Abstracts

AB-2680-76
Nonketotic Hyperglycemic Hyperosmolar Coma. Report of Neurosurgical Cases With a Review of Mechanisms and Treatment — Park BE (Division of Neurosurgery, Vanderbilt University Hospital, Nashville, Tennessee 37232), Meacham WF, Netsky MG — J Neurosurg 44: 409-417 (Apr) 1976*

Seventy-eight critically ill patients who died while on the neurosurgical service were studied retrospectively to establish the prevalence of nonketotic hyperglycemic hyperosmolar coma (NHHC). All patients had been comatose before death, and all underwent necropsy. Criteria for the diagnosis of NHHC included moderate-to-severe hyperglycemia with glucosuria, absence of significant acetonuria, hyperosmolarity with dehydration, and neurological dysfunction. This study revealed seven cases of unequivocal NHHC (9%), and six of hyperosmolarity but with incomplete records. Five of the seven confirmed cases of NHHC demonstrated no evidence of cerebral edema, transmantorial herniation, or brain stem damage, and showed central nervous system (CNS) lesions compatible with survival. Fatal complications of this syndrome, such as acute renal failure, terminal arrhythmias, and vascular accidents, both cerebral and systemic, were common in this series. The mechanism of coma in NHHC is believed related to shifts of free water from the cerebral extravascular space to the hypertonic intravascular space, with subsequent intracellular dehydration, accumulation of metabolic products of glucose, and brain shrinkage. It is uncertain whether injury to specific areas in the CNS is a predisposing factor to the development of NHHC. Factors documented to be significant in its development include nonspecific stress to primary illnesses, hyperosmolar tube feedings, dehydration, diabetes, and mannitol, Dilantin, or steroid administration.

AB-2681-76

The authors studied the effect of high cervical cord section on the phenomenon of autoregulation in the rhesus monkey with the hydrogen clearance method to measure focal spinal cord blood flow (SCBF). Laminectomies were performed at T7-11 and C1-2. The spinal cord was completely severed at C1-2. Under normocapnic conditions, SCBF was then measured in the thoracic spinal cord over a wide range of blood pressures (MAP). The MAP was either lowered by bleeding or raised by the intravenous infusion of antifibrinolytic therapy in ruptured intracranial aneurysms is discussed.

AB-2682-76
Use of Epsilon Aminocaproic Acid (EACA) in the Preoperative Management of Ruptured Intracranial Aneurysms — Sengupta RP (Department of Neurosurgery, Newcastle General Hospital, Newcastle upon Tyne, NE4 6BE, England), So SC, Villarejo-Ortega FJ — J Neurosurg 44: 479-484 (Apr) 1976*

The authors report their experience with the use of epsilon aminocaproic acid (EACA) in the preoperative management of a series of patients with ruptured intracranial aneurysms. A similar series of patients was taken as control. They found that EACA is of definite value in preventing recurrent hemorrhage in the preoperative period. The significance of antifibrinolytic therapy in ruptured intracranial aneurysms is discussed.

AB-2683-76
Jugular Venography for Evaluation of Abnormalities of the Skull Base — Quencer RM (Department of Radiology, Downstate Medical Center, State University Hospital, Brooklyn, New York 11203), Tenner MS, Rothman LM, Laster DW — J Neurosurg 44: 485-492 (Apr) 1976*

Jugular venography done to evaluate abnormalities at the base of the skull demonstrated three distinctly different patterns depending on whether there is occlusion, invasion, or growth within the internal jugular vein. Improper technique results in a lack of intracranial dural sinus filling which may masquerade as venous occlusion. This problem is avoided by adequate neck compression along with proper volume and rate of delivery of contrast. Radiographically, an abnormal jugular vein at the base of the skull will show a concave defect in true occlusion, constriction or invasion of the vein by tumor, or tumor growth within the vein.

AB-2684-76
Fatal Paradoxical Muscle Embolization in Traumatic Carotid-Cavernous Fistula Repair. Case Report — McCormick WF (Division of Neuropathology, University of Texas Medical Branch, Galveston, Texas 77550), Kelly PJ, Sarwar M — J Neurosurg 44: 513-516 (Apr) 1976*

A unique case of fatal paradoxical muscle embolism in a patient with a traumatic carotid-cavernous fistula is described. The muscle plug intended to occlude a left-sided fistula passed through the large fistula, bypassed the lungs by way of a patent foramen ovale, and embolized through the right carotid artery to lodge in the internal carotid and middle cerebral arteries producing fatal brain infarction.

AB-2685-76
Middle Cerebral Artery Embolectomy. Case Report — Garrido E, Stein BM (Department of Neurosurgery, Tufts-New England Medical Center, Boston, Massachusetts 02111) — J Neurosurg 44: 517-521 (Apr) 1976*

*Authors' abstract. These abstracts were assembled for publication by the Neurological Information Network of the National Institute of Neurological and Communicative Disorders and Stroke through Contract Number NS6-0933 with Dr. Robert G. Siekert, Head, Abstract Section, Mayo Clinic, Rochester, Minnesota 55901.
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A patient who had an embolic occlusion of the right middle cerebral artery while undergoing a cerebral arteriogram was successfully operated on by removal of the embolus under the surgical microscope. Early postoperative cerebral vascular spasm was a factor in the transient deterioration of the patient's neurological condition. When the patient was last seen two and one-half months after surgery she was almost intact neurologically with only a mild right parietal dysfunction but with total resolution of the left hemiplegia. The literature is reviewed.

AB-2686-76

Extracranial-intracranial arterial anastomosis is gaining acceptance as a form of treatment in selected cases with ischemic cerebrovascular disease. To establish indications for this operation and to provide an objective assessment of postoperative results, regional cerebral blood flow (rCBF) studies were performed in 110 patients with cerebrovascular insufficiency considered for extracranial-intracranial bypass surgery. The 133Xe intracarotid injection method with 16 externally placed detectors was used for measuring rCBF. Postoperatively, rCBF was measured in 40 patients. From these results our present criteria for surgery have evolved. The probability of a good postoperative result is best in patients with either normal or severely reduced CBF values (<60% of normal).

AB-2687-76

Clinical results of an extracranial-intracranial arterial bypass (EIAB) procedure for cerebral ischemia are assessed in 65 patients. The five-year study suggests that the EIAB procedure has a protective effect against further clinically significant cerebrovascular accidents in properly selected patients. Correlation with angiography and regional cerebral blood flow (rCBF) studies is discussed. It is felt that rCBF measurements offer the best diagnostic test to determine which patients are suitable for surgery by revealing if an ischemic or relative ischemic focus is present. The surgical procedure is contraindicated in acute cerebral ischemia and when the rCBF study reveals general reduction of cerebral blood flow as opposed to a localized ischemic focus.

AB-2688-76

Bypasses of the sagittal sinus, 2.5 mm in diameter, were carried out in 25 dogs with venous (13 cases) and arterial (12 cases) autogenous grafts, by classical microtechniques. Animals were killed 10 to 75 days after the operation, on average 40 days. The patency rate was 54% in the venous autograft group; in all cases, thrombosis occurred early and was due to technical factors. The immediate postoperative patency rate was 100% in the arterial graft group, but this type of graft showed a tendency to progressive occlusion because of extensive fibrosis of the arterial wall; thus the patency rate was 75% at the time of autopsy. This preliminary work demonstrates the technical feasibility of bypass procedure which could be used for sagittal sinus repair.

AB-2689-76
Effects of Hyperventilation, CO2, and CSF Pressure on Internal Carotid Blood Flow in the Baboon — Rudzénberg FH (Department of Physiology and Biophysics, University of Texas Medical Branch, Galveston, Texas 77550), McGraw CP, Tindall GT — J Neurosurg 44: 347–352 (Mar) 1976

The combined effect upon cerebral blood flow (CBF) of an elevation of cerebrospinal fluid pressure (CSFP) and changes in respiratory CO2 was studied in nine baboons under chloralose anesthesia. The animals were mildly hyperventilated and provided with increasing amounts of CO2 in O2-air. Arterial CO2 tensions (Paco2) increased from 17 to 58 mm Hg. Internal carotid blood flow (ICBF) was measured at normal CSFP and at hydrostatically maintained 50 mm Hg CSFP. It was found that: (1) end-tidal CO2 may be used as a substitute for arterial Paco2 determinations; (2) this elevation of CSFP has little effect on ICBF during hypercapnia and normocapnia; however, (3) during hypocapnia the ICBF is reduced an additional 20% when CSFP is elevated; that is, ICBF is reduced 50% from normal when end-tidal CO2 is reduced to 2% at this elevated level of CSFP. Caution should be exercised during hyperventilation therapy particularly if the elevated CSFP or intracranial pressure (ICP) is not reduced to approach normal levels; in these conditions, the combination of decreasing Paco2 and elevated ICP may reduce CBF below critical levels and thus lead to cerebral hypoxia.

AB-2690-76

The hydrogen clearance method was used to measure total and focal cerebral blood flow (CBF) in the monkey before and for five hours after a simulated subarachnoid hemorrhage (SAH). Some monkeys also received 0.2 to 1.0
mg/kg phenolamine intracisternally three hours after SAH. Results show that SAH did not change cerebrovascular resistance, but as cerebral perfusion pressure decreased CBF fell transiently. Phenolamine injected intracisternally three hours after SAH produced a significant fall in arterial blood pressure; cerebrovascular resistance did not change but CBF decreased significantly. These data indicate that intracisternal phenolamine cannot be considered potentially useful to treat ischemic encephalopathy after SAH.

AB-2691-76
Surgical Anatomy of the Proximal Anterior Cerebral Artery
— Dunker RO (Department of Neurological Surgery, University of Washington, RI-20, Seattle, Washington 98195), Harris AB — J Neurosurg 44: 359–367 (Mar) 1976*

The authors present this study of proximal anterior cerebral arteries in the normal human to provide a clearer basis for strategy in aneurysm surgery. They describe patterns of origin of branches, their subarachnoid course, and parenchymal distribution. Branches that originate from the anterior cerebral artery at the internal carotid bifurcation perfuse the genu and contiguous posterior limb of the internal capsule and the rostral thalamus. Proximal 4-mm branches supply the anterior limb of the internal capsule, the neighboring hypothalamus, anteroventral putamen, and pallidum. The remaining anterior cerebral artery proximal to the communicating artery sends branches to the optic chiasm, the adjacent hypothalamus, and the anterior com- missure. Heubner’s artery arises directly opposite the anterior communicating artery to supply much of the striatum and internal capsule rostral to the anterior com- missure. The anterior communicating artery branches supply the fornix, corpus callosum, septal region, and anterior cingulum. The parenchymal distribution of these end arteries may be surmised from the site of origin of named vessels. With this anatomical information one can avoid interruption of blood supply to vital structures when dealing with the anterior cerebral artery and its branches.

AB-2692-76
Carotid-Anterior Cerebral Artery Anastomosis. Case Report
— Nutik S (Department of Neurosurgery, Centre Hospitalier Universitaire, Université de Sherbrooke, Sherbrooke, Quebec, Canada), Dilenge D — J Neurosurg 44: 378–382 (Mar) 1976*

The angiographical and anatomical features of an anomalous communication between the intradural internal carotid artery and the anterior cerebral artery are described. Essential features of the anastomosis include an origin at, or close to, the origin of the ophthalmic artery, a course ventral to the ipsilateral optic nerve, and anterior to the optic chiasm, and a termination near the anterior communicating artery. Although rare, the condition should be considered as an entity. The incidence of associated berry aneurysm and other congenital vascular anomalies is high.

AB-2693-76
Cerebral Embolism, Marantic Endocarditis, and Cancer — Kooiker JC, MacLean JM, Sumi SM (Mail Stop RJ-05, Laboratory of Neuropathology, University of Washington School of Medicine, Seattle, Washington 98195) — Arch Neurol 33: 260–264 (Apr) 1976*

Two subjects with cerebral embolism were found at autopsy to have marantic (nonbacterial thrombotic) endocarditis (NBTE) and an unsuspected carcinoma. An additional 16 subjects with marantic endocarditis and cancer were found on reviewing the autopsy records of 22 subjects with NBTE. Of these 18 subjects with NBTE and cancer, eight had a stroke during their illness, in five as the initial manifestation of cancer. Although the association of cancer and marantic endocarditis is generally well recognized, cerebral embolism from this source should be more seriously considered as one of the “remote effects” of cancer on the nervous system.

AB-2694-76
Neurologic Manifestations of Glomus Tumors in the Head and Neck — Spector GJ (517 South Euclid Avenue, St. Louis, Missouri 63110), Druck NS, Gado M — Arch Neurol 33: 270–274 (Apr) 1976*

In 75 patients with glomus tumors in the head and neck region, 57 tumors arose from the jugular bulb region, 11 from the middle ear, and seven from the vagus nerve. Thirty-seven percent (28 patients) had cranial nerve paralysis, and 14.6% (11) had intracranial tumor extension. The jugular foramen syndrome was associated with a 50% (two of four patients) incidence, and hypoglossal nerve paralysis with a 75% (three of four) incidence of posterior fossa tumor invasion. Horner syndrome and labyrinthine destruction had a 50% (two of four) incidence of a middle cranial fossa tumor invasion. The incidence of central nervous system (CNS) invasion with cranial nerve paralysis (excluding the seventh nerve) was 52% (11 of 21). Otologic findings and seventh nerve paralysis did not correlate with CNS tumor extension.

AB-2695-76
Brain Specialization for Language Does Not Depend on Literacy — Damásio AR (Department of Neurology, University of Iowa Hospitals and Clinics, Iowa City, Iowa 52242), Castro-Caldas A, Grosso JT, Ferro JM — Arch Neurol 33: 300–301 (Apr) 1976*

Aphasia in focal brain-damaged illiterates is analogous to asphasia in patients who have learned how to read and write, regarding (1) expectancy rate, (2) distribution of clinical types, (3) semantic structure, and (4) score of relevant laboratory variables. The organization of neurological structures whose lesions produce language disturbances seems to be independent from the acquisition of reading and writing skills.

AB-2696-76
Brain-Blood Partition Coefficients of "Krypton at 37 C and 29.5 C — Van Horn K, Ingvar M, Shapiro HM (Anesthesia Research Laboratory, Veterans Administration Hospital, San Diego, California 92161) — Anesthesiology 44: 426–427 (May) 1976*

To permit utilization of the Kety-Schmidt technique for measuring cerebral blood flow during hypothermia, the brain-blood partition coefficients for "krypton at 37°C and
29.5°C were determined in a series of cats. At 37°C the partition coefficient for krypton was 1.092 ± 0.009; it was 0.931 ± 0.007 (SE) at 29.5°C. These values were significantly different from each other (p < 0.001).

AB-2697-76
Fetal Cerebral Atheromatous Embolization After Cardiopulmonary Bypass — McKibbin DW, Bulkley BH, Green WR, Gott VL, Hutchins GM (Department of Pathology, The Johns Hopkins Hospital, Baltimore, Maryland 21205) — J Thorac Cardiovasc Surg 71: 741–745 (May) 1976*

Cholesterol embolization to the abdominal viscera is common. Fetal cholesterol embolization to the central nervous system is rare. This report describes a 55-year-old woman with severe atherosclerotic disease who underwent cardiac surgery during which she had a fatal cerebrovascular accident. Postmortem examination revealed multiple infarcts in the brain, eye, and spleen due to emboli of cholesterol crystals and other atheromatous debris from a ruptured atherosclerotic plaque in the ascending aorta at the site of an aortotomy for cardiopulmonary bypass. In patients known to have severe atherosclerotic disease, atheromatous embolization to the central nervous system should be regarded as a potential complication of surgical manipulation and incision of the aorta for cardiopulmonary bypass. Ophthalmoscopic examination may be of diagnostic value in such cases.

AB-2698-76
Comparison of Two Systems for Stroke Rehabilitation in a General Hospital — McCann BC, Culbertson RA (Rhode Island Hospital, Providence, Rhode Island 02902) — J Am Geriatr Soc 24: 211–216 (May) 1976*

This study was designed to compare the effectiveness of stroke rehabilitation therapy in a specialized stroke unit with that provided on the medical service of a general hospital (Rhode Island Hospital). The eight-bed Stroke Unit is staffed by a multidisciplinary team, and a weekly conference is held for evaluation and planning. On the basis of data obtained from the hospital records, two groups of patients were studied: 224 who were treated in the stroke unit, and 110 who were evaluated and approved for admission to the unit but were not accommodated. A rigid "first come, first served" policy for admission to the unit was observed. Hypothesis testing was performed with reference to the patient's medical condition, socioeconomic status, demographic characteristics, and difficulties during hospital stay to determine whether the groups were comparable. A patient was considered to have improved if his condition decreased in severity between the time of admission to therapy and the time of discharge. Severity was rated as: mild (level one), moderate (level two), severe (level three), and profound (level four).

No significant difference in rehabilitation results was found between the two treatment systems at severity levels two (moderate) and four (profound). However, the stroke unit attained significantly better results with level-three patients (severe stroke). This group received more sessions of physical therapy and remained in the hospital longer than did the level-three patients treated on the general medical service. Physicians referred patients selectively to the stroke unit, although the unit had no policy of screening patients for admission, and this may have had some influence on the achievement of better results with level-three patients. Level-four patients did not do well in either setting.

AB-2699-76

An inexpensive and reproducible model to help in developing the technical skills for, and to investigate experimentally, a microvascular anastomosis resembling the superficial temporal-middle cerebral artery bypass is described. The model is used to illustrate the important principles of microvascular surgery. Using a standardized operative technique, we evaluated 50 successive preparations by perfusion; the patency rate was 100%.

AB-2700-76
Experimental Canine Atherosclerosis and Its Prevention. The Dietary Induction of Severe Coronary, Cerebral, Aortic, and Iliac Atherosclerosis and Its Prevention by Safflower Oil — McCullagh KG, Ehrhart LA (Research Division, Cleveland Clinic, Cleveland, Ohio 44106), Butkus A — Lab Invest 34: 394–405 (Apr) 1976*

Severe atherosclerotic lesions were produced without thyroid suppression in seven of eight dogs by feeding semisynthetic diets containing 5% cholesterol and 16% hydrogenated coconut oil for 12 to 14 months. Occulsive plaques were located in the coronary arteries and major cerebral arteries as well as in the aorta and iliac vessels. The lesions were characterized by an intense sclerotic reaction to areas of lipid deposition and foam cell accumulation in the intima. The diet induced a rapid elevation of plasma-free and esterified cholesterol, triglyceride, and phospholipid, and the extent of aortic atherosclerosis was shown to be partially dependent on mean plasma cholesterol concentration.

A second group of eight dogs was fed a diet identical with the first except for the replacement of 4% hydrogenated coconut oil by 4% safflower oil. Despite receiving the same amounts of dietary cholesterol and fat, this second group of dogs was completely protected from the atherogenic process. Plasma lipids became only slightly elevated and no induced atherosclerotic lesions were found at autopsy. Circulating thyroid hormone concentrations were similar between the two groups of dogs and the thyroid glands had a normal morphology in both groups.

The atherogenic diet was designed to contain only trace amounts of essential fatty acids, and essential fatty acid deficiency was demonstrated in the animals to which it was fed. The second diet was intended to counteract this deficiency by providing 8% of diet calories as linoleic acid. The results of these experiments suggest that in the absence of essential fatty acids the dog becomes intolerant of dietary cholesterol, resulting in reactive hyperlipoproteinemia and atherosclerosis. The addition of linoleic acid to the diet...

*Authors' abstract.
appears to restore the normal resistance of this species to hypercholesterolemia. The protective effect of linoleic acid on atherogenesis therefore can be explained on the basis of its role as a regulator of plasma lipemia.

AB-2701-76
Scanning Electron Microscopic Observations of the Common Carotid Artery of the Rat. III. Heparin Effect on Platelets — Gregorius FK (c/o Mrs. Seba Kolb, Editor, Department of Surgery, UCLA School of Medicine, Los Angeles, California 90024), Rand RW — Surgery 79: 584-589 (May) 1976*

After administration of high systemic doses of heparin verified by assay, common carotid arteries in the rat were divided and sutured. Scanning electron microscope observations of endothelial surfaces showed a decrease in platelet adhesion, as well as a reduction in the adherence of other circulatory blood elements when compared to controls. This is the first report indicating the in vivo effect of high dose systemic heparin on platelets.

AB-2702-76
Occipital Artery-Posterior Inferior Cerebellar Artery Anastomosis — Khodadad G (Neurosurgery Section, Veterans Administration Hospital, Cincinnati, Ohio 45220) — Surg Neurol 5: 225-227 (Apr) 1976*

In a 58-year-old man who had a stroke and had multiple and extensive extracranial arterial occlusions, an anastomosis was completed between the right occipital artery and the right posterior inferior cerebellar artery. Cerebral angiograms performed two weeks postoperatively showed patent anastomosis and partial improvement of the posterior circulation.

AB-2703-76
Experimental Cervical Myelopathy: Autoradiographic Studies of Spinal Cord Blood Flow Patterns — Gooding MR, Wilson CB (Department of Neurological Surgery, University of California School of Medicine, San Francisco, California 94143), Hoff JT — Surg Neurol 5: 233-239 (Apr) 1976*

The cervical spinal cord was compressed at one (C5) or two (C4, C5) levels in eight awake dogs by advancing screws through the vertebral bodies into the spinal canal until minimal limb weakness occurred. Ischemia of the cervical cord was produced by ligation of vertebral and spinal arteries in four anesthetized dogs, of which two had previously undergone cord compression at two levels. The neurological and histological findings were studied. By means of antipyrine [14C] autoradiography, qualitative changes of blood flow in dogs with compression and/or ischemia of the cervical spinal cord were compared to flow patterns in normal dogs. The authors conclude that the neurological and histological changes produced by spinal cord compression, ischemia and their combination correlate with altered patterns of blood flow within the cervical spinal cord.

AB-2704-76
Super-Selective Arteriography of Branches of the External Carotid Artery — Djindjian R (Hôpital Lariboisière, Service de Neurochirurgie, 16 Rue de L'Université [7e], Paris, France) — Surg Neurol 5: 133-142 (Mar) 1976*

Superselective arteriography of the branches of the external carotid artery is of great value in the diagnosis of vascular lesions in the distribution of this artery. These include vascular anomalies of the scalp, tongue, ears, face, dura mater, and intracranial sinuses, of meningiomas, gliomas tumours, angiofibromas of the nasopharynx, and metastases. Superselective catheterization of the branch of the external carotid artery also can be utilized for the treatment of these lesions by embolization. The technique is described and the various lesions illustrated.

AB-2705-76
Reversal of Aphasia With Superficial Temporal Artery to Middle Cerebral Artery Anastomosis — Jacques S (Huntington Institute of Applied Medical Research, Pasadena, California 91105), Garner JT — Surg Neurol 5: 143-145 (Mar) 1976*

Two patients with aphasia which markedly regressed following superficial temporal to middle cerebral artery anastomoses are reported. Added to the armamentarium of stroke therapy for the amelioration of focal ischemic disease, modern microvascular techniques allow the establishment of collaterals to recipient vessels of less than 1 mm in diameter. A neurological deficit which is supposed to be permanent is usually considered a contraindication to these procedures. This report details two cases in which aphasia and motor weakness markedly improved following a superficial temporal artery to middle cerebral artery anastomosis.

AB-2706-76
Timing of Pentobarbital Administration for Brain Protection in Experimental Stroke — Corkill G (Department of Neurological Surgery, Sacramento Medical Center, Sacramento, California 95817), Chikovani OK, McLeish I, McDonald LW, Youmans JR — Surg Neurol 5: 147-149 (Mar) 1976*

Significant reduction of experimentally induced cerebral infarction was associated in the canine model with the administration of pentobarbital at one hour postocclusion but not thereafter.

AB-2707-76
Acute Hemorrhagic Cerebellar Infarction Following Angiography — Ferguson L (Department of Surgery [Neurosurgery], Michael Reese Hospital and Medical Center, Chicago, Illinois 60616), Sundaresan N, Richardson R, Marsan R — Surg Neurol 5: 176-178 (Mar) 1976*

Cerebellar infarction following cerebral angiography is an unusual complication. A case is reported. The patient's condition deteriorated with each diagnostic study. Improvement occurred after cerebellar decompression and evacuation of an intracerebellar hematoma.

AB-2708-76
Inhibition of Injury Induced Thromboatherosclerotic Lesions by Anti-Platelet Serum in Rabbits — Moore S (Department
of Pathology, McMaster University, Hamilton, Ontario, L8S 4J9, Canada), Friedman RJ, Singal DP, Gauldie J, Blajchman MA, Roberts RS — Thrombos Haemostasi (Stuttgart) 35: 70–81 (Feb 29) 1976*

We have previously shown that repeated or continuous intimal injury caused by an indwelling aortic catheter causes a variety of lesions in rabbits maintained on a diet un-supplemented by lipid. These include fatty streaks, lipid-free fibrous plaques and lipid-rich raised thromboatherosclerotic plaques. Whether lipid-rich raised lesions are a result of injury or coexisting thrombosis or both is not clear. The present experiment was designed to answer this question. Antiplatelet serum (APS) to washed sonicated rabbit platelets was raised in sheep. PE 60 polyethylene catheters were placed in the aortas of 35 rabbits by way of a femoral artery. The animals were randomly divided into two groups. The experimental group (17 rabbits) received an intravascular injection of 1.0 ml of APS followed eight hours later by a subcutaneous injection of 0.5 ml. Thereafter, 0.5 ml APS was given subcutaneously each day for 13 additional days. The control group (18 rabbits) received no APS. Platelet counts were done prior to surgery, at five minutes following surgery, at four days, at eight days and just prior to killing. Extent of lesions was estimated by photographing the opened aortas, projecting the photographs on cardboard, cutting out the areas occupied by the different lesions and weighing the cardboard. The mean weight of raised lesions in the control group was six to seven times greater than in the experimental groups. Statistical analysis of this difference based on Welch’s “t” test for unequal variances was highly significant (p < 0.001). Platelet counts in the experimental group varied from 0 to 20,000 at 14 days. In animals with platelet counts ≤1,000 mm$^3$ raised lesions were completely prevented. In a second experiment the effect of APS was compared with normal sheep serum (NSS). A similarly significant inhibition of raised lesions occurred in the APS group. The extent of lesions in the NSS control was similar to that in the no-APS group of the first experiment. These findings indicate that thrombosis is more important than injury in the development of lipid-rich raised lesions.

**AB-2709-76**

A noninvasive steady-state method for studying the regional accumulation of oxygen in the brain by continuously inhaling oxygen-15 has been investigated. Oxygen respiration by tissue results in the formation of water of metabolism which may be considered as the “exhaust product” of respiration. In turn the steady-state distribution of this product may be related to that of oxygen utilization. It has been found in monkeys that an appreciable component of the signal, recorded over the head during $^{18}$O$_2$ inhalation clearly relates to active cerebral tissue. Theoretically the respiration product is linearly dependent on the oxygen extraction ratio of the tissue, and at normal cerebral perfusion it is less sensitive to changes in blood flow. At low rates of perfusion a more linear dependence on flow is shown. The dual dependence on blood flow and oxygen extraction limits the interpretation of the cerebral distribution obtained with this technique. Means for obtaining more definitive measurements with this approach are discussed.

**AB-2710-76**
Vertebral Artery Occlusion and Oral Contraceptives — Ask-Upmark E (Department of Medicine, Uppsala University, Uppsala, Sweden), Bickerstaff ER — Br Med J 1: 487–488 (Feb 28) 1976*

If vertebral artery occlusion occurs in degenerative arterial disease, it is almost invariably left-sided, but in vertebral artery deficiency syndromes associated with oral contraceptives a striking preponderance of right-sided involvement has been shown. This observation adds support to the view that causes other than changes in the wall of the vessel at the site of occlusion must be sought as an explanation of the occlusion.

**AB-2711-76**
Biofeedback Treatment of Foot Drop After Stroke Compared With Standard Rehabilitation Technique (Part 2): Effects on Nerve Conduction Velocity and Spasticity — Takebe K, Kukulka CG, Narayan MG, Basmajian JV (Georgia Mental Health Institute, Atlanta, Georgia 30306) — Arch Phys Med Rehabil 57: 9–11 (Jan) 1976*

Peroneal nerve conduction velocity (NCV) was determined in 20 hemiplegic patients with chronic foot drop. At the initial visit, relative slowing of NCV of the affected leg was observed. The patients were randomly separated into two groups, and treated for five weeks by different therapies — group 1 by conventional physical exercise and group 2 by physical exercise plus biofeedback training. Of these patients, six with severe spasticity were selected from each group to investigate the change of spasticity by patellar tendon reflex. Although with biofeedback remarkable improvement of function was observed (and reported in an earlier paper), there was no significant change of NCV and spasticity.

**AB-2712-76**
Functional Recovery With and Without Training Following Brain Damage in Experimental Animals: A Review — Yu J (Department of Physical Medicine and Rehabilitation, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania 19104) — Arch Phys Med Rehabil 57: 38–41 (Jan) 1976*

Review of observations on experimental animals following brain damage shows that some functions may recover spontaneously and functional accomplishment can be increased by training even with unchanged reflex status. Training consists of a combination of two basic techniques: forced use of the impaired body part, and instrumental conditional reflexes. The possible mechanisms of recovery include
restoration by an alternative pathway, compensation through complicated interactions among brain structures and, with training, activation of a parallel system essential to conditioned responses. Factors, such as motivation and emotion, may complicate the course of recovery. Results of recovery with training in experimental animals strongly indicate that such training can play an active and specific role in functional improvement following brain damage in man. Future development of rehabilitation medicine in this direction is suggested.

AB-2713-76

Analysis of abnormalities of the configuration of the anterior inferior cerebellar artery in lateral projection facilitates diagnosis of posterior fossa masses. Cerebellopontomedullary angle lesions frequently cause arcuate postero-inferior displacements of the rostralateral artery or reversal of curvature of the ascending segment of the metanal loop. Vermian, hemispheric, intra-fourth ventricular, and suitably situated extra-axial masses alter the plane of the lateral loop of the caudomedial artery. Tonsillar herniation may be detected in patients with hypoplastic or absent posterior inferior cerebellar arteries by analyzing the relationship of the biventral segment of the descending or caudomedial artery to the foramen magnum.

AB-2714-76
Intracerebral Venous Angioma — Wendling LR (Department of Radiology, Sacred Heart Medical Center, Spokane, Washington 99204), Moore JS Jr, Kieffer SA, Goldberg HI, Latchaw RE — Radiology 119: 141-147 (Apr) 1976*

Intracerebral venous angioma is a rare congenital vascular malformation of the brain. Three cases are reported, all of which had strikingly similar angiographic findings in the venous phase, viz., a local network of small medullary veins which converge centrally into a single large venous channel which courses transcerebrally to reach the superficial venous system. No gross abnormalities are seen in the arterial phase with the usual techniques. However, magnification delineated enlarged arterial branches supplying the periphery of the malformation in two of the three cases. A poorly margined homogenous blush and early filling of the draining veins were also seen in these two patients. The findings in the venous phase agree with those described in previous isolated case reports and appear to be highly suggestive of this rare malformation.

AB-2715-76
A Technical Contribution to the Exact Angiographic Localization of Carotid Cavernous Fistulas — Huber P (Department of Diagnostic Radiology, University of Berne, CH-3010 Berne, Switzerland) — Neuroradiology 10: 239-241 (Apr 6) 1976*

A better visualization and localization of carotid cavernous fistulas may be achieved by selective angiography of the vertebral artery with simultaneous digital compression of the ipsilateral carotid artery, if the posterior communicating artery is patent.

AB-2716-76
Angiographically Verified Transient Alteration of the Intracranial Arteries and Veins in Dependence on Different CO₂ Tensions — Bradic GB (Department of Radiology, Klinikum Steglitz, Free University of Berlin, D-1000 Berlin 45, Germany), Simon RS, Heidsieck CH — Neuroradiology 10: 257-262 (Apr 6) 1976*

Simultaneous tomography applied to normal vertebral angiography has, by the dissociation of the vascular planes, made a selective and spatial study of the vertebrobasilar circulation possible, and therefore the identification of the vessels which are partly or totally hidden by other vascular structures. This technique also has led to a better delineation and sometimes a direct observation and spatial localization of some anatomical structures above and below the tentorium.

AB-2717-76
Angiographically Verified Transient Alteration of the Intracranial Arteries and Veins in Dependence on Different CO₂ Tensions — Bradic GB (Department of Radiology, Klinikum Steglitz, Free University of Berlin, D-1000 Berlin 45, Germany), Simon RS, Heidsieck CH — Neuroradiology 10: 257-262 (Apr 6) 1976*

The effect of different arterial CO₂ tensions on the cerebral vessels was studied by angiography. These included functional variations in the arterial, capillary and venous phases in normal and pathological cases.

AB-2718-76
Posterior Fossa Subdural Hematoma Demonstrated by Vertebral Angiography — McClelland RR (Department of Radiology, St. Paul-Ramsey Hospital, St. Paul, Minnesota 55101), Ramirez-Lassepas M — Neuroradiology 10: 181-185 (Feb 27) 1976*

A case of spontaneous posterior fossa subdural hematoma secondary to anticoagulation therapy with definitive diagnosis made by vertebral angiography is reported. Vertebral angiographic findings are illustrated and demonstrate primarily mass effect from posterior compartment of posterior fossa and avascular area. Carotid angiography did not show hydrocephalus. A review of the literature was made and this appears to be the first reported case in which a posterior fossa subdural hematoma has been diagnosed by vertebral angiography.

AB-2719-76
Cerebral Cortical Arteries in the Diagnosis of Epidural Hematoma — Glickman MG (Department of Radiology, Yale-New Haven Hospital, New Haven, Connecticut 06504), Handel SF, Hoff JT, Coulson W — Neuroradiology 10: 187-195 (Feb 27) 1976*

Review of cerebral arteriograms of all our patients (19) with epidural hematoma over a two-year period revealed evidence of localized extrinsic compression of the cerebral
cortex in all cases. This finding, although not as specific as those previously described for epidural hematoma, was strongly suggestive. A two-year prospective study was then initiated employing internal, rather than common carotid, arteriography because opacification of the external carotid artery is not necessary for evaluation of cortical compression. In this study, which consisted of 21 patients, epidural hematoma was correctly diagnosed in all, relying primarily on signs of localized extrinsic cerebral cortical compression. No epidural hematoma was misinterpreted as being a subdural hematoma or an intracerebral injury, and all epidural hematomas that were present were diagnosed correctly. We conclude that internal carotid arteriography is a sensitive method for diagnosing epidural hematoma. The signs of extrinsic cortical compression should be emphasized in the interpretation of arteriograms of patients with head injuries whether the internal or the common carotid artery is injected.

AB-2720-76
Is Atheroma a Reversible Lesion? — Gresham G (Department of Morbid Anatomy and Histopathology, Addenbrooke's Hospital, University of Cambridge, Cambridge, Great Britain) — Atherosclerosis 23: 379-391 (May-Jun) 1976*

In this review atherogenic factors are discussed in relation to the possibility of regression. Evidence for regression of human lesions comes mainly from postwar studies and observations on persons with chronic wasting diseases. The entry, exit and effects of lipids in the arterial wall are considered as important factors which might determine regression. A variety of experiments in different animals which have been done in order to study regression are described. Some involve cholesterol feeding and withdrawal, others are concerned with the effects of hyperoxia and drugs. It is concluded that certain forms of atheroma can be induced to regress.

AB-2721-76

The regression of atherosclerotic lesions in rhesus monkeys was evaluated by means of a low-fat, low-cholesterol diet with or without N-phenylpropyl-N-benzyloxy acetamide (W-1372). Moderate to severe aortic and coronary atherosclerosis was induced by feeding four groups of male monkeys a high-fat, high-cholesterol diet for 18 months, after which the first group was autopsied for assessment of the lesions. During a subsequent 18-month regression period, the second group of animals was fed a low-fat, low-cholesterol diet with W-1372, and the third group the low-fat, low-cholesterol diet without W-1372. A pair of monkeys (the fourth "group") was fed an atherogenic diet throughout the experiment. Serum cholesterol, which increased about fivefold during the induc-

*Authors' abstract.
CBV when compared with the right. Measurements of CBV in the cortex showed no regional variation, but the mean cortical value of 6.0 ± 1.8 was significantly higher than the hemisphere mean.

AB-2724-76
Enzymatic Destruction of the Elastic Lamella at the Mouth of Cerebral Berry Aneurysm? An Ultrastructural Study With Special Regard to the Elastic Tissue — Cajander S (Department of Pathology, University of Umeå, S-901 87 Umeå, Sweden), Hassler O — *Acta Neurol Scand* 53: 171-181 (Mar) 1976*

Destruction of the elastic tissue is probably an acquired lesion and is decisive for the appearance of cerebral arterial aneurysms at the sites of congenital media defects. The elastic component in the mouths of aneurysms therefore has been studied by electron microscopy, using two new staining methods, i.e., ruthenium-red staining and prolonged osmium-tetroxide treatment. The hypertrophic, duplicated, elastic lamellae showed a disintegration of their luminal portions not earlier described. In close connection with the disintegrated portions, extracellular lysosome-like granules were observed. It is hypothesized that discharged leukocyte granules containing elastase help to destroy the elastic lamellae.

AB-2725-76
Short-Term Clinical Trial of Propranolol in Racemic Form (Inderal), D-Propranolol and Placebo in Migraine — Stensrud P (Department of Neurology, Rikshospitalet, Pilestredet 32, Oslo, Norway), Sjaastad O — *Acta Neurol Scand* 53: 229-232 (Mar) 1976*

Propranolol penetrates the blood-brain barrier, whereas mainly the racemic form, Inderal, possesses beta-receptor blocking properties. A comparison between d-propranolol and Inderal therefore might indicate the relative importance of the beta-blocking properties and possible "central" effects mediated by propranolol and of importance in migraine prophylaxis. The effects of propranolol in racemic form (Inderal) 40 mg q.i.d., d-propranolol 40 mg q.i.d., and placebo were compared in 20 migraine patients. Inderal and d-propranolol both were significantly superior to placebo. However, the effect of ATP showed decrease or disappearance in accordance with the elevation of the loaded pressure group. Cerebral vasodilating effect of ATP was promptly observed after administration, and its degree was 30% to 50% in photographic observation. Increasing effect on cerebral blood flow and cerebral vasodilating action of ATP were similar in pattern to that of vasodilators such as papaverine hydrochloride.

AB-2726-76
Acute Confusional States With Right Middle Cerebral Artery Infarctions — Mesulam M-M (Harvard Department of Neurology, Beth Israel Hospital, Boston, Massachusetts 02215), Waxman SG, Geschwind N, Sabin TD — *J Neurol Neurosurg Psychiat* 39: 84-89 (Jan) 1976*

Three patients presenting predominantly with acute confusional states (ACS) are shown to have infarctions in the distribution of the right middle cerebral artery. It is suggested that the main deficit in ACS is in the function of selective attention. On the basis of cortical connections of homologous areas in the monkey brain, it is argued that this deficit arises from lesions in convergence areas for association cortex.

AB-2727-76
Effects of ATP on Cerebral Circulation. Morphological Observation of Cerebral Blood Vessel and Cerebral Hemodynamics — Terada H (Department of Neurosurgery, Nara Medical University, Nara, Japan), et al. — *Brain and Nerve* 28: 151-156 (Feb) 1976*

Review was made on the effect of adenosine triphosphate, 1.0 to 3.0 mg per kilogram intravenously, on the cerebral circulation and the presence of the dilating action on the cerebral blood vessels in cats. The group with normal intracranial pressure showed, as reported previously, transient hypotension and its complicated decrease of cerebral blood circulation at the initial period for 30 to 100 check, then demonstrating the increase of cerebral blood flow for 200 to 1,000 check. Its increased volume and duration were dose-dependent. The group with loaded intracranial pressure of 20 to 30 mm Hg (slightly elevated group) showed increase of cerebral blood flow, similar to the normal intracranial pressure group. However, the effect of ATP showed decrease or disappearance in accordance with the elevation of the loaded pressure group. Cerebral vasodilating effect of ATP was promptly observed after administration, and its degree was 30% to 50% in photographic observation. Increasing effect on cerebral blood flow and cerebral vasodilating action of ATP were similar in pattern to that of vasodilators such as papaverine hydrochloride.

AB-2728-76
Congenital Anomalies of Cerebral Artery and Intracranial Aneurysms — Nakajima K, Ito Z, Hen R, Uemura K, Matsuoka S (Division of Surgery, Tokyo Metropolitan Komagome Hospital, Tokyo, Japan) — *Brain and Nerve* 28: 197-201 (Feb) 1976*

It is well known that congenital anomalies such as polycystic kidney, aortic coarctation, Marfan syndrome, and Ehler-Danlos syndrome are apt to be complicated by intracranial aneurysms. In this report we attempt to reveal the relation and incidence between cerebrovascular anomalies and intracranial aneurysms. The etiology of aneurysms has been discussed, too. Twelve cases of persistent trigeminal artery, two cases of persistent hypoglossal artery and 11 cases of fenestration were obtained from 3,841 patients who were angiographically examined in our clinic for five years. The incidence is 0.31%, 0.05% and 0.29%, respectively. Persistent trigeminal arteries were complicated by two cases of intracranial aneurysms and one case of arteriovenous malformations (AVM), persistent hypoglossal arteries were complicated by one case of aneurysm, and fenestrations were complicated by two cases of aneurysms and one case of AVM. One case of congenital agenesis of right internal carotid artery was observed which was complicated by aneurysm of anterior communicating artery. Totally, eight cases of aneurysms and AVM were observed from 26 cases

*Authors' abstract.*
of cerebrovascular anomalies (incidence 30.8%). On the other hand, thalamic or caudate hemorrhage revealed the highest incidence of complication of intracranial aneurysms among intracerebral hematomas (10.7%). Compared with the incidence of aneurysms between cerebrovascular anomalies (30.8%) and thalamic or caudate hemorrhage (10.7%), the difference is statistically significant (p < 0.05).

The cause of intracranial aneurysm has not yet been clarified. But it is well accepted that the defect of tunica media vasorum is the most responsible factor as to the occurrence of intracranial aneurysms.

We concluded that the genetic error of cerebral vessels including defect of media caused intracranial aneurysms, and this result was supported from the evidence that cerebrovascular anomalies showed statistically high incidence of complication of intracranial aneurysms.

AB-2729-76
Double-Blind Trial of Glycerol Therapy in Early Stroke — Larsson O (Fremantle Hospital, Alma Street, Fremantle, Western Australia), Marinovich N, Barber K — Lancet 1: 832–834 (Apr 17) 1976*

The effects of intravenous glycerol and intravenous dextrose were compared using a double-blind trial in 27 patients with acute stroke. Administration continued for up to six days. A standard scoring system was used for neurological evaluation. There was no difference in mortality or in improvement in neurological score between the two groups.

AB-2730-76

The EMI scan has much simplified the management of head injuries. The conventional investigations have been supplanted by a safe noninvasive technique in which lesions of the brain can be demonstrated. Thus, high-density intracerebral or extracerebral hematomas are readily diagnosed, even when they are in unusual sites. Wherever their location, they appear in sharp contrast to the low density of cerebral or extracerebral hematomas. The safety of the procedure recommends its sequential use in patients who fail to improve or who deteriorate; and repeated examinations can be useful in monitoring the response to therapy. Under clinical supervision, the quantity and quality of information the method yields during a single comprehensive study are such that it should become the definitive investigation in victims of cerebral trauma.

AB-2731-76
Acute Traumatic Intracranial Haematoma Without Skull Fracture — Galbraith S (Department of Neurosurgery, Institute of Neurological Sciences, Southern General Hospital, Glasgow G51 4TF, Scotland), Smith J — Lancet 1: 501–503 (Mar 6) 1976*

Three hundred seven cases of acute traumatic intracranial hematoma in patients admitted to the Institute of Neurological Sciences in Glasgow have been analyzed for various presenting features. Fifty-seven (19%) had no fracture, and 14 had neither a fracture nor neurological symptoms and signs immediately after the injury. Apart from the children, immediate admission and observation of these 14 cases for a period of 24 hours rarely led to the early detection of a hematoma.

AB-2732-76
Effect of Carotid Sinus Nerve Stimulation Pattern on Cardio-respiratory Responses — Levy MN (Department of Investigative Medicine, Mount Sinai Hospital, Cleveland, Ohio 44106), Zieske H, Walters F — Am J Physiol 230: 951–958 (Apr) 1976*

The reflex responses to steady and intermittent stimulation of the carotid sinus nerve (CSN) were compared in anesthetized dogs. Intermittent stimulation was less effective than steady stimulation in reducing the arterial blood pressure, and the disparity was exaggerated after acute sinoaortic denervation. With the sinoaortic nerves intact, at low mean stimulation frequencies the heart rate responses were greater during intermittent than during steady CSN stimulation. At higher mean stimulation frequencies, however, steady CSN stimuli were more effective than were the intermittent type. After sinoaortic denervation, steady stimuli evoked greater heart rate responses than did intermittent stimuli over the entire mean frequency range studied. Reflex changes in respiratory depth and frequency also were greater during steady than during intermittent CSN stimulation. The greater efficacy of steady than of intermittent stimulation in evoking the observed reflex cardiovascular and respiratory changes is probably ascribable to the pronounced frequency limitation at the first synapse of the baroreceptor reflex in the brain.

AB-2733-76
Effect of Cervical Sympathetic Nerve Stimulation on Canine Carotid Sinus Reflex — Bolter CP (Department of Physiology, Faculty of Medicine, University of British Columbia, Vancouver, British Columbia, Canada V6T 1W5), Ledsome JR — Am J Physiol 230: 1026–1030 (Apr) 1976*

In the chloralose-anesthetized dog the carotid sinus on one side of the neck was isolated vascularity. Pressure in the isolated sinus (carotid sinus pressure (CSP)), electrocardiogram, and systemic arterial pressure were recorded. Both vago sympathetic trunks were cut and the contralateral common carotid artery was occluded or the contralateral sinus nerve was cut to reduce reflex buffering of arterial pressure changes. By varying CSP from 50 to 250 mm Hg the full range of the reflex response was examined. Electrical stimulation of the peripheral end of the cut ipsilateral cervical sympathetic nerve brought about a rapid decrease in mean arterial pressure (MAP) and heart rate (HR) at lower CSPs, no change in these variables at midrange CSPs, and a gradual increase at higher CSPs, such that the gain of the reflex was reduced (1.89 ± 0.19 to 1.33 ± 0.15 mm Hg/mm Hg). The decrease in MAP and HR at lower CSPs implies an increase in baroreceptor activity whereas the converse would appear to occur at higher CSPs. These responses attained a maximum value at low stimulus frequencies (< 10 Hz).
AB-2734-76
Elastic Behavior of Brain Tissue In Vivo — Walsh EK, Schettini A (Surgical Division 691/112B, Veterans Administration Wadsworth Hospital Center, Los Angeles, California 90073) — Am J Physiol 230: 1058-1062 (Apr) 1976*

A measurement system and a test sequence have been developed to determine the in vivo elastic response of brain tissue in terms of a pressure-depth ratio. This parameter appears sensitive to changes in the tissue environment that may occur due to the influence of, e.g., anesthetic agents, hyperventilation, etc., and thus may be useful in evaluating such influences. The measurements are made with the dura-arachnoid membranes intact, thus maintaining the influence of the cerebrospinal fluid compartment on the response behavior of the brain tissue that comprises the subpial region. As an integral part of the test, the procedure also serves to determine the depth or position of the subpial region and thus assures that the subsequent pressure-depth measurements involve brain tissue response. Finally, some discussion is given to relating the measured pressure-depth ratio to the classical elastic modulus. Values of the pressure-depth ratio and the corresponding elastic modulus for seven dogs are given.

AB-2735-76

The effects of inspiring low O2 or high CO2, or low-O2-high-CO2 gas mixtures on tissue perfusion and tissue Po2 of brain and muscle were studied in 76 anesthetized rats. Under control conditions, relative tissue Po2 of cerebral white matter measured polarographically averaged 16.4 mm Hg and 18.7 mm Hg in the biceps brachii. With low-O2 gas mixtures, tissue Po2 declined in both brain and muscle, but more in muscle. Tissue Po2 increased under high-CO2 conditions, with the brain increasing to a greater extent. Control cerebral cortex tissue perfusion averaged 23.5 ml per minute per 100 gm and muscle was 18.3 ml per minute per 100 gm measured by H2 clearance. Brain perfusion increased under all experimental conditions. Muscle perfusion did not change with low O2 alone, but increased with low-O2-high-CO2 or high-CO2 gas mixtures. Brain perfusion increased under all conditions significantly more than muscle. The brain appeared better protected compared to skeletal muscle in terms of tissue Po2 and perfusion under the stress of hypoxia and hypoxic-hypercapnia. The effects of hypercapnia are also greater on the brain.

AB-2736-76
Blood-Brain Barrier Permeability of C14-Labeled Alcohols and O18-Labeled Water — Raichle ME (Division of Radiation Sciences, The Edward Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, Missouri 63110), Eichling JO, Straatmann MG, Welch MJ, Larson KB, Ter-Pogossian MM — Am J Physiol 230: 543-552 (Feb) 1976*

The extraction of C14-labeled methanol, ethanol, and isopropanol, as well as O18-labeled water by the brain during a single capillary transit, was studied in vivo in six adult rhesus monkeys by external detection of the time course of these tracers subsequent to their internal carotid artery injection. The data demonstrate the feasibility of accurately measuring brain permeability of highly diffusible substances by this technique and show that neither water nor the alcohols studied freely equilibrate with brain when the cerebral blood flow exceeds 30 ml/100 gm min-1. At a cerebral blood flow of 50 ml/100 gm min-1 only about 93% of an injected bolus of labeled water freely exchanges with brain, compared with methanol (93%), ethanol (97%), and isopropanol (99%). The brain capillary permeability-surface area (PS) products computed from these data were 0.023 cm2/s gm-1 (water), 0.024 cm2/s gm-1 (methanol), 0.030 cm2/s gm-1 (ethanol), and 0.062 cm2/s gm-1 (isopropanol). This sequence of PS products is consistent with the individual lipid solubilities of the alcohols studied and underscores the unique brain permeability characteristics of lipid-insoluble water.

AB-2737-76
Computerized Tomography (CT) in Acute Head Trauma — Merino-deVillasante J, Taveras JM (Department of Radiology, Massachusetts General Hospital, Boston, Massachusetts 02114) — Am J Roentgenol 126: 765-778 (Apr) 1976*

The retrospective evaluation of 100 cases of head trauma that were subjected to computerized tomography (CT) leads to the following conclusions: (1) Computerized tomography and plain skull survey should be the first neuroradiological procedures performed. (2) Angiography may be carried out after computerized tomography when necessary, but as proved by this series, it will be needed in a relatively small number of cases. These include patients with technically limited CT scans or those in whom the possibility of an associated vascular lesion of the cervical or intracranial vessels is clinically suspected. (3) It is essential to obtain CT scans of the best possible quality. Sedation will be required in many instances, but this is considered worth doing because a normal CT scan, without significant technical limitations, will exclude the presence of lesions requiring prompt surgical intervention. Those patients who require surgery will need general anesthesia under any circumstances. (4) There is generally a direct relationship between the severity of clinical presentation and the CT demonstration of the abnormality responsible for the clinical status. Seventy percent of the patients clinically diagnosed as having contusion had positive CT scans, and for all practical purposes, 100% of patients having trauma more severe than our Group III (contusion) had abnormal CT scans. Likewise, the number and intensity of tissue abnormalities on CT scans increase proportionately with the severity of the clinical signs and symptoms. (5) It is foresen that, with the advent of faster computerized tomographic scanners, the usefulness of this method will increase further, owing to a reduction in the total examination time and the lessened requirement for sedation.
AB-2738-76
Embolic Occlusion of the Superior and Inferior Divisions of the Middle Cerebral Artery With Angiographic-Clinical Correlation — Altemus LR (Department of Radiology, Maine Medical Center, Portland, Maine 04102), Roberson GH, Fisher CM, Pessin M — Am J Roentgenol 126: 576–581 (Mar) 1976

Clinicians, in defining cerebrovascular syndromes, recognize embolism to the superior and inferior divisions of the middle cerebral artery in addition to embolism of the individual branches. In the present study 14 examples of arteriographically visualized divisional occlusion are analyzed, and a good correlation is demonstrated between the roentgenologic and clinical findings.

AB-2739-76
Visual Field Changes in Branch Retinal 'Vein' Occlusion — Birchall CH, Harris GS (Department of Ophthalmology, University of British Columbia, Vancouver VSZ 3N9, British Columbia, Canada), Drance SM, Begg IS — Arch Ophthalmol 94: 747–754 (May) 1976

The visual field defects in 20 consecutive patients who had branch retinal “vein” occlusions included arcuate nerve fiber bundle scotomas, central scotomas, paracentral scotomas, and segmental peripheral constriction. The role of retinal arteriolar insufficiency in the production of these field defects is discussed. The available evidence suggests that the term “branch retinal vascular occlusion” is a preferable term to describe such clinical findings.

AB-2740-76
Ischemic Papilledema in Giant-Cell Arteritis. Mucopolysaccharide Deposition With Normal Intracranial Pressure — Hinzpeter EN (Histological Laboratory, Universitäts-Augenklinik Eppendorf, 2 Hamburg 20, Martinistrasse 52-01, Germany), Naumann G — Arch Ophthalmol 94: 624–628 (Apr) 1976

A 68-year-old man died 18 days after the onset of ischemic optic neuropathy caused by histologically proved giant-cell arteritis. On histopathologic study of the eye, ischemic necrosis of the prelaminar and retrolaminar optic nerve was seen, along with the massive presence of acid mucopolysaccharides sensitive to testicular hyaluronidase. This finding was interpreted as an intrusion of vitreal material resulting from breaks in the internal limiting membrane and the pressure gradient from intraocular to extraocular tissues, an analogy to Schnabel degeneration in acute glaucoma.

AB-2741-76
Regression of Injury-Induced Atheromatous Lesions in Rabbits — Friedman RJ, Moore S (Department of Pathology, Room 3N20, McMaster University Medical Centre, Hamilton, Ontario L8S 4J9, Canada), Singal DP, Gent M — Arch Path Lab Med 100: 189–195 (Apr) 1976

For four consecutive weeks, 61 rabbits received weekly injections of lymphocytotoxic-positive human serum into the left carotid artery and of autologous serum into the right carotid artery as a control. Serum cholesterol and serum triglyceride levels were measured before the study, in the second and fourth weeks of the study, and weekly thereafter. The results show that repeated intimal injury caused raised lipid-containing thromboatherosclerotic lesions and that there was a consistent regression to lipid-free fibromusculoelastic plaques from the first week after completion of the injection regimen to the fourth week. Apparently, regeneration of an intact covering cell layer resulted in the elimination of lipid deposits from raised lesions, resulting in lipid-free fibromusculoelastic plaques. In addition, fatty streaks were observed to occur during regression. A statistically significant rise in serum cholesterol level during the phase of progression of lesions and a subsequent fall during regression were observed.

AB-2742-76

Two cases of paradoxical embolism, one with recurrent cerebral embolism and one with brachial and coronary embolism and both associated with pulmonary embolism, were diagnosed during life. Although there was neither pulmonary hypertension nor intracardiac shunt present at the time of cardiac catheterization in both cases, the presence of a patent foramen ovale with an interatrial right-to-left shunt was demonstrated by a simple ascorbate dilution technique following a Valsalva maneuver. Each patient was treated by surgical interruption of the inferior vena cava and did well. Paradoxical embolism should be included in the differential diagnosis of arterial embolism for which there is no obvious source, especially when there is also evidence of venous thrombosis or pulmonary embolism.

AB-2743-76

The evidence supporting the thesis that hypertension can be prevented by eliminating salt from the diet is based on four principal sources: (1) epidemiological studies in uncultivated peoples showing that the prevalence of hypertension is inversely correlated with the degree of salt intake; (2) hemodynamic studies suggesting that the development of chronic experimental hypertension is a homeostatic response to a maintained increase in extracellular fluid volume (ECF); (3) evidence that the ECF of “salt eaters” is expanded in comparison to that of “no-salt eaters”; and (4) investigations in hypertensive patients receiving either diets greatly restricted in salt or continuous diuretic therapy which correlate the fall in blood pressure with a reduction in ECF. Although this mechanism of essential hypertension is still obscure the evidence is very good if not conclusive that reduction of salt in the diet to below 2 gm per day would result in the prevention of essential hypertension and its disappearance as a major public health problem.

*Authors’ abstract.
Autoregulation of cerebral blood flow (CBF) was studied by the arteriovenous oxygen difference method in 13 patients with untreated or ineffectively treated severe hypertension, nine patients with effectively treated, formerly severe hypertension, and ten normotensive controls. Resting mean blood pressure in these three groups was 145 ± 17 (1 SD) mm Hg, 116 ± 18 mm Hg, and 98 ± 10 mm Hg, respectively. Blood pressure was decreased by trimethaphan infusion combined with head-up tilt. The lower limit of CBF autoregulation in the three groups was 113 ± 17 mm Hg, 96 ± 17 mm Hg, and 73 ± 9 mm Hg, and the lowest tolerated blood pressure where mild symptoms of brain hypoperfusion were encountered was 65 ± 10 mm Hg, 53 ± 18 mm Hg, and 43 ± 8 mm Hg. These pressures were all significantly higher (p < 0.01) in the group of untreated or ineffectively treated hypertensive patients than in the normotensive group, demonstrating a shift of CBF autoregulation in the former. The observations in effectively treated hypertensive patients strongly suggested a readaptation of CBF autoregulation toward normal in some cases. In four hypertensive patients studied twice it was found that 8 to 12 months of antihypertensive treatment on an average did not influence the lower limit of CBF autoregulation.

Evidence for a Dual Innervation Affecting Local Blood Flow in the Hypothalamus of the Conscious Rabbit — Rosendorff C (Department of Physiology, University of the Witwatersrand Medical School, Johannesburg, South Africa), Mitchell G, Scriven DRL, Shapiro C — Circulation Research 38: 140-145 (Mar) 1976*

We have attempted to evaluate the role of adrenergic nerves which arise from the superior cervical ganglia or which are intracerebral throughout their course, in the control of local cerebral blood flow (CBF). Hypothalamic blood flow (HBF) was measured in the conscious rabbit by the 133Xe-clearance technique. Stimulation of the upper brainstem, using 5-Hz, 3-V, 1-msec, square wave pulses, in the hypothalamus, is mediated by two distinct pathways. The first consists of the sympathetic nerves which arise in the cervical ganglia, and which activate intrahypothalamic β-receptors to cause constriction. The second is an entirely intracerebral noradrenergic pathway which stimulates β-receptors to cause vasodilation.

Cerebral Cavernous Haemangiomas or Cavernomas. Incidence, Pathology, Localization, Diagnosis, Clinical Features and Treatment. Review of the Literature and Report of an Unusual Case — Voigt K, Yasargil MG (Neurochirurgische Universitätsklinik, Kantonsspital, CH-8000 Zürich, Rämistrasse 100, Switzerland) — Neurochirurgia (Stuttg) 19: 59-68 (Mar) 1976 (George Thieme Verlag, publisher)*

With a review of the literature and the addition of one unusual case, the features of 164 cerebral cavernous hemangiomas are described with special reference to incidence, localization, diagnosis and clinical findings. Cavernomas may be found in every age group including the neonatal period. The sex incidence is equal. In 126 cases (76.8%) the cavernomas were of supratentorial site, in 34 cases (20.7%) of infratentorial site, and in four more cases (2.5%) there was multiple occurrence of supratentorial and posterior fossa cavernous hemangiomas. A specific clinical syndrome could not be defined, but the course is usually acute or subacute, and initial symptoms are commonly epileptic seizures, acute headache and subarachnoid or intracerebral hemorrhage. Macroscopic calcifications of cerebral cavernomas were found in only 18 cases (11%). Cerebral angiography was done in 31 cases (18.9%). In nine cases angiography was totally normal, and in 11 cases the cavernoma presented only as an avascular mass. In the remaining cases there was no conformity in the angiographic appearance of cerebral cavernous hemangiomas. Operative extirpation is the treatment of choice if a solitary lesion is favorably located. In addition to our patient there are now 21 cases (12.8%) in which cavernomas were treated successfully by operative extirpation.

Differentialdiagnose des Schlaganfalles im Computer-Tomogramm — Wüllenweber R (Neurochirurgische Klinik der Freien Universität Berlin, Klinikum Charlottenburg, 1000 Berlin 19, Spandauer Damm 130), zum Winkel K, Grumme T, Lange S, Meese W — Neurochirurgia (Stuttg) 19: 1-9 (Jan) 1976 (George Thieme Verlag, publisher)*

Computer tomography permits an early diagnosis of acute intracerebral hemorrhage a few hours after onset of symptoms. Embolic or thrombotic infarcts may be detected only after two to three days. Late manifestations of ischemic infarcts are unequivocal when confined to the circulation area of a cerebral artery. They must, however, be differentiated from small gliomas with edema, while in cerebral hemorrhage the differential diagnosis must consider bleeding from tumors and vascular malformations.

Perangiographic Rupture of a Right Posterior Communicating Artery Aneurysm — de Tribolet N, Oberson R (Neuroradiology, Centre Hospitalier Universitaire Vaudois, CH-1011 Lausanne, Switzerland), Zander E — Neurochirurgia

*Authors' abstract.
The Dilatatory Action of Adenosine on Pial Arteries of Cats

W — Pflügers Arch 362: 55-59, 1976 (Springer-Verlag, publisher)*

A case of fibromuscular dysplasia (FMD), mostly involving the basilar artery, associated with an intracranial aneurysm, is presented. Although the patient was symptomatic, the typical angiographic pattern is felt to be in this case an incidental finding. However, the potential for FMD to produce severe neurological impairment is emphasized. The case is used as a basis for discussing shortly the incidence, the characteristic radiological appearance, the relationship with the presence of intracranial aneurysms and the therapeutic problems of FMD.

Fibromuscular Dysplasia of the Basilar Artery. Report of a Case — Tomasello F (Institute of Neurosurgery, First Medical School, Naples, Italy), Cicifò FA, Albanese V — Neurochirurgia (Stuttg) 19: 29-32 (Jan) 1976 (George Thieme Verlag, publisher)*

An electron microscopic study of the intracerebral arteries from nine hypertensive cases was performed in order to elucidate the morphogenesis of the plasmatic arterionecrosis which was considered to be the direct cause of hypertensive intracerebral hemorrhage. In the preceding stage of the arterial lesions, marked necrosis of medial smooth muscle cells and increase of basement membrane-like substance in the intima and media were observed. The lumina of these arteries were slightly dilated. The dilatation and hemodynamic factors were supposed to cause endothelial injury resulting in blood plasma insudation into the intima through the opened spaces between endothelial cells. The insudated blood plasma dispersed and dissolved the basement membrane-like substance, collagen and elastic fibers in the arterial wall, leading to the development of the plasmatic arterionecrosis.

The Dilatatory Action of Adenosine on Pial Arteries of Cats and Its Inhibition by Theophylline — Wahl M (Physiologisches Institut der Universität, Pettenkoferstrasse 12, D-8000 München, Federal Republic of Germany), Kuschinsky W — Pflügers Arch 362: 55-59, 1976 (Springer-Verlag, publisher)*

The effect of adenosine upon pial resistance vessels was studied using local microapplication from the perivascular side and measurement of vascular diameter. Concentration-response curves revealed a concentration-dependent dilatatory effect of adenosine between $10^{-2}$ and $10^{-3}$ M. The degree of dilatation was independent of initial vessel size (47 to 260 μ). The dilatations due to adenosine could be reduced by theophylline in a reversible competitive antagonism. Concentration-response curves for theophylline yielded no vascular reaction at concentrations of up to $10^4$ M theophylline. From these data it is concluded that the pial arterial resting tone is not influenced under our experimental conditions by adenosine formed and released by brain tissue. The dilatations measured at high theophylline concentrations are apparently due to a mechanism different from the adenosine antagonism.

Experimental Cerebral Ischemia in Mongolian Gerbils. III. Behaviour of the Blood-Brain Barrier — Ito U, Go KG, Walker JT Jr, Spatz M, Klutzo I (Laboratory of Neuropathology and Neuroanatomical Sciences, NINCDS, National Institutes of Health, Bethesda, Maryland 20014) — Acta Neuropath (Berl) 34: 1-6, 1976 (Springer-Verlag, publisher)*

The behavior of the blood-brain barrier (BBB) in cerebral ischemia was studied in symptom-positive Mongolian gerbils subjected to left common carotid artery occlusion using Evans blue dye as indicator of BBB injury. The BBB damage was demonstrable grossly by the presence of areas of blue discoloration, and microscopically by the presence of a bright red fluorescent tracer, localized mostly in the neurons.

The survey of various groups of animals revealed a direct relationship between the incidence and time of appearance of the BBB lesions and the duration of the ischemic occlusion. This relationship can be interpreted as another example of the previously described "maturation" phenomenon. A relatively late occurrence of the BBB injury in cerebral ischemia, at the time when the affected brain tissue shows severe, edematous histopathologic changes, indicates that the brain edema, as the main complication of ischemia, could be regarded as being primarily of the cytotoxic type.

Capillaries in the Subarachnoid Space — Hirano A (Department of Pathology, Montefiore Hospital and Medical Center, Bronx, New York 10467), Cervós-Navarro J, Ohsugi T — Acta Neuropath (Berl) 34: 81-85, 1976 (Springer-Verlag, publisher)*

The fine structure of the small vessels of the subarachnoid spaces in the rat and mouse cerebral and cerebellar cortices was examined. Small vessels with lumen under 7 μ and whose walls consisted of a single layer of endothelial cells were found. These vessels are regarded as true capillaries.
Quantitative percutaneous flow velocity measurements are possible in carotid arteries. The results of the direct percutaneous angiography were measured by means of a Doppler directional flow velocity device and registered on a polygraph. The results indicate an increase in the flow velocity of the injected as well as the non-injected carotid system. This implies that there are no local constrictions of the carotid artery following intervention and, furthermore, it implies a systematic effect of the puncture and injection itself, or of the contrast medium, on the whole cerebral circulation. A diffuse vasodilatation, at least in the cerebral circulation, is postulated. The possible implications are discussed.

AB-2755-76
Techniques for Positron Scintigraphy of the Brain — Hoop B, Hnatowich DJ (Physics Research Laboratory, Massachusetts General Hospital, Boston, Massachusetts 02114), Brownell GL, Jones T, McKusick KA, Ojemann RG, Parker JA, Subramanyam R, Tavera JM — *J Nucl Med* 17: 473-479 (Jun) 1976

Short-lived positron-emitting radionuclides can be used in rapid sequence to produce scintigrams with high spatial resolution. The radiopharmaceuticals $^{15}$N-ammonia ($^{15}$NH$_3$), $^{18}$O$_2$, and $^{68}$Ga complexed with ATP ($^{68}$Ga-ATP) have different cerebral distributions and may be useful in the differential diagnosis of intracranial lesions. Positron scintigraphic equipment can produce axial tomograms and two-dimensional projections. Six clinical cases are presented.

AB-2756-76
Experimental Carotid-Basilar Bypass — Feely M (Department of Neurosurgery, Cleveland Clinic Foundation, Cleveland, Ohio) — *Br J Surg* 63: 186-188 (Mar) 1976

Twenty dogs underwent carotid-basilar bypass surgery. A length of saphenous vein was used to connect the common carotid to the basilar. The basilar artery was cross-clamped temporarily during the procedure. Ten of the dogs were done as chronic procedures, and anastomosis was successful in 70%. Four of the dogs had no neurological deficit. Two of these had patent grafts three months after surgery.

The basilar artery in man is less accessible and the availability of collateral blood flow is less. The author feels that another type of anastomosis would have to be used in man, perhaps employing a temporary shunt during surgery.

AB-2757-76
Occlusive Retinal Arteriitis With Neovascularization — Jampol LM (Kimbrough Army Hospital, Ophthalmology Clinic, Fort Meade, Maryland 20755), Isenberg SJ, Goldberg MF — *Am J Ophthalmol* 81: 583-589 (May) 1976

A 34-year-old woman had occlusive arteriitis first in one eye and then in both, with exacerbations and remissions. This resulted in a branch arteriolar occlusion and retinal neovascularization. She was taking oral contraceptives at the time. Extensive medical work-up revealed only an elevation of the erythrocyte sedimentation rate during exacerbation, a positive purified protein derivative, and pulmonary scarring from old granulomatous disease.

Addendum

AB-2758-76
Rapid Resolution of Venous Stasis Retinopathy After Carotid Endarterectomy — Neupert JR (Section of Publications, Mayo Clinic, Rochester, Minnesota 55901), Brubaker RF, Kearns TP, Sundt TM Jr — *Am J Ophthalmol* 81: 600-602 (May) 1976

A 60-year-old woman with ocular hypertension had blurred vision in her right eye and was found to have venous stasis retinopathy on the right, characterized by a fine neovascular network extending into the vitreous from the optic disk, irregular dilatation of the veins, and the presence of retinal hemorrhages and microaneurysms. This prompted a search for carotid occlusive disease. The left carotid artery was occluded and the right carotid artery was 99% stenosed. After right carotid endarterectomy, the appearance of the right ocular fundus had become virtually normal. The new vessels were no longer visible. Vision was 6/6. The authors speculate that ischemic retinal tissue elaborates a vasoproliferative substance that is inhibited quickly when blood flow returns to normal and that is necessary for the patency as well as the proliferation of new vessels.

AB-2759-76
Treatment for High Extracranial Internal Carotid Artery Aneurysms — Oller DW, Gee W (Department of Surgery, National Naval Medical Center, Bethesda, Maryland 20014), Kingsley JR — *Am Surg* 42: 311-315 (May) 1976

In four cases of high extracranial carotid artery aneurysm, ligation of the artery was performed after evaluation of collateral hemispheric blood pressure by ocular pneumoplethysmography. Three of the patients had collateral hemispheric blood pressures of 60, 65 and 72 mm Hg preoperatively and did well at surgery: two had transient paresthesias and the third was asymptomatic after carotid ligation. The fourth patient had a preoperative collateral hemispheric blood pressure of 50+; he had a left hemispheric stroke after surgery. The authors feel that a collateral hemispheric pressure of 60 mm Hg is necessary to prevent strokes from carotid ligation.

Items of Interest

Hypertension: Therapy as Recommended by the National Committees — Moyer JH (Director of Professional Affairs, Conemaugh Valley Memorial Hospital, Johnstown, Pennsylvania) — *Angiology* 27: 71-90 (Feb) 1976

New Frontier for Radiology: Computed Tomography — Evens RG (Department of Radiology, Washington University School of Medicine, St. Louis, Missouri 63110) — *Am J Roentgenol* 126: 1117-1129 (Jun) 1976

Hypertension: Neural, Vascular and Hormonal Factors (Proceedings of the Council for High Blood Pressure Research) — Cohn JN (ed) (Department of Medicine, Cardiovascular Division, University of Minnesota, Minneapolis, Minnesota) — *Circulation Research* (Suppl 2) 38: II-1-112 (Jun) 1976

Cerebral Vasospasm — Heros RC, Zervas NT (Beth Israel Hospital, Boston, Massachusetts 02215), Negoro M — *Surg Neurol* 5: 354-362 (Jun) 1976
Abstracts

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