interval between treatment and $CaCl_2$ injection. Optimal effect was observed with a 5 mg/kg dose and a time interval of 24 h. α-methyldopa showed a very strong protective action if administered in a 500 mg/kg dose 30–60 min prior to $CaCl_2$ injection, a lower dose (320 mg/kg) had no effect. Bretylium tosylate in a dose of 40 mg/kg, given 30 min and 6 h respectively prior to $CaCl_2$, proved to be ineffective on the incidence of ventricular fibrillation.

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