Tabelle II. ^{14}C-Aktivität des bei der Photosynthese in Luzerne-Blättern gebildeten L-Alanins

Zugesetzte Verbindung (Vol%)	Diäthyläther	Methylenchlorid	Schwefelkohlenstoff	Benzol	n-Octan
0	3850	7910	3370	4930	4750
1	2960	8180	4530	3240	4170
11	3340	5420	6800	2500	2200[b]
21	2790	1390	7350	480[a]	—

Die Inkubationsdauer beträgt 1 min. Die Radioaktivität ist in cpm eines Flüssigkeitsszintillationszählers gemessen und auf 1 mg Blattgewicht bezogen. [a] Für die Sättigungskonzentration von 17 Vol%. [b] Für die Sättigungskonzentration von 2.7 Vol%.

einer 21%igen CS_2-Konzentration entspricht. Co-Chromatographie in verschiedenen Lösungsmittelsystemen und Co-Kristallisation mit einer authentischen Probe weisen die Verbindung als L-Alanin aus. Eine quantitative Auswertung der L-Alanin-Bildung ist in Tabelle II wiedergegeben.

Folgende Ergebnisse lassen sich den Versuchen entnehmen: 1. Im Bereich von 0–10 Vol% in der umgebenden Atmosphäre aktiviert Schwefelkohlenstoff im Gegensatz zu den anderen untersuchten Verbindungen (Diäthyläther, Methylenchlorid, Benzol, n-Octan) die CO_2-Fixierung bei Luzerne. 2. Im Bereich $>$ 10 Vol% CS_2 ist die L-Alanin-Bildung bei Luzerne weit grösser als unter Normalbedingungen, obwohl die Photosyntheseaktivität zunehmend gehemmt wird. Die Hemmung der CO_2-Fixierung durch lipophile Lösungsmittel verschiedener chemischer Konstitution und deren Abhängigkeit von der jeweiligen Löslichkeit in Wasser deuten eine unspezifische Einwirkung auf den Photosyntheseapparat an. Sie ist in den Bereichen niedriger Konzentrationen (unter 1 Vol%) reversibel und wird als Narkose[5] bezeichnet. Worauf der stimulierende Effekt von Schwefelkohlenstoff zurückgeführt werden kann, ist vorläufig nicht erkennbar. Versuche mit $C^{35}S_2$ und $^{14}CS_2$ haben gezeigt[6], dass diese Verbindungen von Luzerne unter photosynthetisierenden Bedingungen aufgenommen und metabolisiert werden. Eine Erklärung für dieses Phänomen wird das Ziel unserer Untersuchungen sein[7].

Summary. Vapourized organic solvents such as: diethyl ether, methylene chloride, carbon disulfide, benzene, and n-octane have an inhibiting effect on CO_2 fixation in alfalfa leaves (*Medicago sativa*). One exception is CS_2 which stimulates overall fixation up to 10 vol%. Beyond 10 vol% it inhibits overall CO_2 fixation like the other solvents, but stimulates the formation of L-alanine as the major remaining fixation product. Proportionality exists between water insolubility of the organic solvents and their inhibiting effect on CO_2 fixation.

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Changes in Composition of Etheric Lipids During Brain Development

It is well known that lipid composition of the white matter changes with age[1]. Most of the data available derives from the analysis of the tissue either taken as a uniform histological structure[2] or from the analysis of corpus callosum which is considered as its major representative[3].

However, it is known that changes in number and composition of cells which occur during development may take place to a different extend in different parts of the white matter[4]. Concomitant changes in the chemical composition and especially of the lipids may therefore be expected to occur in the various parts of the white matter.

With this in mind, we have examined the changes in composition of plasmalogens which are the major etheric lipids of the brain and the glycerol ether phospholipids (kephalin B) for which slight evidence exists that their composition varies with age in a way which does not parallel changes of total lipids[5].

Materials and methods. The parietal lobe, the temporal lobe, the corpus callosum and the interna capsula from the white matter of male human brain were obtained by anatomical preparation from the corpus of individuals free of clinical history of central or peripheral neurological disorders. The tissue was washed with NaCl 0,9% and immediately wiped and weighed. Total lipids were extracted according to FOLCH et al.[6], and weighed. The a-/b unsaturated ether content (plasmalogens) of the tissue was determined in the total lipids by the method of GOTTFRIED and RAPPORT[7]. Total ether containing glycerophosphatides (GEP) were determined according to THOMPSON and KAPOULAS[8].

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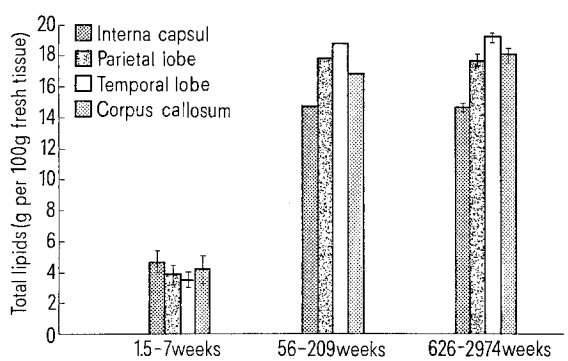
Plasmalogens[a] and GEP[b] content of certain parts of human brain (white matter) as a function of age

Parts of the brain	Group A (5)[c] 1.5–7 weeks	Group B (3) 56–209 weeks	Group C (9) 626–2974 weeks	Significance of differences BvC
I Interna capsula	Plasm 392[d] ± 26	2974 ± 56	2514 ± 4.5	+
	GEP 65 ± 4.5	475 ± 12	413 ± 3	+
II Parietal lobe	Plasm 320 ± 22	4468 ± 70	3379 ± 37.6	+++
	GEP 51 ± 5	738 ± 5.3	552 ± 6	+++
III Temporal lobe	Plasm 280 ± 15	4573 ± 35	3744 ± 38	++
	GEP 46 ± 4	752 ± 7	619 ± 15	++
IV Corpus callosum	Plasm 333 ± 18	4171 ± 77	3367 ± 46	++
	GEP 50 ± 5	677 ± 14	546 ± 8	++
Significance of differences				
I v II	Plasm ++		++	
	GEP ++		++	
I v III	Plasm +++		++	
	GEP +++		++	
I v IV	Plasm ++		++	
	GEP ++		++	

[a,b] μmoles/100 g fresh tissue. [c] Number of brains for experiments. [d] Mean values ± standard error. Plasm, Plasmalogens; GEP, Glycerol ether phospholipids. +, $p < 0.05$; ++, $p < 0.02$; +++, $p < 0.001$.



A histogram showing total lipids (g/100 g fresh tissue) of 4 parts of human white matter examined in 3 groups of ages. Each bar represents the mean ± SD of 5 experiments (A Group) and 9 experiments (C Group). Statistical analysis was not carried out in B Group (3 experiments). Ranges of ages are shown at the abscissa of the histogram.

Results and discussion. The material was divided according to ages into 3 groups relevant, as much as possible, to what is believed to be basic stages of myelination. As shown in the Figure, before the age of 56 weeks the 4 parts of the brain have almost equal content of total lipids, while after the age of 56 weeks, when it is reasonable to believe that active myelination has been completed, the interna capsula has distinctly lower lipid content than the other parts.

The changes of the plasmalogens and GEP content in certain parts of the white matter during brain development are shown in the Table. Comparison of the data obtained for each part of the brain of the same group of ages reveals that for the period of 1.5–7 weeks (Group A), the highest content of plasmalogens and GEP is found in the interna capsula. On the contrary, for older brains (Groups B and C) this part acquires the lowest content of these lipids as compared to the other 3 parts examined.

This data may be related to the histological findings that considerable alterations occur with age in oligodendroglia cells of the examined parts of the white matter[4]. The oligodendroglia, which is responsible for the myelin growth[9], contains at the early stage of brain development (Group A) a higher cell number in the interna capsula and a lower one in the white matter of the temporal lobe. The inverse phenomenon is observed in these areas of the white matter during the period of brain maturation.

It is therefore reasonable to speculate that the quantitative variations in etheric lipids content do not derive from changes in myelin lipids, but from changes in lipids occuring in cells out of the myelin. These cells comprise lipids which are organized into less stable membrane structure than that of myelin[10]. These membranes may be more susceptible than myelin to the metabolic events, which take place during maturation of the brain.

Concerning the changes with age in the same part of the brain, it is interesting to note that plasmalogen and GEP contents in all parts of the brain are significantly decreased during the period of brain maturation (Group B as compared to Group C). This is in accordance with the finding of SVENNERHOLM and THORIN[5] who have determined the GEP concentration in child and adult whole brain. The finding that plasmalogens content changes in a similar way to GEP indicate similarities in their appearance within specific cell population.

Résumé. On a étudié les lipides éthériques dans la capsule interne, la région interlobaire et la substance blanche du lobe pariétal et temporal. On a constaté qu'avant la myélinisation la concentration des ces lipides est supérieure dans la capsule interne tandis qu'après le lobe temporal présente la plus haute concentration par rapport aux autres régions étudiées. Ces fluctuations expriment probablement l'instabilité lipidique des membranes cellulaires se trouvant à l'extérieur de la myéline.

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