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Commentary

Novel Treatment for Drug-Resistance Offers New Hope for Stage IV Breast Cancer Patients

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The good news for breast cancer patients currently undergoing chemotherapy treatments is that, we have identified indicators associated with endocrine disorders, which point to specific overactive enzymes associated with cellular detoxification of Doxorubicin and other breast cancer drugs. With our present-day individualized approach to medicine, standard diagnostic tests can be employed to flag patients who are candidates for this novel treatment. Funding is presently required to complete patent submissions [1] for these novel adjunct chemotherapies, which treat drug resistance to the most cardiotoxic regimens for end-stage breast cancer patients.

What do such adjunct chemotherapy treatments mean for a cancer patient on Doxorubicin or other chemotherapy regimens that may be lethal at dosages elevated for the purpose of eradicating cancer? It means a fighting chance!*

While Doxorubicin is presently the best treatment-of-choice for breast cancer patients unresponsive to standard regimens in chemotherapy, elevated dosages may induce cardiovascular events [2]. Doxorubicin's trade names include Adriamycin, Doxil, Caelyx, and Myocet [2]. It was originally formed by isolation via chemical semisynthesis from an antibiotic against a red bacterium located beneath Castel del Monte [3], a 13th century castle in Italy. Interestingly, the antibiotic targeting *Streptomyces peucetius* has demonstrated efficacy against tumors in mice [4]. 14-hydroxylation of the precursor in its biochemical pathway produced Daunorubicin [5]. Daunorubicin was used successfully to treat acute leukemia and lymphoma in the 1960's [4], but by 1967 had unfortunately been associated with cardiotoxicity [5]. Doxorubicin and Daunorubicin are, however, the prototype compounds for our present anthracyclines [3].

Dexrazoxane is a cardioprotective agent discovered in 1972 [6,7], and more recently, was approved for use by the FDA only in adults in 2011. Despite its use in combined treatment with Doxorubicin or other anthracyclines prescribed for late-stage cancer patients, elevated dosages of these drugs may induce myocardial infarction or cardiomyopathy [8] and congestive heart failure in those patients fighting for survival between cancer and chemotherapy toxicity (Personal communication) [9]. Thus, interest in immunotherapy has increased within the field of cancer research during the last decade [10]. The reason for this view emerges from data indicating that several cancer patients have died due to chemotherapy toxicity when battling breast cancers, which include estrogen-receptor positive breast cancer [11] and Triple Negative Breast Cancer (See Acknowledgement).

Our intention is not to discourage the use of chemotherapy regimens for oncology patients, which have assisted to save numerous lives. Here, we focus rather upon the imperative that chemotherapy dosages be vigilantly monitored. With this approach, Doxorubicin continues to be an attractive option for patient's refractory to standard chemotherapy regimens, including patients of several other cancers, such as bladder, stomach, lung, ovaries, and thyroid [2]. However, Doxorubicin's toxicity levels are still a serious treatment-associated concern. For example, cardiovascular events are not the only issues associated with elevated chemotherapy dosages, but neurological [12] side-effects are as well, pointing to potential brain damage, and related behavioral health concerns.

We must persist with informing patients to monitor their own health-related chemotherapy side-effects [12], and more importantly, request that their family members watch for behavioral changes, suggesting side effects upon brain function, which may indicate a cancer patients' chemotherapy dose should be lowered. Of course, any other unusual side-effects should be noted as well, such as liver complications [11], and so forth.

Fortunately, advances in diagnostic assays offer a more personal approach to Oncology treatment [13,14]. Less invasive options than traditional protocols, such as the phlebotomy patch, should eventually be fine-tuned for endocrine indicators, which signal eligibility for novel treatments against drug resistance presently being developed [1]. Only funding for completion of patent submissions and drug development stand in the way of treating drug resistance to the most toxic chemotherapy regimens the field of cancer research offers. Finding the money? Now, that is something we can certainly do!

Acknowledgement

This review is dedicated to Delia Tronson, who died in the arms of her husband while battling Triple Negative Breast Cancer. She succumbed due to chemotherapy toxicity, not the disease. Please contact the editor for information regarding how to contribute to the completion of this vital new treatment for end-stage breast cancer patients.

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