INTERACTION OF LANTHANUM WITH CADMIUM INFLUX ACROSS ISOLATED *CARCINUS* GILL

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The effect of the non specific Ca channel blocker La on the ^{109}Cd influxes in isolated perfused *Carcinus* gills were studied. The influx of ^{109}Cd are shown to be lanthanum concentration dependent processes. The half-maximum inhibition of cadmium influxes by La was at 1.4 x 10^{-6} mol l^{-1}. Cadmium transport is discussed in terms of non-specific influx utilizing Ca channels. The gills are the most important interface barriers of the cadmium transport between the marine organisms and their environment. In spite of the large number of reported evidences on cadmium bioaccumulation and toxicity, there has been poorly studied transport mechanisms of cadmium through the cells and tissues of aquatic organisms. In isolated membrane vesicles lanthanum was shown to be a powerful blocker of a Na^+/Ca^{+2} exchanger (KACZOROWSKI *et al.*,1984) and membrane Ca^{+2} ATPase activity (WUYTACK and RAEYMAEKERS, 1992). In freshwater trout gills basolaterally located Ca dependent ATPase and Na^+/Ca^{+2} exchanger with extremely high Cd affinity was found experimentally (SCHOENMAKERS *et al.*,1992). Studies of the effects of lanthanum on Cd influxes have been undertaken as a means of further characterization of Cd transport mechanisms. Adult male crabs, *Carcinus mediterraneus* Csrn. (5.5 ± 0.5 cm carapace width), were collected from estuaries of the Venice lagoon. They were acclimated to controled laboratory conditions for at least 2 weeks to aerated sea water diluted by distilled water (DSW;18 x 10^{-3} salinity) at room temperature (t = 20 ± 2°; pH = 7.8 ± 0.1). The animals were fed once a week on slices of bovine heart.The posterior 7th and 8th gill pairs, which are rich in mitochondria-containing chloride cells and which have high Na, K ATPase activity were excised from the adult crabs and perfused, according to the technique described by LUCU and SIEBERS (1986). The effect of lanthanum ($LaCl_3$) on ^{109}Cd influxes is presented on Fig.1. Lanthanum was added to the DSW in concentrations ranging from 10^{-7} to 10^{-6} mol l^{-1}. Lanthanum clearly inhibited ^{109}Cd influxes. Half-maximum inhibition (IC50) of cadmium influx in the gills after 2 h exposure in $LaCl_3$ were 1.4 x 10^{-6} mol l^{-1}. In addition, ^{109}Cd influx is strongly inhibited by $LaCl_3$ acting particularly from the external medium at the apical gill epithelium surfaces. Moreover, apically applied 9 x 10^{-6} mol La l^{-1} in the bathing solution has been found to reduce Ca influxes (IC_{50}) for 50 % of the control group (LUCU, 1994). In the perfused *Carcinus* gills, when Ca was added apically Cd influx inhibition was more pronounced than in the experiment when Ca was added basolaterally.

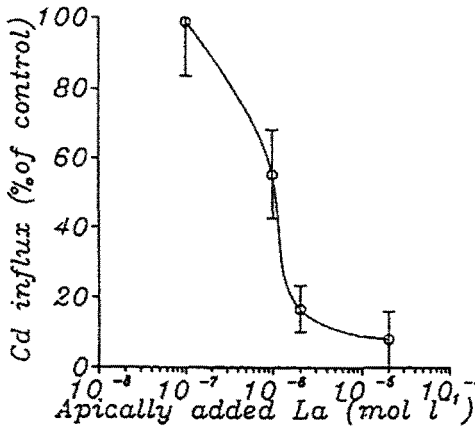

Fig. 1 Response of $LaCl_3$ (10^{-7} to 10^{-5} mol l^{-1}) on ^{109} Cd influxes determined at the steady state level. Values are a mean of 5 determinations ±SEM. Total cadmiumconcentration in medium was 0,26 µmol Cd l^{-1}. Dilute sea water (DSW) wasenriched by Ca (15 mmol ^{Ca} l^{-1}).

This suggests that Cd enter the gill epithelium via a lanthanum-sensitive apical Ca channel. We have used La as an non specific blocker acting selectively from apical perfused *Carcinus* gill surfaces.The entry of cadmium over the apical membrane of gill epithelium cells via Ca^{2+} channels has already been described for the freshwater-adapted trout (PERRY and FLIK, 1988).Vital mechanism of the postmoult Crustacea is the ability to increase Ca absorption for the purpose of rapid calcification of their exoskeleton.It will be stimulating, in the future, to continue studies on the interaction mechanisms of calcium with highly toxic metal cadmium, which effects could be especially hazardeous during such a sensitiver living phase of Crustacea as it is moulting.

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