DNA Binding Specificity and Cytotoxicity of Novel Antitumor Agent Ge132 Derivatives

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Germanium is a naturally occurring element. Organogermanium compounds, typical Ge-132 and Spirogermanium, have been in the clinic trails. Evidence suggests that Ge132 not only possesses antitumor activity, but also increases interferon production with almost no detectable sign of cytotoxicity. A series of Ge132 derivatives has shown activity against different types of cancer cells. However, the organogermanium anticancer mechanism still remains to be elucidated. Here we show that Ge132 can enhance their complex DNA binding affinity more than 100 fold. The newly synthesized Ge132 derivatives can intercalate into DNA and inhibit the PC-3M proliferation. The primary results from flow cytometry and fluorescence microscopy suggest that these compounds could cause apoptosis. Unexpected methyl substitution effect on cytotoxicity and DNA binding affinity of novel antitumor agent Ge132 derivatives was observed. To the best of our knowledge, this is the first report to show that Ge132 derivatives can intercalate into DNA and inhibit cell proliferation.