to be rapid in rat plasma[12] and LPS is believed to activate factor XI (PTA)[13]. Heparin is known to block activated factor IX, and part of the effect of heparin in slowing aggregation in vitro may be related to its action in the intrinsic coagulation system. Although 5-HT is known to cause aggregation of human platelets, its action on rat platelets was variable; and it did not appear to increase aggregation of platelets by LPS[14].

Zusammenfassung. Die Aggregation von Blutplättchen durch *Escherichia coli* Endotoxin wurde untersucht: Die Blutplättchenanhäufung erweist sich anfänglich als langsam, dann aber als sehr schnelle Abnahme der optischen Dichte eines blutplättchenreichen Plasmas. Die schnelle Abnahme der optischen Dichte konnte durch Heparin, und zwar nur in grösserer Menge, unterdrückt werden. Der Beginn der schnellen Ansammlung wurde durch Adenosin verzögert, wobei aber Adenosin keine Wirkung auf den Grad der Anhäufung durch das Endotoxin hatte. Die Ergebnisse weisen darauf hin, dass in vitro Thrombin und Adenosindiphosphat die Thrombozytenaggregation durch Endotoxin unterstützen.

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The Occurrence of Dopamine and Noradrenaline in the Tubero-Hypophysial System

It has been found with a specific fluorescence method that a great number of primary catecholamines containing nerve fibres terminate around the hypophysial portal capillaries in the median eminence[1-3]; the monoamine involved is mainly dopamine, but some noradrenaline is also present[1]. The site of origin of the nerve fibres forming the tubero-hypophysial system seems to be the arcuate and periventicular nuclei[2,4]. In the present work, the content of dopamine and noradrenaline in the median eminence and infundibular stem region, the mediobasal hypothalamus and the rest of hypothalamus of man, pig and cattle was determined chemically. The post-mortem changes in the content of the amines were studied as well.

Material and methods. The material consisted of 9 men, 40 pigs and 30 cows. The brains were dissected from pig within 5 min, from cattle within 15 min and from man 6–18 h after death. The human brains were selected in the autopsy room from patients not having suffered from cerebral or mental disease, but having died either from infection or from diseases of the circulatory system. Tissue samples of the median eminence-infundibular stem region, mediobasal hypothalamus and the rest of the hypothalamus were pooled from 5 pigs and 3 cows and assayed as 1 sample, whereas the tissue samples from man were assayed individually. The tissues were homogenized immediately in perchloric acid, centrifugated and stored frozen until analyzed, usually within a few days. Dopamine was determined by the method of Carlsson and Waldeck[5] and noradrenaline as described by Crout[6].

In order to study the post-mortem changes 30 rats were killed at 08.00 and the brains were dissected immediately, 1, 12 and 24 h after death. Before autopsy the killed rats were stored at + 4 °C. The content of dopamine and noradrenaline in the brain excluding the cerebellum was determined as described above.

Results and discussion. The content of dopamine and noradrenaline in the median eminence and infundibular stem region, in the mediobasal hypothalamus and in the rest of hypothalamus of man, pig and cattle are summarized in Table I. The highest values of dopamine were found in the median eminence and infundibular stem region and that of noradrenaline in the mediobasal hypothalamus although there was some species difference.

As shown in Table II, the content of noradrenaline in the rat brain decreased significantly already 1 h after death, whereas the significant decrease of dopamine content occurred after 24 h.

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Table I. Content (μg/g) of dopamine (DA) and noradrenaline (NA) in the median eminence and infundibular stem region (ME), the mediobasal hypothalamus (MBH) and the rest of hypothalamus (RH) of man, pig and cattle.

Species	ME		MBH		RH	
	DA	NA	DA	NA	DA	NA
Man						
Mean S.E.M. No.	0.24 ± 0.101 (9)	1.66 ± 0.349 (9)	0.18 ± 0.075 (9)	1.34 ± 0.163 (9)	0.34 ± 0.046 (9)	0.45 ± 0.092 (9)
Pig						
Mean S.E.M. No.	0.85 ± 0.135 (8)	0.78 ± 0.086 (8)	0.14 ± 0.027 (8)	1.97 ± 0.146 (8)	0.13 ± 0.024 (8)	0.61 ± 0.054 (8)
Cattle						
Mean S.E.M. No.	0.43 ± 0.095 (10)	0.91 ± 0.124 (10)	0.27 ± 0.066 (10)	1.71 ± 0.141 (10)	0.07 ± 0.007 (10)	0.76 ± 0.086 (10)

Table II. Content ($\mu g/g$) of dopamine and noradrenaline in the rat brain excluding the cerebellum 0, 1, 12, and 24 h after death

h after death	No. of animals	Dopamine Mean ± S.E.M.	%[a]	P[b]	Noradrenaline Mean ± S.E.M.	%[a]	P[b]
0	14	0.61 ± 0.035			0.49 ± 0.015		
1	8	0.52 ± 0.054	85.2	> 0.05	0.36 ± 0.026	73.5	< 0.01
12	4	0.51 ± 0.049	83.6	> 0.05	0.32 ± 0.019	65.3	< 0.001
24	4	0.36 ± 0.033	59.0	< 0.001	0.32 ± 0.018	65.3	< 0.001

[a] Percentage of 0 h value. [b] Compared with 0 h value.

The results show that the areas including the tuberohypophysial system contain the highest concentration of dopamine and noradrenaline in the hypothalamus. According to the pharmacological experiments, the main monoamine in the fluorescent nerve fibres in the median eminence of the rat and mouse is dopamine, but noradrenaline is also present, although to a lesser degree[1]. In the species investigated in the present work, relatively high amounts of noradrenaline were present in the median eminence and infundibular stem region. This is presumably due to species differences as has been observed in cat, sheep and goat[7]. The highest value of noradrenaline was in the mediobasal hypothalamus which is obviously based on the existence of many noradrenaline-containing neurons in this area; these do not belong to the tuberohypophysial system and terminate elsewhere than in the median eminence.

It was found that the content of dopamine and noradrenaline in the rat brain decreased after death, as has been reported in rabbit[8] and man[9]. Thus the relatively long interval between death and autopsy in man has very probably affected on the values obtained.

Zusammenfassung. Mit chemischer Methode wurden bei grösseren Tierarten die Mengen von Dopamin und Noradrenalin im Eminentia-mediana-Infundibulum-Gebiet, im mediobasalen Hypothalamus und im Endteil des Hypothalamus bei Mensch, Schwein und Rind genau bestimmt. Die höchste Konzentration von Dopamin wurde in Eminentia mediana und die höchste Konzentration von Noradrenalin im mediobasalen Hypothalamus gefunden.

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Staining of the Reducing Material in the Tubero-Hypophysial System of the Rat with Osmium Tetroxide

Histological[1–4], histochemical[2,5] and, recently, electron microscopic[6–10] techniques have demonstrated that numerous hypothalamic nerve fibres terminate in the median eminence around the capillaries of the hypophysial portal vessels constituting a neurovascular link between the hypothalamus and the anterior pituitary gland. The exact site of origin of these nerve fibres is not completely clear. However, recent experimental studies[11,12] with the histochemical fluorescence method have indicated the arcuate and periventricular nuclei to be the main site of origin of the catecholamine containing nerve fibres. In the present work the existence of a similar tuberohypophysial system is demonstrated using a combination of glutaraldehyde and osmium tetroxide technique to visualize reducing material in its neurons.

Material and methods. The material consisted of adult female and male rats of Long-Evans strain. After rapid decapitation, the hypothalamus was removed and fixed for 4–6 h in $6^1/_2$% glutaraldehyde buffered to pH 7.3 with a phosphate buffer. Then the tissue blocks or 20 μ thick frozen sections were treated with cocodylate buffered 0.5% osmium tetroxide (pH 7.0) for 20–40 min in room temperature. Some of the sections were treated with 0.1-*N* NaOH for 20–30 min.

Results. The treatment in glutaraldehyde and osmium resulted in a black staining of the perikarya of the neurons in the arcuate (infundibular) and periventricular nuclei (Figure 1). The finely granular precipitate was evenly distributed in the cytoplasm of the perikaryon and extended often into the axon (Figure 2). The staining was restricted to the small neurons of the nuclei. They were, however, scattered throughout the above-mentioned nuclei (Figure 1).

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