Comparative study of metalic ions penetration and bioaccumulation in *Tilapia zilli* Gerv living in fresh and saline water (30‰)

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Laboratory experiments for investigation differential penetration and bioaccumulation of calcium ($Ca^{45}Cl_2$) as macroelement, iron ($Fe^{55}Cl_2$) as microelement, and mercury ($Hg^{203}Cl_2$) as inorganic pollutant in the euryhaline fish *Tilapia zilli* Gerv living in fresh and saline water (30‰) aquaria containing the previous mentioned isotopes for 40 days showed that the permeability of $^{45}Ca^{++}$ is 20% and 8% respectively for fresh and saline water, and its accumulation factors (AF) in the different organs and tissues of the fish are ones or tens except in the skin which is higher. While that of $^{55}Fe^{++}$ is 37.5% and 25% respectively for the permeability, and its accumulation factors (AF) are tens or hundreds. On the other hand, the permeability of $^{203}Hg^{++}$ is nearly complete and its accumulation factors (AF) are hundreds or thousands (Table 1).

It was noticed also that the bioaccumulation of $^{203}Hg^{++}$ is maximum in the kindey which probably means that the chronic toxicity of mercury is mainly due to its destruction of the fish kindey, as mercury reacts with its components rich in Ca, P and S (LEESON and LEESON, 1970). The bioaccumulation of $^{55}Fe^{++}$ is maximum in the liver and intestine which probably causes its chronic toxicity due to alternation in the liver structure which could be noticed in swelling of its cells, its blood vessels are extremely congested and lobular liver structure is largely disappeared (SALEH and HAMZA, 1986). KOHLER and HALZEL (1980) demonstrated that the pollution of aquatic environment with heavy metals causes highly damage in the intestine of the fish as the submucosa is unfiltered occasionally with lymphocytes and small intestine vessels are congested. The architecture of the villi is largely destroyed and the intestinal epithelium has disappeared and bleeding.

The bioaccumulation of $^{45}Ca^{++}$ is maximum in the caudal fin "skin" which means that the fish absorbs calcium directly from the surrounding water through its skin to regulate metabolic rate as calcium role in decreasing permeability of the skin to elements and ions is well known (Table 1).

However, the permeability of elements and ions, their accumulation factors (AF), and their bioaccumulations in organs and tissues of *Tilapia zilli* living in fresh water aquaria are higher than those of the fish living in saline water aquaria due to the tendency of the fresh water fish to absorb more elements and ions to avoid hypotonism.

Tab. 1.- Bioaccumulations (B) of $^{45}Ca^{++}$, $^{55}Fe^{++}$ and $^{203}Hg^{++}$ as impulses/minute x gram organ or tissue of *Tilapia zilli* living in fresh or saline water (30 ppt) aquaria. Their accumulation factors (AF) and their contents in the aquarium water, as impulses/minute x ml, are also indicated.

Organs	Fresh water aquaria						Saline water aquaria					
	$^{45}Ca^{++}$		$^{55}Fe^{++}$		$^{203}Hg^{++}$		$^{45}Ca^{++}$		$^{55}Fe^{++}$		$^{203}Hg^{++}$	
	B	AF	B	AF	B	AF	B	AF	B	AF	B	AF
Kidney	3900	11,5	182	18,2	30850	15425	1860	4,6	109	9	15270	6108
Liver	555	1,5	1122	112,2	10910	5455	460	1,1	209	17,4	5540	2216
Intestine	8900	26	5960	596	3270	1635	580	1,6	1850	154	5820	2324
Gills	5890	17,5	51	5,1	1874	935	410	1	41	3,4	1400	500
Caudal fin	6440	191	51	5,1	380	190	3230	8	40	3,3	550	220
Gonads M	1220	3,6	250	25	3010	1505	880	2	200	17	620	248
Gonads F	630	1,9	110	11	560	280	70	0,2	65	5,4	90	36
Fish flesh	765	2,2	5,6	0,58	145	77,5	37	0,12	4,2	0,35	110	44
Water aquarium	Start	436		16		72		439		16		72
	Final	339		10		2		402		12		2,5

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