

Chemo-radionuclide therapy for thyroid cancer: Initial experimental study with cultured cells

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Radioiodine therapy has long been used for distant metastases of thyroid cancer. Although partially effective in most cases, it can render a complete cure only in a limited number of patients. One way to enhance its efficacy would be to combine it with antineoplastic agents. Here we describe an initial *in vitro* evaluation with 4 thyroid cancer cell lines. **Methods:** Cells were sparsely seeded in microtiter plates and allowed to grow for 2 days; then they were exposed to sublethal concentrations of cisplatin (CDDP), doxorubicin (Dox), or 5-fluorouracil (5-FU), followed by treatment with I-131 for 48 hr. Cell survival was measured with a commercial kit based on the colorimetry of succinate dehydrogenase activity. **Results:** Chemotherapeutic drugs exerted similar concentration-dependent cytotoxic effects in all 4 cell lines. The doses necessary to reduce the surviving fraction to half of the control were about 3 $\mu\text{g/ml}$ for CDDP, 0.3 $\mu\text{g/ml}$ for Dox, and 3 $\mu\text{g/ml}$ for 5-FU (when used continuously for 48 hours). On the other hand, sensitivity to I-131 irradiation differed among the lines; same doses (7.4–14.8 MBq/ml) caused the greatest damage in FRO cells, a modest effect in NPA and WRO, and only minimal change in B-CPAP. The combined effect was most demonstrable in wells treated with Dox and radioiodine, whereas the addition of CDDP or 5-FU had marginal or insignificant merit, respectively. In FRO cells, half-lethal doses of the above mentioned CDDP, Dox, and 5-FU, when used together with 14.8 MBq/ml I-131, reduced cell survival to 54.5%, 29.4% and 33.4%, respectively, vs. 60.2% with radioiodine alone. **Conclusion:** *In vitro*, clinical concentrations of Dox can accelerate the killing of thyroid cancer cells by radioiodine. These favorable experimental results warrant future studies to evaluate whether this new bidisciplinary approach is clinically relevant and feasible.

Key words: thyroid cancer, radioactive iodine, radionuclide therapy, cancer chemotherapy, doxorubicin