The markedly hypotensive effect during the mackerel diet is consistent with the more than twofold higher intake of EPA and DHA with the mackerel as compared to the herring diet. Which of the two n-3 fatty acids is more effective, should be clarified by further studies. The mechanisms involved remain to be elucidated. If the dietary intake of n-3 fatty acids can be confirmed as the determinant factor, blood pressure lowering might be considered to be caused by changes in lipid composition and fluidity of cell membranes at receptor sites of vasoactive hormones or neural transmitters. Furthermore, direct effects of prostaglandins of the 3-series derived from EPA on vessel wall[11-13] or on transmitter release, similar to the effects of prostaglandins of the 2-series[14], should be considered.

From the preventive point of view, it seems relevant that also in patients with essential hypertension and HLP, respectively, a decrease of systolic blood pressure and atherogenic serum lipids by dietary n-3 fatty acids could be confirmed. The results suggest that the favorable influence of diets enriched with n-3 fatty acids on the cardiovascular risk is not restricted to a decrease of atherogenic lipoproteins[8-10], an increase of HDL[15] and reduced platelet aggregation[16,17] but might include other parameters which have not yet been mentioned. Moreover, recent data reveal a beneficial long-term effect of dietary supplementation with fish oils on several risk factors and on coronary heart disease[2]. The data which already exist are encouraging and should stimulate further experimental work.

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An analysis of the distribution of the myelinated nerve fibers in the optic fascicle of a Beagle dog[1]

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Summary. The composition of both optic fascicles of a Beagle dog was studied in topographically oriented, semithin transections of whole nerve stained with toluidine blue. About 165,000 myelinated fibers were present in each nerve, their maximum caliber reaching 11 μm; large, less densely arranged fibers occurred especially in the dorso-temporal region.
Key words. Beagle dog; myelinated fibers; optic fascicle.

Little is known about the composition of the optic nerve in the dog; the cat has been much more studied in this respect. The total number of nerve fibers in the dog optic nerve, estimated by means of a random, sample technique using silver-stained, paraffin sections from ten dogs of various breeds, lies between 126×10^3 and 165×10^3 [2,3]. Our assessment[4] of the number of myelinated fibers in the optic nerve of the beagle dog, using random sampling on toluidine blue-stained, semithin sections from six individuals, indicates an average of 177×10^3.

The technique of random sampling has serious disadvantages, e.g. the sampling error, and the lack of detection of regional differences; for this reason, a complete examination of the whole cross-sectional area of the optic nerve should give optimal results; however, due to the large number of nerve fibers, this approach is only applicable to single specimens.

We report here a total count of the number of myelinated nerve fibers in both optic nerves of a Beagle dog. We have taken into consideration the topographical orientation to show the regional differences in the distribution and caliber of the fibers.

A healthy, purebred, adult, female Beagle dog (five years old and weighing 11.6 kg) was deeply anesthetized with sodium pentobarbital; fixation was immediately carried out by perfusion of 4% formaldehyde followed by 5% glutaraldehyde in 0.1 M phosphate buffer directly into the heart. Portions of the left and right optic fascicles were dissected out; two adjacent transections of each fascicle were taken exactly 8 mm behind the globe (one from each in reserve) after finely notching the dorsal and temporal margins (for the purpose of orientation). The specimens were postfixed with glutaraldehyde, chrome-osmificated with Dalton's solution, and embedded in Spurr epoxy resin. Semithin sections (1 μm) were stained with toluidine blue, and photographed using the light microscope to give a final magnification of × 1000; the whole cross section of the nerve was then reconstructed. A grid was laid on each photomicrograph, subdividing each nerve into square fields, each one representing 40,000 μm^2 (200 × 200 μm); each field was identified by using a combination of letters and numbers (fig. 1). All myelinated fibers in each square were counted; the average caliber of each fibre was determined in selected fields by measuring the greatest and smallest outer diameter of each myelin sheath.

The right and the left optic nerve both contained a similar number of myelinated nerve fibers (165,238 and 164,888, respectively) despite different sizes in cross-sectional area (2.5092 and 2.8790 mm^2, respectively); since the smaller right nerve possessed essentially the same number of myelinated fibers as the larger left nerve, its average density of fibers/mm^2 was higher (65,853

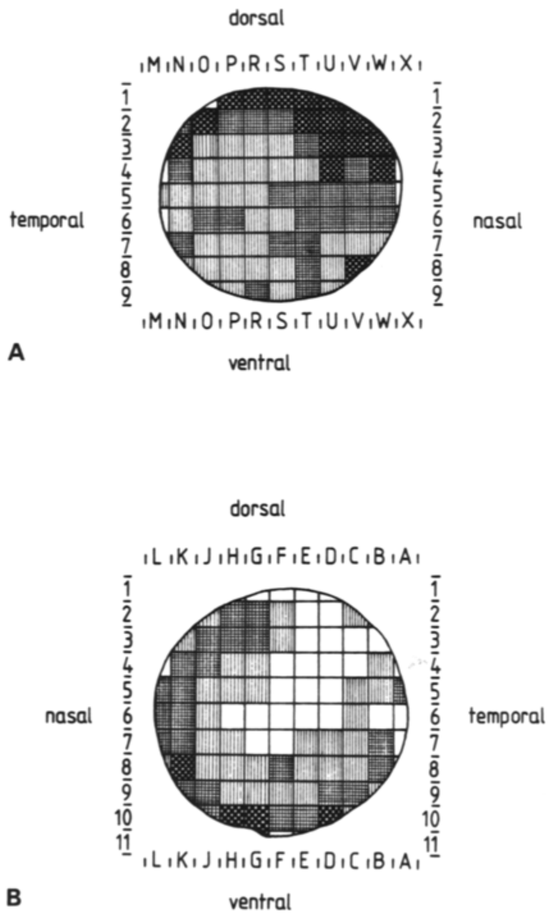

Figure 1. Density of myelinated fibers in the right (A) and the left (B) optic nerves expressed as number of fibers/40,000 μm^2 (full surface of a square field 200 × 200 μm): □ less than 2000; ▤ 2001–2500; ▦ 2501–3000; ▩ more than 3000.
The fiber numbers in the incomplete squares at the nerve margins were adjusted.

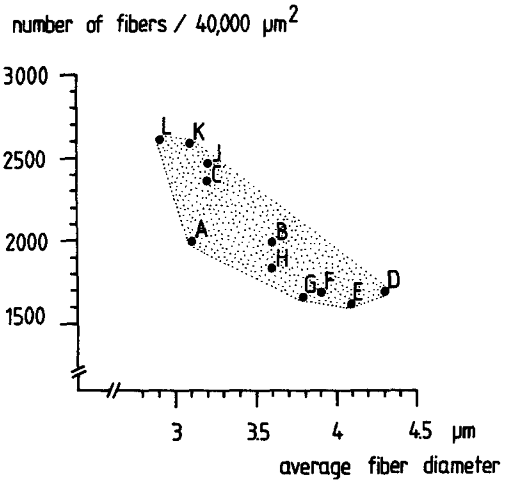

Figure 2. Relationship of fiber density to average fiber diameter in square fields A_6 to L_6 from the left optic nerve. The dotted area indicates the estimated range of values. The Kendall rank correlation coefficient $\tau = -0.68$; a test for significance of τ revealed statistical evidence for associating the two variables ($p < 0.002$).

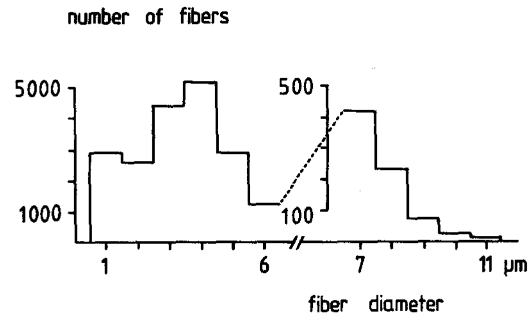

Figure 3. Distribution of fiber caliber in all 19,915 myelinated fibers found in the horizontal row of square fields '6' from the left optic nerve.

and 57,273, respectively). Both nerves showed a variable regional distribution of myelinated fibers with maximum fiber density in fields at the nerve margin, and minimal in the dorso-temporal area – more distinct in the left than in the right nerve (fig. 1). Since the optic nerve fibers are regularly arranged and project onto the central visual nuclei in a 'retinotopic' manner[5], the dorso-temporal region of the optic nerve should contain those fibers originating in the dorso-temporal area of the retina, i.e. in the central area[6]. The low density of fibers at this site (in the optic nerve) would thus indicate the presence of large-caliber fibers originating from the central area – this inference is based on the inverse correlation between the caliber and the density of the fibers (fig. 2).

Analysis of fiber-caliber distribution (fig. 3) showed that the largest fibers in the dog optic nerve were 11 μm in diameter. Only the cat possesses optic nerve fibers of a similar size[7] – the upper limit of optic nerve fiber caliber in the other mammals investigated is much lower. This interspecies difference in size should be reflected by a similar difference in the conduction velocity of the nerve impulse; indeed, physiological studies on the cat optic nerve have demonstrated the presence of fibers conducting as rapidly as 70 m/sec[8]; in contrast, the fastest conduction velocity in species equipped with smaller optic nerve fibers is much lower, e.g. 20 m/sec in the rhesus monkey, with a maximum fiber caliber reaching 6 μm.

Our analysis of the composition of the optic nerve of the dog allows us to conclude that its physiological capabilities may be comparable to those of the cat: a brisk reaction to visual stimuli seems to be provided by the presence of large optic nerve fibers in both carnivorous species. This analysis, furthermore, has demonstrated both the topographical diversity and the individual variability that can occur in the optic nerves of one animal.

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