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Impact of Deuterium-Depleted Water on Long-Term Tumor Survival Demonstrated in a Case of Prostate and Breast Cancer

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ABSTRACT

Background: Long-term survival remains, as a less studied aspect, a major challenge in oncology because the efficacy of treatments is often determined based on short-term results. Deuterium-depleted water (DDW) has emerged as a potential adjunctive treatment with reported benefits in several cancer types.

Cases: This study presents two long-term analysis of two cases—a prostate cancer patient who relapsed after prostatectomy and a breast cancer patient diagnosed in stage IV. Both patients consumed DDW intermittently in addition to standard therapies. Clinical parameters, including prostate-specific antigen (PSA) and Ca 15-3 tumor marker were followed for 21 and 18 years, respectively, to assess the potential association between DDW consumption and disease stability.

Results: In both patients, continuous or repeated consumption of DDW was associated with sustained remission and stable disease markers. After discontinuation of DDW consumption, increases in PSA or Ca 15-3 levels were observed, while reintroduction of DDW was associated with decreases in markers and stabilization of clinical status. These observations are consistent with previous studies in larger patient groups, where continuous DDW consumption during remission was associated with significantly prolonged median survival times.

Conclusion: Based on the presented long-term observations, DDW may contribute to the maintenance of remission and delay cancer progression when used as part of standard treatments. Due to its favorable safety profile, DDW may be used as a potential adjunctive therapy in long-term oncology care. Controlled clinical trials are needed to confirm these observations and to develop standardized protocols for DDW treatment in different tumor types.

Keywords: Deuterium; Deuterium-depleted water; Median survival time; Prostate cancer; Breast cancer

INTRODUCTION

Long-term survival is one of the most important and complex indicators of cancer treatment, reflecting both the long-term efficacy of therapeutic interventions and the preservation of patients' quality of life. However the

clinical trials, the efficacy of new drugs or treatment modalities is often evaluated based on short-term outcomes, focusing on symptom relief and quality of life. Although significant progress has been made in the field of oncological treatments, the study of factors affecting long-term survival and durable remission has not received sufficient attention to date.[1]

Given the limited attention to long-term outcomes, randomized controlled clinical trials (RCTs) represent the most evidence-based approach to evaluating the effectiveness of oncology treatments.[2]

Breast and prostate cancers are among the more treatable tumors, with a high five-year survival rate. In both cases, long-term survival is closely linked to early diagnosis, successful surgery, and subsequent treatments such as local radiotherapy and hormone therapy. However, long-term survival is uncommon when prostate cancer recurs following prostatectomy and breast cancer is diagnosed at stage IV.

Prostate cancer, while typically slow-growing, often leads to the emergence of therapy-resistant cells following hormonal treatment, and relapses are common, creating treatment challenges over the long term. Prostate cancer accounts for 13.1% of newly diagnosed cancers in the United States and ranks as the fifth leading cause of cancer-related death among men.[3] It predominantly affects older males and is more common in individuals with a family history of the disease. Prostate-specific antigen (PSA), also known as kallikrein-related peptidase 3 (KLK3), is a key biomarker for monitoring disease progression following diagnosis. Notably, its enzymatic activity confers antiangiogenic properties, which may contribute to the typically slow-growing nature of prostate cancer.[4] A range of therapeutic options is available for managing this type of cancer. Non-surgical interventions include androgen deprivation therapy (ADT), radiation therapy (RT), chemotherapy, and the emerging immunotherapies. These treatments may be used individually or in combination, depending on the patient's clinical characteristics and disease stage.[5] However, aggressive interventions often carry a risk of significant adverse effects, including erectile dysfunction and urinary incontinence. Consequently, treatment planning requires a shared decision-making approach considering tumor severity, individual risk profiles, and patient preferences.[6] Although prostate cancer is generally considered highly treatable, long-term hormone therapy often leads to the emergence of therapy-resistant cancer cells, complicating efforts to halt tumor progression. Disease monitoring also presents a clinical challenge: despite early detection through elevated PSA levels and post-prostatectomy values approaching zero, PSA levels may gradually rise, signaling potential recurrence or disease progression.

Breast cancer, especially in metastatic forms, faces the challenge of survival primarily focused on symptom management, with limited focus on improving long-term survival. Breast cancer remains a major global health burden and is the second leading cause of cancer-related mortality among women worldwide.[7] Although population-based mammographic screening has improved early detection and a broad spectrum of therapeutic options — including surgery, radiotherapy, endocrine therapy, chemotherapy, and, more recently, targeted biological agents — can provide advanced disease management, breast cancer continues to be associated with substantial morbidity.[7] Long-term follow-up studies have shown a wide variability in recurrence risk, ranging from 30% to 85% depending on tumor stage at diagnosis.[8] In advanced-stage disease at diagnosis, clinical trials report median survival times (MST) of 12 to 31 months.[9] For patients with metastatic breast cancer, standard

therapy involves combination chemotherapy and targeted agents, with treatment goals focused on symptom control, delaying disease progression, and preserving quality of life.[9]

Since the early 1990s, the biological effects of deuterium (D), the heavy isotope of hydrogen, have been extensively studied, with the first publications highlighting its regulatory role in cell proliferation.[10] In recent years, two extensive review articles have compiled, synthesized, and analyzed the findings from three decades of research on D and DDW.[11,12]

Naturally occurring D significantly influences a range of biological processes, including tumor development, [13,14] aging,[15] cognitive functions such as memory,[16] cellular metabolism,[17] and physical endurance.[18] Clinical evidence supporting the anticancer effects of deuterium depletion has been obtained, among others, from a prospective Phase 2 trial involving prostate cancer patients,[19] a case study of a prostate cancer patient, [20] and the analyses of 232 breast cancer patients consuming DDW.[21] These investigations, conducted in patient groups with well-defined cancer types and stages, demonstrated that adding DDW to standard treatments led to a three- to seven-fold increase in median survival time (MST), depending on cancer type, in comparison to historical controls.[22]

It happens frequently in clinical trials that investigational agents induce significant tumor regression but fail to provide meaningful improvements in long-term survival. This discrepancy highlights the vital importance of long-term survival data in assessing the true clinical value of anticancer therapies.

This publication aims to demonstrate how DDW may contribute to improving survival outcomes and how it can play a role in the long-term management of these diseases. To this end, two illustrative case studies are presented offering valuable insights into the efficacy of DDW in promoting long-term survival. The first case involves a prostate cancer patient who had two periods of progression over a 21-year follow-up, yet overall survival significantly exceeded average expectations. The second case is of a stage IV breast cancer patient who maintained stable disease for 18 years after starting DDW therapy. These cases suggest that, in addition to its established efficacy and favorable safety profile,[22] integrating DDW with standard treatments may play a crucial role in enhancing long-term survival among cancer patients. To fully understand the mechanisms through which DDW can support long-term cancer treatment strategies, further research is essential.

CASE 1 - DESCRIPTION

A 53-year-old male patient was diagnosed with prostate cancer on 19 January 2004, with an elevated PSA value of 11.9 ng/ml. The diagnosis was confirmed with a positive biopsy and ultrasound showing a tumor of 47 x 45 x 54 mm. The patient refused hormone treatment and started to consume DDW on 30 July 2004, which caused a 50% decrease (6.4 ng/ml) in PSA level within 2 months. He was operated on 13 October 2004, which was followed by an additional reduction of PSA (1.0 and 0.04 ng/mL).

The patient consumed DDW regularly in three-month intervals. One year after the surgery, PSA level increased from 0.04 to 0.1, but with the regular consumption of DDW, a significant PSA increase (to 1.1 ng/mL) occurred

only four years after the surgery. Despite continued DDW consumption, the PSA level later rose further (11.15 ng/mL), which by the end of 2008 justified initiation of hormone therapy.

The patient underwent hormone therapy until 2011, while simultaneously drinking DDW with an ever-decreasing D content. Between 2011 and 2016, patients consumed DDW only twice and for short periods each time, during which the PSA level increased from 0.05 to 0.87.

In 2016, the patient consumed DDW twice for 4-month periods, stabilizing the PSA level between 1.44 and 1.48. However, during a subsequent 6-month break, the PSA increased to 3.443, which warranted the initiation of a new hormone therapy.

Despite the slow PSA increase over the following 6-7 years, the patient did not resume DDW consumption until the summer of 2025, when the PSA level rose to 0.427 ng/mL.

The patient consumed DDW periodically in the subsequent 21 years, altogether 2058 days long. Figure 1 shows the DDW consumption periods and the PSA value over that time span.

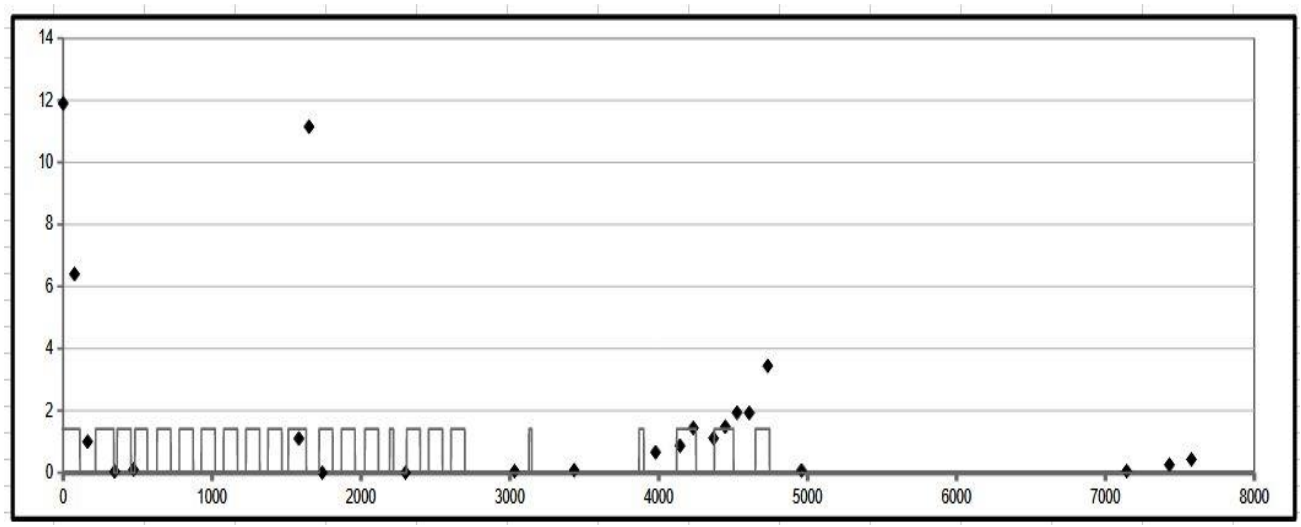

Figure 1 The day of the start of DDW consumption and the length of it (column) and the changes in PSA (ng/mL) value (rhombus) during the follow-up period

The columns in the figure show the day of the start and the duration of DDW consumption during the follow-up period. It illustrates the timeline, indicating the initiation of DDW administration and the total period of consumption.

The rhombuses in the figure shows the changes in PSA levels (ng/mL) during the follow-up period associated with DDW consumption. It presents the variation of PSA values over time, demonstrating the DDW intake and post-consumption phases.

CASE 2 - DESCRIPTION

A 43-year-old female patient was diagnosed with breast cancer on June 9, 2007. Following surgical intervention, she underwent chemotherapy. Five months later, disease progression was suspected. On November 27, 2007, MRI confirmed vertebral metastases, and the patient received radiotherapy.

She started consuming DDW 6 months after diagnosis and consumed it periodically in the subsequent 18 years, 1835 days long. Figure 2 shows the DDW consumption periods and the Ca 15-3 tumor marker value over that time.

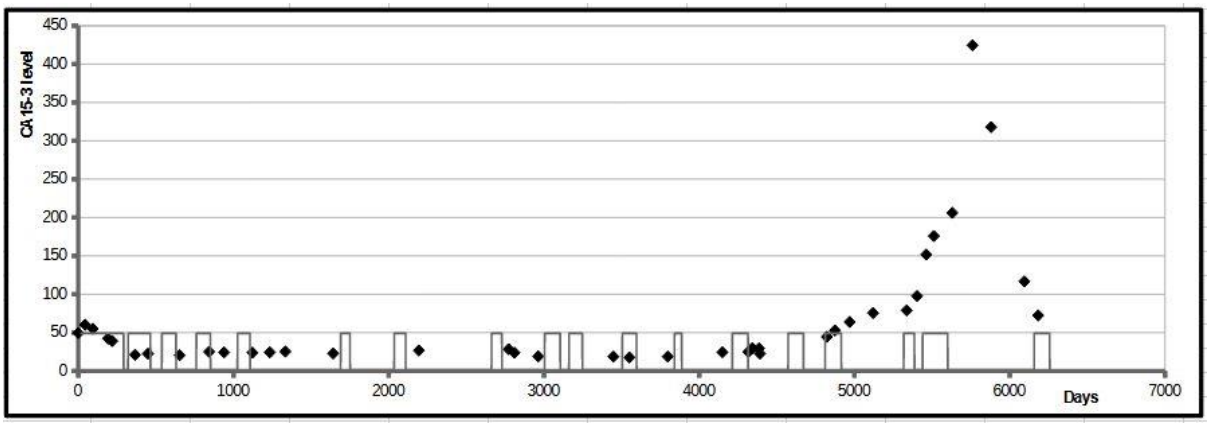

Figure 2 The day of the start of DDW consumption and the length of it (column) and the changes of Ca 15-3 (U/mL) value (rhombus) during the follow-up period

The columns in the figure show the day of the start and the duration of DDW consumption during the follow-up period. It illustrates the timeline, indicating the initiation of DDW administration and the total consumption period.
The rhombuses in the figure show the changes in Ca 15-3 levels (U/mL) during the follow-up period associated with DDW consumption. It presents the variation in Ca 15-3 values over time, demonstrating the DDW intake and post-consumption phases.

The patient's tumor marker level reached its peak (60.2 U/mL) 10 months after diagnosis, after which it gradually decreased and remained within the normal range for 14 years, until 2021.

Between 2012 and 2015, the patient consumed DDW only once, for a short period (66 days). At the end of 2014, a bone scintigraphy revealed a one-millimeter increase in the vertebral metastasis diagnosed 8 years earlier. Given the 8-year interval since the initial diagnosis, doubts arose regarding the relationship between the spinal lesion and the primary disease; therefore, a biopsy was performed from the vertebra, which confirmed that the lesion was indeed a metastasis of the primary disease.

From 2015, the patient received hormone therapy and consumed DDW on four occasions until 2019, after which a two-year break followed. In 2021, new bone metastases were identified, followed by liver and lung metastases.

Since 2023, the patient has been receiving chemotherapy, which has resulted in a decrease in tumor marker levels. Imaging in the summer of 2025 reported regression. After a two-year break, the patient resumed DDW consumption in February 2025.

DISCUSSION

In Case 1 (prostate cancer patient), the follow-up period extended for 21 years. Figure 1 illustrates that throughout the prolonged follow-up, DDW administration for shorter or longer periods was associated with the sustained maintenance of low PSA levels. During the initial phase, the patient consistently consumed the water over several years, following the recommended cycles. Figure 1 clearly shows the correlations between DDW consumption and the magnitude of PSA values. A positive outcome is evident in the fact that hormone treatment became necessary only after a considerable length of time with consistently low PSA levels.

Prolonged gaps between consecutive DDW treatment cycles, including intervals lasting several years, were consistently accompanied by increases in PSA levels, reinforcing the observed association between ongoing DDW consumption and disease stability.

This case highlights that a 'timely' and successful prostatectomy does not guarantee complete recovery, as by the time of diagnosis, cells from the primary tumor may have already entered the blood and lymphatic circulation. It is thus especially important to integrate DDW in the treatment of patients in remission, regardless of tumor type, because the risk of recurrence can be reduced with this apparently harmless preparation that can be applied without time limitations.[23]

That DDW can postpone the need for hormone therapy, was emphasized also by a 2021 publication presenting another prostate cancer case.[20] Over 11 years, that patient completed 13 courses of DDW treatment, the first one starting one month after diagnosis. Following the first month of intake, his PSA level decreased from 8.7 ng/mL to 6.3 ng/mL. After 1.5 years, MRI examination no longer confirmed the presence of the previously identified 1 cm tumor. Over the long follow-up period, changes in PSA values indicated that deuterium depletion played a role in controlling prostate cancer progression.

This patient was followed for further 4 years after the paper had been published. Subsequent to a longer break of DDW consumption, elevated PSA levels were observed, at which point hormone therapy was initiated. With continued DDW consumption, PSA values returned to the low range. At present, the patient is doing well, with the latest measured PSA value being 0.427, on 10 May 2025.

In Case 2 (breast cancer patient), the follow-up period was 18 years. Analysis of her data, presented in Figure 2 indicates that during the initial period, the patient consumed DDW consistently and for extended durations, with

only brief interruptions. During this regimen, no disease progression was observed. However, as the intervals between DDW intake lengthened, signs of disease progression appeared, underlining the potential association between regular DDW consumption and maintenance of disease stability. Notably, when the patient stopped consuming DDW for 2 years in 2021, the tumor marker values increased significantly (Figure 2). Then, from 2023, a slow but continuous decrease due to the effect of DDW and chemotherapy could be observed until today, and the patient remains in good health.

In a summary paper of the authors[22] statistical evaluation of 2649 cancer patients who consumed DDW was presented. Among them, 256 patients initiated DDW consumption after successful therapy while in remission. Median survival time of this subgroup was 23.2 years. Also, earlier findings from a breast cancer study, in which only one out of 48 patients died during a cumulative follow-up period of 221patient-years while consuming DDW in remission, emphasized the substantial advantage of DDW application in this phase.

Long-term follow-up of the prostate and breast cancer patients presented here suggests that regular consumption of DDW may contribute to maintaining remission and delaying disease progression. Periods without DDW intake were consistently followed by rising tumor markers, while continuous use was associated with stable disease. These findings, together with previous clinical data, indicate that DDW could serve as a safe and supportive adjunct to conventional cancer therapies, warranting further controlled studies to confirm its efficacy and define optimal application protocols.

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