Induction of apoptosis in human leukemia cells by naturally fermented sugar cane vinegar (kibizu) of Amami Ohshima Island.

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Abstract
Naturally fermented vinegar such as Kibizu (sugar cane vinegar in Amami Ohshima, Japan), Kurozu (black rice vinegar in Kagoshima, Japan), Kouzu (black rice vinegar in China) and red wine vinegar in Italy had potent radical-scavenging activity analyzed by DPPH method. For the elucidation of food factor for cancer prevention contained in naturally fermented vinegar, the induction of apoptosis in human leukemia cell HL-60 was investigated with sugar cane vinegar Kibizu. Fraction eluted by 40% methanol from Amberlite XAD 2 chromatography of sugar cane vinegar showed potent radical scavenging activity. The fraction also showed the activity repressing growth of typical human leukemia cells such as HL-60, THP-1, Molt-4, U-937, Jurkat, Raji and K-562. On the other hand, the fraction did not have any growth inhibition activity against human fetal lung cell TIG-1. The most potent radical-scavenging activity and the growth repression activity of the leukemia cell were observed in the same chromatographic fraction of methanol 40%. From cell sorting FACS analyses, electron microscopic observations and cytochemical staining of chromatin and nuclear segments in human leukemia cell HL-60 treated with the active fraction, it was concluded that apoptosis was induced in the leukemia cell by the fraction of sugar cane vinegar and resulted in the repression of growth of the human leukemia cells. Chromatographic fraction of sugar cane juice eluted by 20% methanol showed potent activities of radical-scavenging and growth repression of HL-60. These results led us the consideration that active components in sugar cane juice could be converted to more lipophilic compounds with activity to induce apoptosis in HL-60 by microbial fermentation with yeast and acetic acid bacteria.

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