mius-soleus, and in Figure 2 for a motoneurone of the pretibial flexors. Figure 1, records G, H, and I, also illustrates that this inhibition is evoked by stimuli that evoke neither a dorsal root potential (DRP) nor a postsynaptic potential in the motoneurone. Furthermore, these reticular stimuli have no effect on the Ia EPSP or IPSP (Figure 1, C and F; Figure 2, C, D, G, and H). Since the conditioning reticular stimulation has no effect on primary afferents or motoneurones, it is concluded that the inhibition is exerted on the interneurones transmitting effects from the FRA. The time course of the inhibition is shown in the curve of Figure 2. The same reticular stimuli in addition effectively depress the transmission from the FRA to primary afferents and to different ascending spinal pathways. These depressant actions are similar to those tonically active in the decerebrate state. The effect is evoked from a region within the reticular formation that is more ventral than that from which postsynaptic inhibition is produced at the lowest strengths of stimulation in motoneurones[8]. We propose to denote this descending pathway mediating the inhibition to reflex pathways, the dorsal reticulospinal tract.

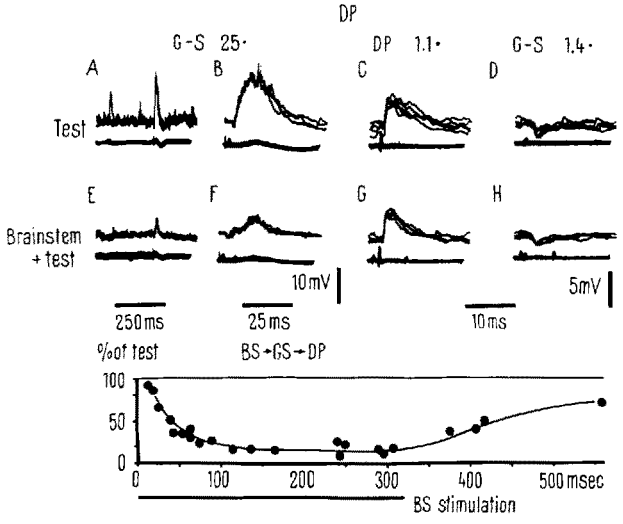

Fig. 2. Inhibition from the reticular formation of transmission from the flexor reflex afferents (FRA) to a flexor motoneurone. A and B, taken simultaneously at different sweep speeds, show the EPSP evoked from high treshold muscle afferents in the gastrocnemius-soleus (G-S) nerve. In the corresponding lower records E and F the EPSP is depressed by stimulation of the brain stem (the same site, frequency and strength as in Figure 1). The time course of the depression is shown in the curve. There is no depression of the Ia EPSP and IPSP, shown unconditioned in C and D and conditioned by brain stem stimulation in G and H. As in Figure 1 the conditioning stimulation of the reticular formation evokes neither a dorsal root potential (DRP) nor a postsynaptic potential in the motoneurone, hence the inhibition is exerted at the interneuronal level.

Experiments are in progress to disclose the mechanism whereby the inhibition is achieved. We have observed that reticular stimulation effectively inhibits activation of interneurones from the FRA; but, in the few interneurones so far investigated with intracellular recording, there has been no postsynaptic inhibition. Presynaptic inhibition at an interneuronal level should also be considered as a possible mechanism.

Résumé. La transmission entre les afférences des réflexes de fléxion (FRA) et les motoneurones peut être inhibée par une stimulation de la formation réticulée bulbaire, sans qu'il se produise une dépolarisation des afférences primaires ou un potentiel postsynaptique des motoneurones. On conclut qu'il existe une inhibition des neurones intercalaires entre les afférences des réflexes de fléxion et les motoneurones.

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PRO EXPERIMENTIS

Fluorescent Staining Techniques in Early Diagnosis of Tissue Alterations

Fluorescent staining techniques have been used in histology mainly in order to differentiate live tissues from dead[1–6]. In developing fluorescent staining techniques, we found this method helpful for demonstrating early degenerative alterations in parenchymal cells that did not show in tissues stained by conventional techniques.

The method proved very sensitive when examining the effect on parenchymal cells of rat livers of a new chemotherapeutic agent (a nitrofurane derivative synthesized at the Institute of Organic Synthesis of the Latvian Academy of Sciences: Director, Professor S. A. Hillers). The sensitivity of this method was confirmed also when examining cancer cells of human tumours.

The compound mentioned above was administered to white rats at a level of 6 mg/kg body weight daily for 20, 40, 60, 80 and 100 days. Animals were sacrificed and small pieces of their livers fixed in a solution of 10% neutral formalin. Frozen sections were stained with a 0.1% solution of coriphosphine on Krebs-Ringer solution at pH 7.4,

as well as with hematoxylin and eosin and Sudan III. Intensity of fluorescence was measured by a photomultiplier.

Fluorochromed sections of liver tissue from rats that had been given the chemotherapeutic agent for 20–40 days, showed apple-green fluorescence of cytoplasm and yellow-green fluorescence of nuclei in parenchymal cells forming a narrow circle around the central veins of liver lobules (EMF of fluorescence from 0.84–0.96 V). In animals that were given the compound for 60 days, bright apple-green fluorescence of cytoplasm was found in a considerable number of cells forming a wide belt around central veins (EMF of fluorescence 1.60–1.84 V). In some lobules, apple-green fluorescence was present in all parenchymal cells. Small zonal necroses of liver tissue were found in animals that had been administered the compound for 80–100 days, the necrotic tissue giving a brilliant yellow-green fluorescence (EMF of fluorescence 2.1 V). Liver tissue of control animals that were not given the compound showed uniform dark green fluorescence of parenchymal cells, their nuclei remaining invisible (EMF of fluorescence 0.42–0.44 V).

In sections of liver tissue stained by conventional methods, the first signs of cloudy swelling were found in animals that had been fed the chemotherapeutic agent for not less than 60 days.

The neoplastic tissue examined consisted of 35 untreated human tumours of various histological structure that were fixed and stained by the techniques described above.

Fluorochromed sections showed dark green fluorescence (EMF from 0.38–0.85 V) in the bulk of the cancer cells forming solid clusters or adenomatous structures, while apple-green fluorescence of cytoplasm (EMF from 1.97 to 2.18 V) was noted in tumour cells bordering on these clusters and structures. Apple-green fluorescence was also found in cancer cells situated around necrotic areas of cancer tissue, the necrotic tissue showing a brilliant apple-green fluorescence assuming in places a reddish tint (EMF from 1.98 to 2.00 V). Epithelial pearls of squamous cell carcinomas fluoresced brightly (EMF from 2.10 to 2.20 V). Sections stained by conventional methods showed signs of fatty degeneration of cancer cells around necrotic foci, the rest of the cells showing no signs of damage.

These results prove that histological investigations by fluorochrome staining techniques may permit the demonstration of alterations in cell metabolism up to 40 days earlier than investigations by conventional methods. They show also that in cancer tissue alterations of cell metabolism may occur that cannot be demonstrated by conventional techniques. On the other hand, our findings prove that, on the grounds of results gained by conventional staining techniques, altered cells and tissues may well be mistaken for normal undamaged ones.

Zusammenfassung. Lumineszenzmikroskopisch wurde in histologischen Schnitten nachgewiesen, dass nach Nitrofuranverabreichung der Anstieg der Fluoreszenzintensität der Leberzellen im Lebergewebe von Ratten dem Störungsgrad des Zellmetabolismus entsprach. Im Tumorgewebe kranker Tiere lokalisierten sich intensiv fluoreszierende Zellen am Aussenrande von Krebsnestern.

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Beschleunigtes Wachstum von Karpfen in Aquarien mit Hilfe biologischer Wasserklärung

Für züchterische Arbeiten an Nutzfischen wird eine Haltungsweise benötigt, die die ständige Kontrolle der Tiere erlaubt. Dies ist in der üblichen Teichhaltung nicht gegeben.

Wir entwickelten daher eine Aquarienhaltung für Karpfen, die neben der vollständigen Kontrollmöglichkeit im Gegensatz zu allen bisher bekannten Versuchen ein erheblich schnelleres Wachstum der Fische als unter natürlichen Bedingungen ergibt. Der bisher als Grund für nur minimale Gewichtszunahme in Aquarien namhaft gemachte sogenannte «Raumfaktorenkomplex» besteht nach unserer Ansicht in erster Linie in unzureichender Wasserreinigung.

Wir haben Karpfen verschiedener Altersstufen in Plastikbehältern von 40 l Fassungsvermögen gehalten, deren Wasser durch ständigen Ab- und Zufluss in den Cyclus einer biologischen Selbstreinigung eingefügt wurde. Kernstück dieses geschlossenen Kreislaufes stellt ein Belebtschlammbecken dar, in dem neben der Oxydation und Mineralisierung der organischen Substanzen durch Bakterien eine Verarbeitung, Umlagerung und Durchlüftung des Schlammes durch eingesetzte Tubificiden erfolgt.

Bei Wassertemperaturen von 23–25°C erreichten die Karpfen in diesem geschlossenen Wassercyclus beachtliche Gewichtszunahmen. Zu Anfang des Winters eingesetzte einsömmerige Karpfen, die mit Stückgewichten von 8 bis 10 g weit unter dem Durchschnitt normaler K_1 (25–30 g) lagen, erreichten in sechs Monaten ein Durchschnittsgewicht von 135 g – Einzelexemplare 275 g.

Drei ebenfalls zu Wintersanfang mit einem durchschnittlichen Stückgewicht von 140 g in ein gemeinsames 40 l-Becken eingesetzte K_2 haben jetzt nach 6 Monaten Stückgewichte von 915, 910 und 815 g.

Diese Gewichtszunahmen (Verdreizehnfachung bzw. Versiebenundzwanzigfachung bei den kleinen und Versechsfachung bei den grösseren Karpfen) wurden während der Wintermonate erzielt. Die Fütterung erfolgte mit Fertigfutter für Karpfen und Forellen unter Zugabe von Tubifexen und Daphnien. Mittels einer zentral ange-