Protecting Ovaries from Chemotherapy Damage Using Proteasome Inhibitors

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Technology description

Primary ovary insufficiency (POI) caused by chemotherapy treatment is experienced by many cancer survivors, including up to 40 percent of reproductive-age breast cancer survivors and eight percent of childhood cancer survivors. The condition can lead to infertility and premature menopause, which increases a woman’ s risk for osteoporosis, mental health problems and cardiovascular disease.

Fertility preservation options—like the freezing of embryos and oocytes—are invasive, do not preserve endogenous estrogen and are not viable for young girls. Surgical removal and later re-implantation of ovarian tissue is available for children and women but is considered experimental and necessitates surgery to harvest and later transplant ovarian tissues.

There is a clear need to develop drug-based options aimed at preserving the long-term reproductive and endocrine health of female cancer survivors. UW–Madison researchers have developed a method to reduce ovarian damage in cancer patients by administering a proteasome inhibitor prior to chemotherapy.

The inhibitors work by binding to a cell’ s proteasome –the large complex of enzymes found in the cytoplasm that degrades and disposes old proteins. This binding action blocks chemotherapeutic agents from invading the cell nucleus.

To shield ovaries from chemotherapy toxicity, an effective dose of a proteasome inhibitor like bortezomib (Bort) or MG-132 is injected about an hour before treatment.
The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method for reducing chemotherapy damage to ovarian cells regardless of patient age or cancer type.

Roti Roti E.C., Leisman S.K., Abbott D.H. and Salih S.M. 2012 Acute Doxorubicin Insult in the Mouse Ovary is Cell- and Follicle-Type Dependent. PLoS One.7(8):e42293
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Application area

Preserving ovarian health and fertility for cancer survivors without diminishing cancer care
Preserving ovarian endocrine function and preventing chemotherapy-induced premature menopause in cancer survivors
Preventing chemotherapy-induced delayed puberty in children diagnosed with cancer

Advantages

Potential to reduce or prevent chemotherapy damage to human ovaries
Preserves fertility
Protects all types of ovarian cells
Helps combat early menopause and risk to offspring
Could work regardless of patient age or form of cancer
Method is drug-based, hence non-invasive and cost-effective.

Institution

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