

Communications to the Editor

UDC 547.233 : 616-006.6-085

Effect of Some Polymethylenepolyamines on the Growth of Transplantable Cancer

Boyland¹⁾ reported that biogenic amines, especially 2-aminoethanol, cadaverine, and choline, possess inhibitory action on cultured tumor tissue. Tokuoka²⁾ claimed, from the result of coloration reaction with copper carbonate, that spermine is present in the serum of cancer patients and stated that this would be one of the measures for clinical diagnosis. Kosaki³⁾ reported that a lipid, malignolipin, is present in the blood of cancer patients and that this lipid contains spermine and phosphorylcholine.

The effect of biogenic amines on the growth of cancer cells was examined with Ehrlich solid tumor and Yoshida sarcoma *in vitro*, by the method reported earlier,⁴⁾ using tetramethylenediamine (putrescine) hydrochloride, pentamethylenediamine (cadaverine) hydrochloride, spermidine phosphate, and spermine phosphate.

Since spermidine and spermine are nephrotoxic to mice, the dose used was below 0.5 mg./head/day as a free base, using 0.5, 0.25, and 0.1 mg. The doses of other amines used were 1, 0.5, 0.25, and 0.1 mg./head/day as a free base.

For Yoshida sarcoma, all the amines were used in the concentration of 10^{-4} , 10^{-5} , and $10^{-6}M$.

None of the amines used had any effect on the Ehrlich solid tumor in the doses administered, while all the amines were inhibitory to Yoshida sarcoma in $10^{-4}M$ concentration, the effect being the strongest in spermine. The inhibitory effect was rather weak in $10^{-5}M$ and there was no action in $10^{-6}M$ concentration (Table I).

TABLE I. Effect of Polymethylenepolyamines on the Growth of Yoshida Sarcoma *in vitro*

| Amine added | | Spermidine | | | Spermine | | |
|-------------------------|----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Incubation period (hr.) | None | $10^{-4}M$ | $10^{-5}M$ | $10^{-6}M$ | $10^{-4}M$ | $10^{-5}M$ | $10^{-6}M$ |
| 0 | $2.1 \times 10^{4*}$ | | | | | | |
| 24 | 5.4×10^4 | 1.6×10^4 | 5.2×10^4 | 5.1×10^4 | 7.0×10^3 | 1.6×10^4 | 5.5×10^4 |
| 48 | 1.1×10^5 | 9.0×10^3 | 7.7×10^4 | 1.1×10^5 | 1.9×10^3 | 9.3×10^3 | 9.8×10^4 |

| Amine added | | Putrescine | | | Cadaverine | | |
|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Incubation period (hr.) | None | $10^{-4}M$ | $10^{-5}M$ | $10^{-6}M$ | $10^{-4}M$ | $10^{-5}M$ | $10^{-6}M$ |
| 0 | 1.2×10^4 | | | | | | |
| 24 | 2.6×10^4 | 1.8×10^4 | 2.5×10^4 | 2.5×10^4 | 9.0×10^3 | 2.6×10^4 | 2.5×10^4 |
| 48 | 5.5×10^4 | 2.2×10^4 | 5.1×10^4 | 5.4×10^4 | 7.0×10^3 | 4.6×10^4 | 5.2×10^4 |

* Figures indicate number of cells/cc.

Institute of Food Microbiology,
University of Chiba,
Ohkubo, Narashino, Chiba-ken.

Komei Miyaki (宮木 高明)
Makoto Hayashi (林 誠)
Takehisa Chiba (千葉 剛久)
Kashio Nasu (那須嘉資雄)

February 10, 1960.

- 1) E. Boyland: Biochem. J., **35**, 1283(1941).
- 2) T. Tokuoka: Acta Schol. Med. Univ. Kyoto, **27**, 241(1950).
- 3) T. Kosaki, T. Ikoda, Y. Kotani, S. Nakagawa: Science, **127**, 1177(1958).
- 4) K. Miyaki, M. Hayashi, T. Chiba, K. Nasu, T. Unemoto, K. Onodera: This Bulletin, **8**, 900(1960).