

Abstract

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Evidence for a zinc uptake transporter in human prostate cancer cells which is regulated by prolactin and testosterone.

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OBJECTIVE: The glandular epithelial cells of the human prostate gland have the unique capability and function of accumulating the highest zinc levels of any soft tissue in the body. Zinc accumulation in the prostate is regulated by prolactin and testosterone; however, little information is available concerning the mechanisms associated with zinc accumulation and its regulation in prostate epithelial cells.

METHODS: In the present studies the uptake and accumulation of zinc were determined in the human malignant prostate cell lines LNCaP and PC-3.

RESULTS: The results demonstrate that LNCaP cells and PC-3 cells possess the unique capability of accumulating high levels of zinc. Zinc accumulation in both cell types is stimulated by physiological concentrations of prolactin and testosterone. The studies reveal that these cells contain a rapid zinc uptake process indicative of a plasma membrane zinc transporter. Initial kinetic studies demonstrate that the rapid uptake of zinc is effective under physiological conditions that reflect the total and mobile zinc levels in circulation. Correspondingly, genetic studies demonstrate the expression of a ZIP family zinc uptake transporter in both LNCaP and PC-3 cells. The rapid zinc uptake transport process is stimulated by treatment of cells with physiological levels of prolactin and testosterone, which possibly is the result of the regulation of the ZIP-type zinc transporter gene. These zinc-accumulating characteristics are specific for prostate cells.

CONCLUSION: The studies support the concept that these prostate cells express a unique hormone-responsive, plasma membrane-associated, rapid zinc uptake transporter gene associated with their unique ability to accumulate high zinc levels.

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