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Enhancement of radiosensitivity of human endothelial and breast cancer cells with melatonin by regulating angiogenesis and genes involved in estrogen biosynthesis

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Enhancing the radiosensitivity of cancer cells is one of the most important goals in clinical radiobiology. Melatonin exerts oncostatic effects on breast cancer by reducing estrogen biosynthesis in human breast cancer cells, surrounding fibroblasts and endothelial cells and by regulating cytokines that influence tumor microenvironment. This hormone also has antiangiogenic activity in tumoral tissue. Vascular endothelial growth factor (VEGF) produced from tumor cells is essential for the expansion of breast cancer. Thus, the aim of the present study was to investigate whether melatonin sensitizes endothelial cells to radiotherapy by regulating angiogenesis and estrogen biosynthesis. To accomplish this we used cocultures of HUVEC cells with MCF-7 cells. The expression of genes was analyzed by RT-PCR. Cell proliferation was measured by the MTT method, the migration of HUVECs was measured by the wound healing assay and tubulogenesis studies were performed in a tubulogenesis multiplate system in vitro. Only the presence of malignant epithelial cells in the cocultures altered proliferation, the expression of genes involved in the local biosynthesis of estrogens and VEGF, in endothelial cells. In addition, ionizing radiation decreased cell proliferation and VEGF expression, and melatonin pretreatment 1 mM led to a significantly greater decrease. Furthermore, the migration of endothelial cells and the tube formation were reduced with the radiation and melatonin pretreatment resulted in a significantly higher reduction. Our results demonstrate that melatonin could exert a cooperative enhancement of radiosensitivity associated with the modulation of angiogenesis and local estrogen biosynthesis.

Biography

Alicia González González is a PhD student from Cantabria University School of Medicine. Currently, she is involved in breast cancer research and melatonin, specifically in the sensitizing effects of melatonin to chemotherapy and radiotherapy for its antiangiogenic and antiadipogenic actions. She has published 2 papers and has presented her work in 5 congress.

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