their post-tetanic depression was gradually reduced. When the DRPs were produced at 4 times the threshold strength, their changes following tetanization were negligible and consisted in reduction of the depolarization only to 95–99% of the control. It follows from these experiments that the size of the post-tetanic depression of the ipsilateral DRP is inversely proportional to their initial amplitude. On the contralateral side of the cord, the relationship between the size of the DRPs and their depression occurring just after terminating the tetanus proved to be quite opposite. The greater the amplitude of contralateral DRPs, the greater their post-tetanic depression. On the other hand, the delayed post-tetanic potentiation of the contralateral DRPs was inversely proportional to their preceding depression.

Our experiments reveal that in contrast to the DRPs evoked by stimulation of the whole dorsal roots or of the muscle afferents which exhibit appreciable post-tetanic potentiation[2,3,5], the depolarization of the dorsal roots produced by stimulation of the cutaneous nerves undergoes mainly post-tetanic depression. The other trait of the post-tetanic changes of the DRPs observed in our experiments seems to be connected with differences in depolarizations resulting from testing volleys on both sides of the cord. The contralateral DRPs are much smaller than the ipsilateral ones[4], and it was found that they appear at slightly higher intensities of afferent stimulation. Hence, at very low intensities of stimulation, contralateral depolarizations are almost invisible and post-tetanic depression of presynaptic inhibition may be considered to occur exclusively on the ipsilateral side of the cord. On the contrary, when the strength of the testing stimulation is high enough to excite all alpha cutaneous afferents, following tetanization only contralateral DRPs are affected.

The described pattern of post-tetanic depression shows that only in a narrow range of the stimulation intensities producing the testing DRPs (such as chosen to produce changes illustrated in Figures 1 and 2) it is possible to evoke bilateral reduction of presynaptic inhibition. Even in these instances the depression of the contralateral DRP is rapidly followed by its potentiation. Both at low and at high intensities of the testing stimulation, the alterations of the DRPs concern only one side of the cord. These findings suggest the existence of a subtle mechanism counteracting the simultaneous decrease of presynaptic inhibition on both sides of the lumbar spinal cord.

Summary. In spinal cats following tetanic stimulation of the cutaneous nerve bilateral dorsal root potentials in the lumbar spinal cord are depressed. Because of differences between ipsi- and contralateral potentials, this depression can usually be evoked only on one side of the cord.

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Development of Longitudinal Retraction of Carotid Arteries in Neonatal Dogs

The large arteries of the body are under longitudinal traction. This extends the vessels and has several physiological effects: a) traction interacts with blood pressure to help maintain arteries at constant length[1], b) traction and longitudinal extension alter arterial pulse wave velocity, and thus, indirectly influence arterial pressure[2], c) traction causes retraction of severed arteries, promoting hemostasis[3].

Longitudinal traction has been measured directly[1], but more frequently it has been assessed by measuring vessel retraction upon excision. For example, when severed, the carotid artery in adult dogs retracts about 38%[1,4,5]. The magnitude of this value varies in different vessels and in different species, but retraction occurs in virtually all arteries studied[1,4–8]. What is the genesis of longitudinal traction and how does it develop? The present experiments were undertaken to consider this question by evaluating the retraction of carotid arteries in neonatal dogs.

Method. Two groups of puppies were used. Pregnant mongrel dogs were purchased from Sleepy Hollow Farms to obtain puppies up to 4 weeks of age. The pregnant animals delivered their puppies in the laboratory, and the puppies were nursed by the mother until the time of experiment. Animals 4 weeks of age and older were purchased directly from Sleepy Hollow Farms. Animals were housed in groups according to age, and were fed Purina High Protein Lab Chow and water ad lib until they were studied. Each animal was anesthetized, placed on its back with the head and neck in a natural position, and the animal was used for various experiments concerned with the physiology of the newborn. At the completion of these experiments the animal was sacrificed by i.v. injection of a supersaturated solution of KCl to arrest the heart. A longitudinal incision then was made in the neck lateral to the midline. The incision was carried down to expose the carotid trunk, the sheath was opened and the vagus nerve and internal jugular vein were excised to expose about 3 cm length of isolated common carotid artery. A measured length of vessel was marked by placing 2 small notches in the wall precisely 20 mm apart. The artery then was transected distal to this measured segment and the vessel was permitted to retract; after waiting about 1 min the distance between the 2 notches was measured to the nearest 0.25 mm. Vessel retraction was computed as the difference between the extended and retracted lengths, divided by the extended length. Multiplying this value by 100 gave vessel retraction as a percent of its original in situ length.

Results. A total of 105 common carotid arteries were studied in puppies between 0 and 16 weeks of age. The Figure presents carotid artery retraction values and animal body weight values, both plotted as a function of

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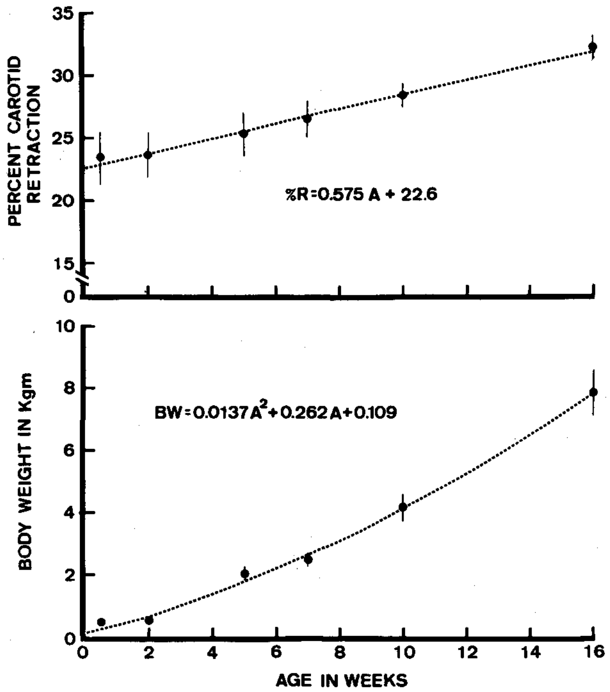
chronological age. The circles indicate means, and the vertical bars indicate standard errors. The numbers over each point are the number of vessels examined at that age. The upper graph indicates a remarkably linear increase in vessel retraction with age, from 23.4 ± 2.2% in the 1-week-old animals to 32.2 ± 0.9% in the 16-wek-old animals. These data were described by the linear equation shown, and predict a 22.6% artery retraction at the time of birth.

Body weight was used as an index of overall body growth. The lower curve in the Figure indicates that the animals body weight increased nonlinearly during the same developmental period. These data were fitted with the quadratic equation shown. The increase in body weight during this period implies that the unstretched carotid artery, as most other body tissues, probably grew in length. However, the increasing magnitude of retraction observed when the vessels were transected indicates that the vessels were stretched even more than they had grown.

Discussion. The present data show that longitudinal retraction develops as arteries gradually are extended during growth. A second determinant of vessel retraction may be developmental changes in the connective tissue composition of the vessel walls. Studies in various species report that during late fetal development artery walls thicken and exhibit increased medial collagen[9]. In the neonatal period there is further deposition of fibrous proteins in the subendothelium[10] and in the media[11,12]. During this period the ratio of collagen to elastin in the artery wall increases[13], and this correlates with increasing circumferential and longitudinal wall stiffness[13]. Thus, both increased stretch and increased collagen content may play a role in the development of longitudinal retraction. However, with aging in adults, there is still further deposition of collagen in the vessel wall[14–18], but this is associated with *decreased* longitudinal retraction[6–8]. The decline in retraction which occurs with age actually may result from the continued accumulation of collagen; fibres deposited after vessels have achieved a stable length in the mature animal resist both retraction and extension. In addition, the development of stiff atherosclerotic plaques also tends to fix the vessels at their mature length. Both of these processes result in decreased longitudinal retraction. Decreased retraction has clinical importance, for the length of these arteries is maintained by the rigidity of their walls instead of by the length-stabilizing interaction of traction and arterial pressure. One might expect these vessels to buckle or bend with pressurization, and indeed, severe tortuosity of carotid and innominate arteries in aged patients has been described[19–21].



Graph of percent artery retraction and of body weight, both plotted as a function of age. Vessel retraction increases linearly with age.

Summary. Longitudinal retraction of carotid arteries, was examined in 105 neonatal puppies as a measure of longitudinal traction. Percent vessel retraction increased linearly with age. This was attributed to stretching of the vessels by growth and to changes in connective tissue composition. The mechanical significance of artery retraction was discussed.

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Seasonal Changes in the Circadian Variation of Oral Temperature During Wakefulness

The circadian variation of body temperature is an entrained endogenous rhythm which in the total absence of time cues (Zeitgebers) is of approximately 24 h periodicity (circadian). With man, a visually oriented animal, an important Zeitgeber is light and darkness[1–4]. In view of the seasonal changes in length of natural daylight the circadian rhythm of body temperature may also show seasonal changes, particularly with peak times. The only previous study of this type was of Eskimos[5] where a seasonal change in peak time of about $2^1/_2$ h was found. The extreme conditions of the Arctic preclude comparisons with people from lower latitudes. The present study investigated whether the circadian rhythm of oral temperature in European subjects would show any similar seasonal changes. Sampling was oriented towards times of the year when daylight length was 1. minimum