ANTIRADIATION EFFECTIVENESS OF THE CHLORINE C

O.M. BUBNOVA, I.I. GRECHKA, V.V. ZNAMENSKY
State Research Centre of Russia - Institute of Biophysics, Moscow

INTRODUCTION

At present ever more attention of the experimenters in the field of search of high-effective antiray means - is directed to development of preparations from bio-active substances of a natural origin. In this connection all greater interest is caused by researches of antiray activity of these compounds, distinguished, as a rule, from known preparations of synthetic manufacture of low toxicity, absence of expressed collateral effects and possibility of course application.

It has biological (antiray) activity in dozes 5-10 mg/kg and clorine C which is derivative of chlorophil A. At present it passes tests in oncology.

Porphyrines (synthetic and natural) are recently subjected to wide study as potential medicinal means (1-2), due to their ability to be accumulated in bodies of the reticulo-endothelial system and proliferous tissues (3), as well as their physical-chemical characteristics (fluorescence, photosensitizing action, colouring).

All this testifies for the benefit of perspective use of porphyrin for treatment and diagnostics of tumors (4). According to the abovedescribed properties of porphyrines there is that fact, that for some of them radioprotective properties are revealed during the injections as well as before and after radiation treatment (5).

The abovesaid has formed the basis for study of antiray properties of the chlorine C during the experiments on small-sized laboratory animals.

The researches of sharp toxicity of chlorine C were conducted on white non-bred and linear (CBA x C57 Bl) F1 mice of both sex weighing 20-26 g. Chlorine C has been injected once (intraperitoneally, intramuscularly, subcutaneously and per os) in a wide range of dozes, registering death of the animals during 7 days after the injections. Parameters of sharp toxicity (LD_{16}, LD_{50}, LD_{84}) were defined by the method of Lichfield and Wilcocson.

Facts on sharp chlorine C toxicity are indicated in the Table.

Table Sharp chlorine C toxicity in experiments on mice.

Mice	Way of injection	LD_{16} (mg/kg)	LD_{50} (mg/kg)	LD_{84} (mg/kg)
non-bred	intraperitoneally	105	200	340
(CBA x C57 Bl) F1	intraperitoneally		270	
	intramuscularly		1100	
	subcutaneously		1400	
	per os		2000	

The facts, submitted in the Table show that toxicity of chlorine C is considerably below at the injection per os, subcutaneously and intramuscularly, than intraperitoneally. These facts permit to relate chlorine C to substances of the average toxicity.

Antiradiation effectivity of chlorine C was studied on the mice (CBA x C57 Bl) F1. Chlorine C was applied in a wide range of dozes with its' use in 3 variants: before radiation treatment, after radiation treatment, combined (before and after radiation treatment).

Studing radioprotective effectiveness of clorine C the mice have been subjected to general radiation treatment on Y-installation " IGUR " with capacity 1.68 Gy/min. 30-days-long survival of mice, dynamics of their death, changes in their weight as well as average duration of life of dead ones depending on a doze of clorine C, time and way of the injection before radiation treatment in the doze of $LD_{90\text{-}95/30}$, that has made for sharp radiation treatement 9 Gy, has been studied.

Experiments have shown, that chlorine C possesses high radioprotective activity in experiments on mice during intraperitoneally injection 15-60 minutes before radiation treatment in dozes, close to minimum absolutely lethal. At the injection 90 mg/ kg 15-60 minutes before the radiation treatment antiray effectiveness was 63 % and 45 %, accordingly (control - 4 %).

In optimum radioeffective doze 40 mg/kg chlorine C by its' effectiveness (80%, the control - 13 %) comes nearer to the widely known radioprotector - mercamine.

Radioprotective activity of chlorine C reduces at an increase of a time of the injection before radiation treatment and at other ways of injection (intramuscularly, subcutaneously, per os).

Studies of medical activity of chlorine C in experiments on mice have shown, that the compound does not possess medical activity. The death of the animals during the experiments did not differ in terms from their death in the control of radiation treatment.

Combined application of chlorine C (before and after radiation treatment) in the experiments on mice did not provide antiray activity. Chlorine C was injected intraperitoneally 30 minutes before radiation treatment in the doze 50 mg/kg and in 1 hour after the radiation treatment in the doze 75 mg/kg.

Thus, as a result of conducted work reasonably high antiray activity of chlorine C is established. At the same time it should be noted, that the compound is effective only at intraperitoneally injection before radiation treatment. In other variants of experience (after radiation treatment, before and after radiation treatment) it is not effective. So, it can be considered to be potential radioprotector.

In the subsequent work we are to evaluate radiodefensive abilities of chlorine C during injection per os and in conditions of radiation treatment in small dozes.

REFERENCES

1. M.A. Rish, K.A. Askarov, Y.I. Yarchev and other, Materials of the third All-Union conference on chemistry and biochemistry of porphyrines ,128-139 (1983).
2. E.S. Gabryelian, A.G. Tatevosyan, R.R. Voroyan, the same, 116-127.
3. O.V. Chernenko, G.M. Syhin, E.I. Yarchev, Thesis of the reports of the 4- All-Union conference on chemistry and porphyrin application, Erevan,230-231, (1984).
4. G.M. Syhin, the same, 223.
5. L.G. Strogonova, T.N. Tyjilkova, G.V. Ponomaryov,G.V. Kirillov,Thesis of the reports of the fourth All-Union conference "Chemistry, pharmacology and mechanisms of antiray means action ", Moscow, 14-15 (1990).