

CARTAS AL EDITOR

A Preliminary Study on the Action of Genus *Allium* on Thyroid ^{131}I Iodide Uptake in Rats

Products derived from *Allium* extract were reported to prevent cancer in some animal models (10, 11); much attention was focused on their biological effects such as decreased platelet aggregation (1, 2), fibrinolytic activity (7), hypoglycemic and hyperglycemic actions (8) and antimicrobial activity (5, 6). Most of the biological properties attributable to onion (*A. cepa* L.) and garlic (*A. sativum* L.) extracts are related to their content in organic sulfur compounds produced by enzymatic activity when the plant tissue is ruptured (3, 4).

Because of the growing search for therapeutic applications of onion and garlic extracts, or their components, we have investigated a toxic effect associated with the genus *Allium*.

Fifty male Wistar rats (150 g b.w.) were maintained under conditions of controlled temperature and humidity. One-week adaptation period, during which the animals were housed in groups of 5 rats per cage, was allowed before the experiments.

All chemicals (table I) were of analytical grade. The plant extracts tested were obtained from steam distillates of garlic and onion.

During the 5 day experimental period, each rat received one daily i.p. injection of 0.2 ml of the test solution of a sulfur compound or garlic or onion extract (equivalent to 50 g f.w.) and mixed with corn oil. Doses are given in table I. In the control group, 0.2 ml sterile corn oil, was injected in each rat. A final group of animals received one daily i.p. injection of aqueous carbimazole solution.

After 5 days, all rats were given a single

i.p. dose of 1 ml 0.9 % saline solution containing $1\mu\text{Ci } ^{131}\text{I}^-$ (Amersham) and 3 h later the animals were killed by a sharp blow to the back of the neck, and the thyroid glands, liver and submaxillary glands were removed. Measurements were taken with a crystal scintillation counter (Berthold, Mag 315). The levels of $^{131}\text{I}^-$ uptake were measured, considering the initial dose to represent 100 % uptake. The percentage uptake was found with the following equation:

$$\% \text{ uptake} = \frac{\text{Ct} - \text{Cb}}{\text{Da} - \text{Ds}} \cdot 100$$

where Ct = thyroid uptake (cpm), Cb = mean uptake by submaxillary glands and liver, considered as background uptake (cpm), Da = initial dose administered (cpm) and Ds = dose remaining in the syringe (cpm).

The i.p. administration way has been chosen because the animals refused oral ingestion, owing to the sharp odor of the compounds involved. The odor caused immediate respiratory arrest when dimethyl disulfide was administered, leading to death in three of the animals in this group, whereas the remaining two rats recovered from the respiratory crisis. This group was therefore considered too small to be included in the analysis of the findings, however, it may be pointed out that the effect of dimethyl disulfide on iodine uptake by the thyroid gland in the remaining two animals was negligible. It is considered that treatment over a period of 5 days would be sufficient, at the doses used, to reveal effects on iodine uptake by the thyroid gland. These doses were below the LD_{50} of each substance.

Table I shows the mean levels of $^{131}\text{I}^-$ uptake with the different products tested

Table I. Daily doses of products; mean levels of ^{131}I uptake (media $\pm$ S. D.) in rats with the different products tested and the significance of the differences between products, the control group and the group injected with carbimazole.

	mg/0.2 ml corn oil	% Uptake	Control	Carbimazole
Control	—	30.86 $\pm$ 5.46		
1-Propanethiol (Merck)	67.00	1.48 $\pm$ 0.36	**	N.S.
Allyl methyl sulfide (Jansen)	54.00	23.40 $\pm$ 5.66	*	**
Diallyl sulfide (Fluka)	37.60	32.65 $\pm$ 9.33	N.S.	***
Diallyl disulfide (Fluka)	8.04	23.00 $\pm$ 3.33	***	****
Dimethyl disulfide	1.34	^b		
Dipropyl disulfide (Aldrich)	72.00	2.14 $\pm$ 1.33	****	*
Garlic extract	^a	0.49 $\pm$ 0.23	*****	***
Onion extract	^a	33.80 $\pm$ 3.11	N.S.	****
Carbimazole	1.00	2.76 $\pm$ 1.30	****	

^a 50 g fresh weight, ^b too small group, **** P < 0.001, *** P < 0.05, ** P < 0.01, * P < 0.1.

(two-tailed comparative tests). Dipropyl disulfide, the mayor component of onion extract, and the whole garlic extract inhibited $^{131}\text{I}^-$ uptake by the rat thyroid.

Our findings concur with those of others (9) on the inhibitory effect of dipropyl disulfide, and the lack of such effect in sulfur compounds. The -S-S- group may be responsible for the inhibitory effect. In comparison to the control group, diallyl sulfide and 1-propanethiol also significantly inhibited uptake. The -SH groups are present in other products used for therapeutic purposed in hyperthyroidism. The fact that garlic oil was able to inhibit $^{131}\text{I}^-$ uptake by the rat thyroid suggests that in addition to the productos assayed in this study, other sulfur compounds may influence uptake. Iodide uptake in rats given diallyl sulfide and whole onion oil was similar or slightly higher than in controls.

Key words: Antithyroid activity, Garlic, Onion, Sulfur compounds.

Palabras clave: Actividad antitiroidea, Ajo, Cebolla, compuestos azufrados.

References

1. Apitz-Castro, R., Cabrera, S., Cruz, M. R. et al.: *Thromb. Res.*, 32, 155-161, 1983.
2. Ariga, T., Oshiba, S. and Tamada, T.: *Lancet*, 2, 150-154, 1981.
3. Brodnitz, M. H., Pollock, C. L. and Vallon, P. P.: *J. Agr. Food Chem.*, 17, 760-766, 1969.
4. Brodnitz, M. H.: *J. Agr. Food Chem.*, 19, 273-275, 1971.
5. Didry, N., Pinkas, M. and Dubreuil, L.: *Pharmazie*, 42, 687-688, 1987.
6. Mirelman, D., Monheit, D. and Veron, S.: *J. Infec. Dis.*, 156, 243-244, 1987.
7. Nishimura, H., Wijaya, C. H. and Mizutani, J.: *J. Agric. Food Chem.*, 236, 563-568, 1988.
8. Pushpendran, C. K., Devasagayam, T.P.A. and Eapen, J.: *Ind. J. Exp. Biol.*, 20, 428-431, 1982.
9. Saghir, A. R., Cowan, J. W. and Salji, J. P.: *Eur. J. Pharmacol.*, 2, 339-402, 1968.
10. Sparnins, V. L., Barany, G. and Wattenberg, W.: *Carcinogenesis*, 9, 131-134, 1988.
11. Sparnins, V. L., Mott, W., Barany, G. et al.: *Nutr. Cancer*, 8, 211-215, 1986.

M. R. Artacho*, M. D. Ruiz, F. Olea and N. Olea**

Departamento de Nutrición y Bromatología
Facultad de Farmacia
Universidad de Granada
18071 Granada (Spain)

(Received on July 24, 1991)

* To whom all correspondence should be addressed.

** Departamento de Radiología. Facultad de Medicina. Universidad de Granada. 18071 Granada (Spain).