



## Preliminary study of the effects of $\beta$ -elemene on MCF-7/ADM breast cancer stem cells

Y. Dong, L. Li, L. Wang, T. Zhou, J.W. Liu and Y.J. Gao

First Affiliated Hospital of Medical University, Dalian, China

Corresponding author: Y.J. Gao

E-mail: gaoyajie\_gyj@yeah.net

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**ABSTRACT.** We examined expression differences in breast cancer stem cells (BCSCs) of the doxorubicin-resistant breast cancer cell line MCF-7/ADM and doxorubicin-sensitive cell line MCF-7/S. The effects of Chinese medicine  $\beta$ -elemene on BCSCs and resistance protein expression were determined. The serum-free cell culture method was used for cell culture, and morphology was observed to determine the rate of cell sphere formation. Reverse transcription-polymerase chain reaction was used to detect breast cancer resistance protein (*BCRP*) and P-glycoprotein (*P-gp*) gene expression. Flow cytometry was used to determine BCRP- and P-gp-positive cell rates and CD44 + CD24-/low cell ratios. Morphological observation and gene amplification showed that compared with MCF-7/S cells, the serum-free cell sphere-forming rate and *P-gp* and *BCRP* gene expression levels were higher in MCF-7/ADM cells. Flow cytometry results showed that P-gp and BCRP protein expression in MCF-7/ADM cells was  $77.78 \pm 9.55\%$  and  $32.33 \pm 5.12\%$ , respectively, and the CD44 + CD24-/low cell rate was  $64.79 \pm 11.78\%$ , which were all significantly higher than those in MCF-7/S cells ( $3.97 \pm 1.51$ ,  $14.26 \pm 2.51$ ,  $18.79 \pm 3.28\%$ ;  $P < 0.05$ ).  $\beta$ -elemene significantly decreased the serum-free cell sphere-forming rate in MCF-7/ADM cells and BCRP and P-gp gene/protein expression ( $P < 0.01$ ).

The proportion of CD44 + CD24-/low cells was reduced. MCF-7/ADM highly expressed the drug-resistant proteins BCRP and P-gp, which can be used for long-term *in vitro* culture and as a seed cell for studies of BCSCs.  $\beta$ -elemene can inhibit BCSC and the sphere-forming rate in MCF-7/ADM cells and reduce BCRP expression.

**Key words:** Breast cancer stem cells (BCSCs); Drug resistance protein;  $\beta$ -elemene