times higher than the normal one. The level of cGMP was slightly affected by the increase in Ca^{2+} concentration and presented an almost steady decrease throughout the experiment. In addition, the concentration of Mg^{2+} showed a small increase which was coincidental with the maximal increase in calcium content. The assayed liver tumors have shown increased Ca^{2+} and cAMP concentrations while Mg^{2+} and cGMP concentrations were equal or lower than the corresponding value in normal liver tissue (figure 2).

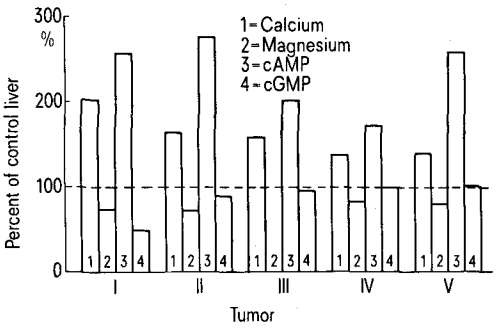

Fig. 2. Calcium, magnesium, cAMP and cGMP concentrations (as percent of the corresponding value in normal liver tissue) in 5 primary liver tumors (cholangiocarcinoma) induced in rats by 4-dimethylaminoazobenzene feeding.

These results appear to indicate a direct relationship between Ca^{2+} concentration and cAMP synthesis. There is evidence that TAA produces a change in cell membrane permeability leading to increased influx of Ca^{2+}[10]. As shown in figure 1, during the first 8 h after TAA administration, the concentrations of Ca^{2+} and cAMP increase at a fairly similar rate. This seems to indicate an increase in both Ca^{2+} permeability and adenylate cyclase activity. The observation that after that point the concentration of Ca^{2+} decreases faster than the concentration of cAMP appears related to the suggested role of cAMP in the regulation of the changes in Ca^{2+} concentration in the cytoplasm[3] by increasing the rate of Ca^{2+} efflux from the cells[5,11]. The observation that cAMP-dependent protein kinase modulates calcium transport by the cardiac sarcoplasmic reticulum[12] suppors that hypothesis.

It seems likely that under these experimental conditions the buildup of cAMP forms part of a cellular mechanism, preventing the uptake of Ca^{2+} into intracellular pools which could provoke a permanent cell damage. It is worth noting that in primary liver tumors a similar Ca^{2+}-cAMP interrelation was observed.

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Occurrence of oxalyl-CoA synthetase in Indian pulses

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Summary. The presence of oxalyl-CoA synthetase was observed in common edible pulses. Excepting in chick pea, the changes in oxalyl-CoA synthetase activity of winter pulses proceeded in stages. The enzyme remained more active in late strains than in early strains of winter pulses. Unlike the activity of the enzyme in winter pulses, that in summer pulses behaved differently.

ATP- and CoA-dependent decarboxylation of oxalate to formate by extracts of a number of plant tissues was first reported by Giovanelli and Tobin[1]. The enzyme catalyzing the reaction – oxalate → oxalyl-CoA – was partially purified (6fold) from pea seeds and its properties were studied. This enzyme was referred to oxalyl-CoA synthetase by the trivial name (or by the systematic name of oxalate-CoA ligase (AMP). Although the pea seeds yielded the most active preparations, the enzyme was also detected in the seeds of lupin, pumkin and in wheat germs[2]. Subsequently, the enzyme was found to be very active in the crude extracts of Lathyrus sativus seeds[3] and was shown to be responsible for the synthesis of β-N-oxalyl, L-α,β-diamino propionic acid (the L. sativus neurotoxin) in condensation with L-α,β-diamino propionic acid in the presence of ODAP synthase[4]. The present communication relates to the occurrence and the activity of oxalyl-CoA synthetase in common Indian pulses with the aging of the seedling.

Materials and methods. Early and late strains of pulses grown in winter, i.e. as post monsoon crops (chick pea, pea, lentil and chickling pea), and those grown in summer, i.e. as pre-monsoon crops (pigean pea, green gram, cowpea and soybean), were collected from the Division of Plant Introduction, IARI, New Delhi-12 (India). Germination of the seeds and the narturing of seedlings were carried out as described by Barat et al.[5]. Samplings collected after the desired period of time were washed with distilled water, pressed softly between 2 filterpaper sheets and then chilled in ice. They were then used as experimental materials. Procedure reported by Malathi et al.[3] was followed for the assay of the enzyme. Protein was estimated by the Lowry et al. method[6]. The activity was expressed in terms of μmoles of acetyl phosphate/mg of protein.

Results and discussion. The activity of oxalyl-CoA synthetase in winter and summer pulses is presented in the table. Data reveal that the presence of oxalyl-CoA synthetase was detected in winter-(chickling pea, pea, lentil and chick pea) as well as in summer-(pigean pea, soybean, green gram and cowpea) pulses. Irrespective of pulse crops and

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Comparative studies on the activity of oxalyl-CoA synthetase in pulses (μmoles of acetyl phosphate/mg protein)

Crops	Age (days)	Chickling pea (Lathyrus sativus L.)		Pea (Pisum sativum Linn. sens ampl.)		Lentil (Lens esculenta Moench)		Chick pea (Cicer arietinum Linn.)	
		P-213 (early)	P-257 (late)	Green frost (early)	T-6115 (late)	Pusa-1 (early)	Pusa-6 (late)	BG 109-1 (early)	P-600 (late)
Winter pulses (post monsoon)	1	0.0143	0.0240	0.0274	0.0180	0.0240	0.0235	0.0121	0.0132
	3	0.0234	0.0305	0.0291	0.0369	0.0280	0.0350	0.0182	0.0275
	5	0.0267	0.0347	0.0294	0.0415	0.0421	0.0628	0.0570	0.0200
	10	0.0462	0.0576	0.0307	0.0830	0.0921	0.1009	Trace	0.0158
Crops	Age (days)	Pigean pea (Cajanus cajan [L.] Millsp)		Soybean (Glycine max [L.] Merr.)		Green gram (Phaseolus aureus Roxb.)		Cowpea (Vigna sinensis [L.] Savi exttassk.)	
		Pusa Ageti (early)	NP(WR)-15 (late)	Clark (early)	L.P. (late)	PS-16 (early)	L-242 (late)	Pusa phalguni (early)	NP_3 (late)
Summer pulses (pre monsoon)	1	0.02160	0.01370	0.02340	0.02080	0.02220	0.03390	0.0168	0.0195
	3	0.09297	0.06647	0.03798	0.02101	0.02035	0.02471	0.0652	0.0303
	5	0.06263	0.08035	0.03400	0.03778	0.10350	0.08730	0.1083	0.1403
	10	0.07750	0.08074	0.09570	0.04790	0.13280	0.21050	0.1665	0.1337

genetic variabilities, the activity of the enzyme was found to increase with the aging of the seedlings, which was quite noticeable after 5 days. In the case of winter pulses, excepting in chick pea, the change in oxalyl-CoA synthetise activity proceeded in stages, whereas in summer pulses such a trend was not observed. Again excepting in chick pea, the enzyme remained more active in late strains than in early strains of winter pulses, while in summer pulses it behaved differently. This discrepancy in the enzyme activity is supposed to be a) the inherent characteristics of the pulses and b) the climatological effect on the growth of pulses. On the basis of activity of oxalyl-CoA synthetase, it is surmised that pea, chickling pea and lentil may be placed in one group, while the second group consists of summer (pigean pea, soybean, green gram and cowpea) pulses, and the third group of only chick pea.

Effect of electric shock on serotonin (5 HT) content in different organs of rat

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Summary. 5 HT content of heart, brain, kidneys and liver in rats increases significantly after repeated exposure to electric shock followed by a trend of normalisation. These changes appear to be organ specific.

Stress is known to induce a number of neurohumoral, hormonal and metabolic alterations in the living organism. It is well-known that stress modifies both noradrenergic and serotonergic activities in the central nervous system [1-4]. During stress, the sympathetic adrenomedullary system is activated. Several studies have demonstrated enhanced synthesis of catecholaminies during the stressful situations. However, little attention has been paid to 5-HT metabolism in peripheral organs in the above condition. The few published studies indicate, however that changes in the 5-HT level in blood and in different organs may occur in animals submitted to stress[5-9]. Lauria[10] observed raised concentration of 5-HT in the heart following electric shock. Other peripheral tissues have not been studied much. Thus the 5-HT content in heart following electric shock suggests that in peripheral organs 5-HT may be involved in alarm reaction similar to catecholamines.

In the present study, we have investigated the influence of electric shock on 5-HT content in 4 vital organs namely the heart, the brain, the kidneys and the liver of rats. Such a study may be helpful for a better understanding and suitable medulation of 5-HT metabolism in peripheral sites during stressful situation.

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