CASE REPORT

REVISED Case Report: A castration-resistant terminal prostate cancer patient's survival prolonged after practicing Falun Gong [version 3; peer review: 1 not approved]

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Abstract

Background: Most metastatic prostate cancer patients receive combined androgen blockade (CAB) as the mainstay of treatment. Unfortunately, patients ultimately progress to castration resistance. **Clinical finding and diagnosis:** We describe a man in his eighties who developed stage IV, M1b prostate cancer, multiple (≥ 5) bone metastases, and required the aid of a walker to ambulate. Without treatment, his treating physician predicted he would survive 6 months. **Interventions and outcomes:** The patient initially responded well to treatment with CAB, but during the 68-80th week of treatment he developed castration resistance. Bicalutamide was then discontinued. He chose to begin practicing Falun Gong (FLG) at week 89 as an alternative form of care while continuing two doses of leuprolide acetate. His PSA decreased by 86% within five weeks, he walked independently at 17 weeks and bone metastases disappeared in 41-43 weeks after beginning to practice Falun Gong. He also reported better psychosocial functioning. His treating physician assessed that his prostate malignancy was "clinically, under control" and "his overall functional status is excellent." The patient survived a total of 263 weeks (61.4 months) post-diagnosis, including 183 weeks (42.3 months) after developing castration resistance. **Conclusion:** This castration-resistant terminal prostate cancer patient gained significant clinical benefits after practicing Falun Gong.

Keywords

Metastatic prostate cancer, Combined androgen blockade (CAB), Castration-resistant prostate cancer (CRPC), Survival, Falun Gong, Alternative medicine, Mind-body medicine

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REVISED Amendments from Version 2

Version 3 has improved wordings to deliver a clearer message and better readability.

Any further responses from the reviewers can be found at the end of the article

Introduction

Prostate cancer is the second most common cancer^a and the fifth leading cause of cancer death in men^b worldwide. In the United States, it is the most prevalent cancer and the second leading cause of cancer death in men^c. The five-year overall survival of metastatic prostate cancer patients aged ≥ 75 years is 13.6%¹. Androgen deprivation therapy (ADT), either by means of bilateral orchiectomy or the administration of a gonadotropin-releasing hormone (GnRH) agonist or antagonist, is the first-line treatment for advanced prostate cancer². Combined androgen blockade (CAB), which involves concurrent use of a Gonadotropin-releasing hormone (GnRH) agonist and non-steroidal antiandrogen, is often recommended as the standard therapy for metastatic prostate cancer². In most metastatic prostate cancer patients, ADT is initially effective, but its response is not sustained and patients ultimately progress to castration resistance³.

In recent years there has been a growing awareness in the west of oriental meditative approaches for health and wellness. Deeply rooted in thousands of years of Chinese cultural history, qigong is a traditional Chinese mind-body practice that uses qi (vital energy) and consciousness cultivation to achieve an optimal state of health. Falun Gong (FLG) is a unique type of qigong practice based on the principles of “Truthfulness, Compassion, and Tolerance.” The practice of FLG includes reading the main teachings, *Zhuan Falun*^d and performing five sets of slow, gentle, meditative exercises^e.

We prospectively followed a terminal stage IV prostate cancer patient in his eighties, who relapsed after CAB and then began practicing FLG. This is the first well-documented, castration-resistant prostate cancer case whose survival was significantly prolonged after practicing FLG.

^ahttp://gco.iarc.fr/today/online-analysis-pie?v=2018&mode=cancer&mode_population=continents&population=900&populations=900&key=total&sex=1&cancer=39&type=0&statistic=5&prevalence=0&population_group=0&ages_group%5B%5D=0&ages_group%5B%5D=17&nb_items=7&group_cancer=1&include_nmsc=1&include_nmsc_other=1&half_pie=0&donut=0&population_group_globocan_id=

^bhttp://gco.iarc.fr/today/online-analysis-pie?v=2018&mode=cancer&mode_population=continents&population=900&populations=900&key=total&sex=1&cancer=39&type=1&statistic=5&prevalence=0&population_group=0&ages_group%5B%5D=0&ages_group%5B%5D=17&nb_items=7&group_cancer=1&include_nmsc=1&include_nmsc_other=1&half_pie=0&donut=0&population_group_globocan_id=

^c<https://gis.cdc.gov/Cancer/USCS/DataViz.html>

^d<https://falundafa.org/eng/eng/pdf/ZFL2014.pdf>

^ehttp://en.falundafa.org/eng/html/dymf_2014/dymf_2014_2.htm

Case report

An 80-year-old Chinese man was a retired professor at a university in the USA. He presented to a urology clinic in 2014 complaining of bone pain, fatigue, and significantly elevated prostate specific antigen for one year (PSA values ranging from 94.7 to 126.6 ng/ml; normal range: 0.6–12.4 ng/ml for 75–79 year-old men born in China⁴). He had a 20-year history of hypothyroidism treated with SynthroidTM (75µg/day), a hernia operation in 2003, and an implanted pacemaker in 2011. He had been diagnosed with benign prostate hyperplasia in 2004 and his baseline PSA values ranged from 4.1 to 8.6 ng/ml between 1996 and 2006. There was a family history of cancer. The patient required the aid of a walker to ambulate. Digital rectal exam (DRE) revealed a “very hard, very nodular and fixed prostate.” PSA was 468 ng/ml on presentation. Transrectal ultrasound image showed the prostate to be 63×57×53 mm³ with disrupted capsule, abnormal inhomogeneous peripheral zone, scattered calcifications, and no median lobe. The prostate biopsy pathology report revealed an adenocarcinoma with a Gleason Score 9 (4+5 or 5+4) in all lobes with 40–80% cancer infiltration (Figure 1). Whole-body bone scan was highly suspicious for numerous osseous metastases in the lumbar and thoracic spine as well as in the left iliac bone of the pelvis, some areas of the sacrum and in the left 9th rib (Figure 2). CT scan findings were consistent with the bone scan (Figure 2). The patient was diagnosed with terminal stage IV, M1b metastatic prostate adenocarcinoma with extensive (≥ 5) bone metastases. His treating physician predicted that without effective treatment he would have a life expectancy of only 6 months.

The patient was started on degarelix (240mg, 80mg, 80mg at month intervals) and bicalutamide 50mg daily. Survival was monitored by symptoms and serum PSA. Quality of life (QoL) was assessed with the SF-8TM questionnaire (Table 1). Psychosocial functioning was evaluated using an adapted,

Figure 1. Core biopsy of the patient's prostatic adenocarcinoma (hematoxylin and eosin stain). The adenocarcinoma consists of poorly formed or fused glandular acini (Gleason grade 4) and aggregates, cords and solid foci not recognizable as acini (Gleason grade 5), resulting in the Gleason score of 9 (4+5). The Gleason score is the sum of two most prevalent histologic grades in a prostate adenocarcinoma, rated on a scale of 1–5, with 5 being the most clinically aggressive.

Figure 2. Comparison of whole-body bone scan and spine CT images before and after Falun Gong (FLG) practice. Upper Row: **before FLG practice (May-2014)**; Lower Row: **after FLG practice (Nov-2016)**; Left and Middle Columns: anterior and posterior views of the bone scan; Right Column: post-processed (Multiplanar Reformation) Spine CT. The yellow arrows denote the normal uptake level of tracer corresponding to the original bone metastatic foci in the upper row, as shown at the sites of the left 9th rib region, thoracic vertebra (T7, also shown on CT image), sacral vertebrae region, and left iliac region, indicating the disappearance of cancer. The blue arrows denote degenerative bone regions with mild increased tracer uptake in sternum region and lumbar spine region but without evidence of neoplastic lesions. Degenerative appearances of bone and joint were also observed in the upper and lower extremities (bone scan) as well as in the spine (CT image).

simplified six-part questionnaire that assessed the patient's status of positive thinking, happiness, altruism, emotional control and purpose of life. All these parameters have been systemically researched in a number of mindfulness psychological studies and commonly used in psychosocial functioning outcomes⁵ (Table 2).

The patient's bone pain was gone within 5 days. After five weeks, his PSA dropped to 4.5 ng/ml. At week 14, degarelix was replaced with leuprolide acetate at a dose of 22.5 mg quarterly. PSA levels remained at 0–0.2 ng/ml until week 68. At week 80, his PSA rose to 1.4 ng/ml, and his physician discontinued bicalutamide due to concerns over cancer relapse. PSA continued to increase to 2.4 ng/ml at week 84 and to 3.7 ng/ml at week 89. (Figure 3, Table 3)

The physician planned to use abiraterone acetate plus prednisone or enzalutamide if the PSA rose to 10 ng/ml. The patient was not pleased with either choice because of the increased risk of side effects and limited survival benefits. Bicalutamide was then discontinued. At week 89, the patient chose to begin practicing FLG. When he watched the FLG video for the first time, the patient reported that he felt as if substantial high

energy matter was plugged into his two lower legs. He could sense the flow of energy and the warmth induced by the energy during practicing. In the past, during cold winter nights, the patient had a tendency to get cramps in his legs. To prevent this, he had been using a hot water bottle under the quilt while sleeping for many years. Soon after starting to practice FLG, the patient reported he did not need a hot water bottle anymore.

At week 94, the patient's PSA reversed its increasing trend by dropping to 0.6 ng/ml (Figure 3, Table 3). At week 106, he no longer needed the assistance of a walker. At weeks 130 and 133, no osseous metastases were seen on either CT or whole-body bone scan (Figure 2). At week 151, DRE revealed that the prostate was softer and smaller than before.

Following CAB, the patient experienced adverse events including right foot swelling, wheezing, and hot flashes for about one year, all of which, the patient reported, gradually disappeared after practicing FLG.

The patient's QoL improved greatly with FLG practice (Table 1). He was even able to go up a 14-step stairway without stopping

Table 1. SF-8™ evaluation at baseline and during Falun Gong (FLG) practice.

Variable	Original questions	Quantitative transformation of qualitative answers						At onset of cancer	One month before FLG practice	Apr 2017	Dec 2017	Jul 2018
	Physical health	6	5	4	3	2	1					
General health	Overall, how would you rate your health?	Excellent	Very good	Good	Fair	Poor	Very poor	1	3	6	6	6
Physical function	How much did physical health problems limit your usual physical activities (such as walking or climbing stairs)?	-	Not at all	Very little	Somewhat	Quite a lot	Could not do physical activities	2*	3*	5*	5	5
Role physical	How much difficulty did you have doing your daily work, both at home and away from home, because of your physical health?	-	Not at all	A little bit	Some	Quite a lot	Could not do daily work	3	3	5	5	5
Bodily pain	How much bodily pain have you had during the past 4 weeks?	None	Very mild	Mild	Moderate	Severe	Very severe	3	6	6	6	6
	Mental health	-	5	4	3	2	1					
Mental health	How much have you been bothered by emotional problems (such as feeling anxious, depressed or irritable)?	-	Not at all	Slightly	Moderately	Quite a lot	Extremely	2	3	5	5	5
Social function	How much did your physical health or emotional problems limit your usual social activities with family or friends?	-	Not at all	Very little	Somewhat	Quite a lot	Could not do social activities	2	3	5	5	5
Role emotion	How much did personal or emotional problems keep you from doing your usual work, school or other daily activities?	-	Not at all	Slightly	Moderately	Quite a lot	Extremely	2	3	5	5	5
Vitality	How much energy did you have?	-	Very much	Quite a lot	Some	A little	None	2	3	4	5	5

* After onset of cancer and before practicing FLG, the patient was short of breath after climbing a 14-step staircase and had to rest midway to catch his breath. At week 187, he could go up the same 14-step staircase without stopping halfway and was no longer short of breath after reaching the top.

Table 2. Psychosocial functioning evaluation.

	At Week 154	At Week 218
Compared to before practicing Falun Gong (FLG):		
1) Do you think more positively now?	Yes	Yes
2) Do you feel happier or less depressed?	Yes	Yes
3) Have you become more altruistic?	Yes	Yes
4) Have you found the purpose of life?	Yes	Yes
5) Do you have a better temper?	Yes	Yes
6) Would you please relate the chronological sequence for the spiritual-mental changes (as noted in questions 1–5) and your symptomatic improvements after starting FLG practice?	The subject related the following sequence of events: 1. Starting FLG practice; 2. Finding purpose of life; 3. Thinking more positively; 4. Developing a better temper; 5. Experiencing symptomatic improvement; 6. Becoming happier and less depressed; 7. Becoming more altruistic.	The subject confirmed with the same answers as Week 154.

Figure 3. Prostate specific antigen (PSA) at baseline, and during CAB therapy and Falun Gong practice. In 1996–2006 the patient's PSA was 4.1–8.6 ng/ml. Before CAB, his PSA was 468 ng/ml. PSA decreased to 0 within five weeks after CAB and remained at < 0.9 ng/ml. At week 80, PSA increased to 1.4 ng/ml, and bicalutamide was stopped. At week 89, PSA increased to 3.7 ng/ml, and he started FLG practice. PSA declined to 0.6 ng/ml at week 94. The last PSA were 4.4–8.2 ng/ml, within his baseline levels (4.1–8.6 ng/ml) in 1996–2006. Each point stands for the PSA recorded at various times and the step size in time is not even.

Table 3. An overview of symptoms, medical examinations, treatment and Falun Gong (FLG) practice.

Time	Weeks	PSA (ng/mL)	Testosterone (ng/dL)	Symptoms / Images / Physical Examinations / Diagnosis	Bicalutamide	Degarelix / Leuprolide acetate	FLG practice
2010-05	-210	Not tested	Not tested	DRE showed asymmetric enlargement of the right gland, with nodular and firm right lobe.	-	-	-
2011-01	-174	27.5	Not tested	Bone mineral density scan was normal.	-	-	-
2011-04	-161	36.2	Not tested	-	-	-	-
2012-03	-115	47.8	Not tested	-	-	-	-
2012-07	-95	61.7	Not tested	-	-	-	-
2013-04	-56	94.7	Not tested	-	-	-	-
2013-07	-45	126.6	Not tested	-	-	-	-
2013-10	-32	97.7	Not tested	Consistent with metastatic prostate cancer.	-	-	-
2013-11	-27	Not tested	Not tested	DRE showed very hard, very nodular and fixed. Diagnosed as Stage T3c prostate cancer.	-	-	-
2014-05	-2	Not tested	Not tested	Bone pains. Whole body scan was highly suspicious for numerous osseous metastases in the lumbar and thoracic spine.	-	-	-
2014-05	-1	-	-	Needed a walker to ambulate.	-	-	-
Day of presentation (2014-05)	0	468	-	Sternal pain, fatigue, anaemia. Needed a walker to ambulate.	50mg daily	degarelix 240mg	-
2014-05	1	73.0	44	Needed a walker to ambulate. Biopsy revealed adenocarcinoma with Gleason score 9 (4+5 or 5+4) for all lobes. Tumor involved 40–80% all tissues. Ultrasound showed abnormal prostate. Diagnosed as metastatic Stage IV M1b prostate cancer.	50mg daily	-	-
2014-06	5	4.5	31	Needed a walker to ambulate.	50mg daily	degarelix 80mg	-
2014-07	9	0.9	-	Needed a walker to ambulate.	50mg daily	degarelix 80mg	-
2014-08	14	0.6	-	Needed a walker to ambulate.	50mg daily	leuprolide acetate 22.5mg	-
2014-11	27	0.2	-	Needed a walker to ambulate.	50mg daily	leuprolide acetate 22.5mg	-
2015-03	42	0.0	-	Needed a walker to ambulate.	50mg daily	leuprolide acetate 22.5mg	-
2015-06	55	0.1	-	Needed a walker to ambulate.	50mg daily	leuprolide acetate 22.5mg	-
2015-09	68	0.2	-	Needed a walker to ambulate.	50mg daily	leuprolide acetate 22.5mg	-
2015-11	80	1.4	-	Needed a walker to ambulate.	50mg daily (last dose)	leuprolide acetate 22.5mg	First learned about FLG
2015-12	84	2.4	< 3	Needed a walker to ambulate.	-	-	-

Time	Weeks	PSA (ng/mL)	Testosterone (ng/dL)	Symptoms / Images / Physical Examinations / Diagnosis	Bicalutamide	Degarelix / Leuprolide acetate	FLG practice
2016-01	89	3.7	< 3	Needed a walker to ambulate.	-	-	-
2016-01	-	-	-	Needed a walker to ambulate.	-	-	Started practicing FLG
2016-03	94	0.6	-	Needed a walker to ambulate.	-	leuprolide acetate 22.5mg	FLG practice
2016-04	102	< 0.1	-	Needed a walker to ambulate.	-	-	FLG practice
2016-05	106	-	-	No longer need a walker to ambulate.	-	-	-
2016-06	110	0.1	-	No longer need a walker to ambulate.	-	leuprolide acetate 22.5mg (Last dose)	FLG practice
2016-08	116	< 0.1	-	No longer need a walker to ambulate.	-	-	FLG practice
2016-09	121	< 0.1	-	No longer need a walker to ambulate.	-	-	FLG practice
2016-10	125	< 0.1	-	No longer need a walker to ambulate.	-	-	FLG practice
2016-11	130	0.1	-	No longer need a walker to ambulate. CT showed did not show any osseous metastatic findings and prostate size was reduced by 14%. The prostate gland had no apparent neoplastic lesions.	-	-	FLG practice
2016-11	132	-	-	Bone scan showed bone metastasis disappeared	-	-	FLG practice
2017-01	138	0.1	-	No need for walker	-	-	FLG practice
2017-04	151	1.5	-	No need for walker	-	-	FLG practice
2017-07	164	4.4	-	No need for walker, very good QoL and psychosocial functioning	-	-	FLG practice
2017-10	176	-	-	No need for walker	-	-	FLG practice
2017-10	179	8.2	-	No need for walker	-	-	FLG practice
2017-12	187	-	-	Walking more steadily, very good QoL	-	-	FLG practice
2018-04	203	-	-	Walking more steadily	-	-	FLG practice
2018-07	218	-	-	Walking more steadily; very good QoL and psychosocial functioning	-	-	FLG practice
2018-09	228	-	-	He had a car accident resulting in a severe neck injury.	-	-	FLG practice
2018-10	231	-	-	His head was bent almost 90 degrees forward. Despite wearing a neck brace, he could only look towards the ground.	-	-	FLG practice
2019-05	260	-	-	His head was bent almost 90 degrees forward. Despite wearing a neck brace, he could only look towards the ground. He walked slowly.	-	-	FLG practice
2019-06	263	-	-	Death	-	-	-

halfway or developing shortness of breath with exertion on stairs that he had before practicing FLG (*Extended data: Video S1*). Additionally, the patient reported the following sequential trend of psychosocial functioning improvement: starting FLG practice, finding the purpose of life, developing positive thinking, having a better temperament, experiencing symptom improvement, feeling happier and less depressed, and becoming more altruistic (*Table 2*). At week 219, based on the extended survival, absence of symptoms, disappearance of bone metastases, improved QoL and psychosocial functioning, his treating physician assessed that his prostate malignancy was “clinically, under control” and “his overall functional status is excellent.” The patient reported he was living a healthy life with good physical and mental states. He shared his experience as a terminal cancer survivor in the hospital support group as well as with the local medical community.

On week 228, the patient had a car accident which resulted in a severe neck injury and decreased ability to walk. On week 263, the patient was found dead at home from unknown causes. Three days before his death, he had spoken with us in person and denied any signs or symptoms of cancer relapse.

Discussion

This terminal prostate cancer patient had a Gleason Score 9, a PSA of 468 ng/ml, and ≥ 5 bone metastases. After an initial response to CAB treatment, he became castration resistant. After starting FLG practice, his PSA came down quickly, he could walk independently, and his bone metastases disappeared within a short time frame.

Furthermore, the patient in this case, who practiced FLG in addition to CAB therapy, survived a total of 61.4 months (263 weeks) post-diagnosis, which is much longer than the survival (18.7 to 32.2 months) of comparable patients in the three studies described below.

In the CHAARTED trial, a high volume of metastatic prostate cancer was defined by the presence of visceral metastases or four or more bone lesions with at least one beyond the vertebral bodies and pelvis⁶. This 80-year-old patient with a Gleason score of 9 met the definition of high volume metastatic prostate cancer as he had 5 bone metastases including one site beyond the vertebral body and pelvis (left 9th rib region). In the CHAARTED trial, the median life expectancy for an analogous patient was 32.2 months with patients seldom surviving longer than 60 months. Despite the multiple effective treatments for castration resistant prostate cancer, such as chemotherapy and second-generation anti-androgen therapy (abiraterone acetate or enzalutamide), utilized in this large clinical trial, the median life expectancy was just 32.2 months. A recent study of the impact of disease volume on metastatic prostate cancer patients that used the same definition for high volume disease as in the CHAARTED trial, the median overall survival was 27 months in high volume disease patients⁷. In another large multi-centre study on the correlation between overall survival and skeletal metastases, the median overall survival was even shorter at 18.7 months in patients with similar clinical conditions⁸.

Some may attribute the objective responses seen in this patient after discontinuing the antiandrogen (bicalutamide) to antiandrogen withdrawal syndrome (AAWS). AAWS, usually defined as $>50\%$ decline in PSA following cessation of the antiandrogen, has been increasingly recognized and reviewed^{9–11}. A large multi-institutional clinical trial (CALGB 9583) to investigate AAWS in androgen-independent prostate cancer patients (with a median age of 72 years) has shown that 11% of patients experienced AAWS with the median time to PSA progression at 5.9 months, and objective responses of measurable disease were observed in 2% of patients¹². In this case, following the same criteria as the trial, the time to PSA progression was 19.8 months (week 94–179) while the post-resistance survival time was 42.3 months (week 80–263), significantly greater than the CALGB 9583 trial’s median survival time of 16.7 months. We believe that even if AAWS may have played a role in this patient’s clinical course, it could not have been the sole or main factor contributing to the longer time to PSA progression and overall survival. As indicated in the CALGB 9583 trial, patients in the AAWS + ketoconazole treatment arm have greater median time to PSA progression (8.6 months) than do patients in the AAWS alone arm (5.9 months). FLG practice, which this patient started at week 89, might have played a role comparable to that of the ketoconazole therapy in the CALGB 9583 trial by adding anticancer activity. However, the enhancing role of ketoconazole therapy did not help prolong the median survival time (15.3 months) in the AAWS + ketoconazole treatment arm, with the median survival time a bit shorter than that for the AAWS alone arm (16.7 months). In contrast, FLG practice did help prolong the survival time to at least 42.3 months after developing castration resistance.

More importantly, without an effective drug treatment after developing castration resistance, the patient in this case lived without any symptoms, in excellent mental and spiritual health, with a good quality of life, and without any cancer complications (such as bone pain, skeletal-related events, and urinary symptoms) or side effects associated with drug therapies. Additionally, after FLG practice, a series of improvements in metastatic prostate cancer occurred sequentially at week 106 (ambulating without a walker), week 130 (CT not showing osseous metastatic findings), week 132 (bone scan showing disappearance of bone metastases), week 151 (prostate getting softer and smaller) and week 187 (walking up a 14-step stairway without stopping halfway). It is unlikely that all these beneficial effects could be attributed to AAWS alone. Holistic mind-body improvement, however, is commonly observed in those who practiced FLG^{13,14}.

The close temporal relationship between FLG practice and significant cancer improvement in the absence of any other effective treatment after starting FLG practice suggest that FLG practice provided a holistic and beneficial effect in this terminal prostate cancer patient. Moreover, the patient reported a good QoL and free of cancer symptoms until he died of a non-cancer related cause, possibly due to the sequela of his severe car accident and/or his pacemaker-related cardiac condition.

While there are many anecdotal testimonies from terminal cancer patients revealing they survived longer than expected after practicing FLG^{13,14}, this is the first case report with detailed, well documented medical records. According to the canon of traditional Chinese medicine, the Yellow Emperor's Classic of Medicine, people may enjoy a long, disease-free life by cultivating the mind and following upright moral principles¹⁵. The emerging discipline of psychoneuroimmunology has begun to disclose the relationship between psychological, neurological and immunological systems. For example, eudaimonic well-being is found to be associated with decreased expression of transcriptional response to adversity profile involving inflammation mediated neoplastic diseases¹⁶, decreased tumour growth and progression-related norepinephrine¹⁷. The patient presented here experienced symptom improvement soon after reading *Zhuan Falun* and accepting the principles of "Truthfulness, Compassion, and Tolerance," suggesting that the improvement of moral and spiritual character also plays a significant role in the improvement of health.

PSA levels are also known to increase with age. A cohort study (the Concord Health and Ageing in Men Project, CHAMP) involving a representative sample of 1434 eligible community-dwelling men with no diagnosis of prostate cancer reported a 5th to 95th percentile range of 0.6–12.4 ng/ml of serum PSA level in men born in China aged 75–79⁴. As the pituitary-gonadal system is usually restored within 4 to 12 weeks after leuprolide acetate is discontinued^f, the later rise in the patient's most recent PSA level most probably reflected his baseline PSA levels of 20 years ago.

This patient's testosterone levels dropped from 44 ng/dL at week 1 to 31 ng/dL at week 5 at the beginning of CAB and stayed low (<3 ng/dL) after discontinuing antiandrogen at week 84 and 89, as expected with the use of the LHRH agonist. However, PSA levels progressively rose between week 68 (0.2 ng/ml) and week 89 (3.7 ng/ml) despite low testosterone, indicating the cancer had become resistant to CAB. Thus, testosterone was not considered to have played any major role in the subsequent clinical events. Accordingly, his physician did not test testosterone levels further.

Conclusions

We describe in detail, for the first time in the medical literature, the clinical course of a terminal prostate cancer case with relapse to CAB followed by FLG practice, a qigong practice of the Buddhist school that originated in China. After developing castration resistance and discontinuing Bicalutamide, the patient chose to practice FLG while continuing two doses of leuprolide acetate. Most of the patient's prostate cancer signs and symptoms disappeared quickly after FLG practice, accompanied with greatly improved psychosocial functioning and quality of life. This case provides valuable objective evidence of the clinical benefits experienced by this patient from practicing FLG.

Although the mechanism by which FLG practice results in improvement is not yet well understood, its effects are identifiable and measurable. This information is useful for physicians and patients alike who are searching for alternative combinational treatment modalities in addition to conventional CAB therapies.

Patient perspective

"My name is XXX. I had a teaching career as an Organic Chemistry Professor for 37 years at XXX before retiring in 2000. In May of 2014, I became a final stage, metastatic prostate cancer patient with bone pain, a 468 PSA, and an estimated life expectancy of less than half a year. I also required the aid of a walker to ambulate. After 19 months of androgen deprivation therapy (ADT), my cancer relapsed. Shortly prior to that relapse, I was very fortunate to have discovered a relatively new but rapidly growing mind and body cultivation practice known as Falun Gong that came originally from China.

On January 2016, I began to seriously engage in FLG cultivation practices involving reading moral teachings from a principle guidebook of Falun Dafa entitled "*Zhuan Falun*" and performing five different sets of Qigong exercises daily. A little over a month later, my PSA reversed its rising trend and dropped immediately to 0.6. Three months after that, I took my last Lupron treatment, thus ending the ADT therapy. After another five months, a new bone scan revealed the disappearance of metastases lesions. Today, I have been off any medicine, including cancer fighting medicine for 22 months. I am a healthy person with normal quality of life, no bone pain, full of energy, better tempered, more optimistic and positive. My own experience so far has demonstrated to my own satisfaction that cultivation of mind and body through practicing Falun Gong can be an effective healing and cost-effective way of combating cancer which is also free of undesirable side effects...

The magical effect of practicing Falun Gong had on my health made me appreciate the importance of elevating one's moral character to be in tune with the fundamental characteristics of the universe, namely, truthfulness, compassion, and tolerance. It also made me realize that there may very well be a set of supernormal science on human body that is quite unique, subtle, and highly deserving of greater attention and further studies by modern scientists."

Patient's Signature, July 2018

Physician perspective

Wednesday, July 2018: Patient seen on July XX. "Overall, he is doing well. He is not depressed. He has no pain. He is currently on no medical therapy for his prostate cancer. He is optimistic and functional. All other systems reviewed and otherwise negative".

"Assessment: Prostate malignancy: Clinically, under control. His overall functional status is excellent. Patient is comfortable with his spiritual approach to care".

^fhttps://www.accessdata.fda.gov/drugsatfda_docs/label/2014/020517s036_019732s0411b1.pdf

Consent

Written informed consent for the publication of this case report and any associated images was obtained from the patient before his death.

Data availability

Underlying data

All data underlying the results are available as part of the article and no additional source data are required.

Extended data

Figshare: A castration-resistant terminal prostate cancer patient survived significantly longer and walked independently after practicing Falun Gong. <https://doi.org/10.6084/m9.figshare.9933296>¹⁸

This project contains the following extended data:

- Video S1: This patient was diagnosed with terminal stage IV, M1b metastatic prostate adenocarcinoma with extensive (≥ 5) bone metastases requiring the aid of a walker to ambulate. He initially responded well to treatment with CAB but during 68-80th week of treatment, he developed castration-resistance. Bicalutamide was then discontinued. He chose to begin practicing Falun Gong at week 89 as an alternative form of care while continuing two doses of leuprolide acetate. His PSA

decreased by 86% within five weeks, he walked independently at 17 weeks and bone metastases disappeared in 41–43 weeks after beginning to practice Falun Gong. This video was taken three and a half years after the diagnosis of terminal cancer was made and less than two years after he started to practice Falun Gong. The patient walked up a 14-step stairway without stopping halfway and did not experience the shortness of breath with exertion on stairs that he had before practicing Falun Gong. His treating physician assessed that his prostate malignancy was “clinically, under control” and “his overall functional status is excellent.”

Data are available under the terms of the [Creative Commons Attribution 4.0 International license](#) (CC-BY 4.0).

Acknowledgements

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Laurence Klotz

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This case could readily be explained by prolonged androgen suppression, which is common in elderly men after discontinuation of LHRH agonist. In the absence of serum testosterone levels after ADT was stopped, the case is not convincing. While I'm open to the effect of interventions such as this, it requires very convincing evidence.

On this basis I'd elect to reject this paper.

Is the background of the case's history and progression described in sufficient detail?

Yes

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?

No

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?

Yes

Is the case presented with sufficient detail to be useful for other practitioners?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Prostate cancer

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Author Response 28 Dec 2019

Yuhong Dong

We thank Dr. Klotz for his valuable review, and summarize his questions into three parts and answer them accordingly below:

(1) This case could readily be explained by prolonged androgen suppression, which is common in elderly men after discontinuation of LHRH agonist.

Answer:

In this case, the use of LHRH agonist (leuprolide acetate) was discontinued at week 116 while the use of antiandrogen (bicalutamide) was discontinued at week 80. The reviewer seemed to attribute the cascade of clinical responses that occurred in the patient to the discontinuation of LHRH agonist therapy. However, the patient already started to walk independently at week 106, indicating improvement in his bone metastases occurred before discontinuation of LHRH agonist and could not be attributed to the effect of prolonged androgen suppression.

Alternatively, the reviewer may refer to Antiandrogen Withdrawal Syndrome (AAWS) in the question instead of prolonged androgen suppression. AAWS, usually defined as >50% decline in PSA following cessation of the antiandrogen, has been increasingly recognized and reviewed^{1,2,3}. A large multi-institutional clinical trial (CALGB 9583) to investigate AAWS in androgen-independent prostate cancer patients (with a median age of 72 years) has showed that 11% of patients experienced AAWS with the median time to PSA progression at 5.9 months, and objective responses in measurable disease were observed in 2% of patients⁴. In this case in his eighties, the time to PSA progression is 19.8 months (week 94-179) following the same criteria in that trial, while the survival time is 42.3 months (week 80-263), significantly greater than the median survival time of 16.7 months in the trial. We believe that even if AAWS might have played some role in this patient's clinical course, AAWS was not the sole factor contributing to longer survival and time to PSA progression. As indicated in that trial, patients in the AAWS + ketoconazole treatment arm have greater median time to PSA progression (8.6 months) and objective response rate (20%) than do patients in the AAWS alone arm (5.9 months). FLG practice in this case started at week 89 might play a role comparable to ketoconazole therapy in the CALGB 9583 trial by adding anticancer activity. However, this enhancing role of ketoconazole therapy does not help prolong the median survival time (15.3 months) in the AAWS + ketoconazole treatment arm, actually a bit shorter than that in the AAWS alone arm (16.7 months). In contrast, FLG practice did help prolong the survival time to at least 42.3 months.

More importantly, without any effective drug treatment after developing castration resistance, the patient in this case lived without any symptoms, in excellent mental and spiritual health with a good quality of life without any cancer complications (such as bone pain, skeletal-related events, and urinary symptoms) or side effects associated with drug therapies. Additionally, a series of improvements in bone metastases occurred sequentially at week 106 (ambulating without a walker), week 130 (CT not showing osseous metastatic

findings), week 132 (bone scan showing disappearance of bone metastases) and week 187 (walking up a 14-step stairway without stopping halfway). It is unlikely that all these beneficial effects could be attributed to AAWS alone. Holistic mind-body improvement, however, is commonly observed in the practice of FLG.

(2) In the absence of serum testosterone levels after ADT was stopped, the case is not convincing.
Answer:

In Table 3, serum testosterone levels were tested at 44, 31, <3 and <3 (ng/dL) at week 1, 5, 84 and 89, respectively. Testosterone levels dropped quickly at the beginning of ADT and stayed low (<3 ng/dL) after discontinuing antiandrogen at week 84 and 89, as expected with the use of the LHRH agonist. However, PSA levels progressively rose between week 68 (0.2 ng/ml) and week 89 (3.7 ng/ml) despite low testosterone, indicating the cancer had become resistant to ADT. Thus, the testosterone level was not considered to have any role in the subsequent clinical events.

(3) "Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?" "Is the case presented with sufficient detail to be useful for other practitioners?" The reviewer ticked "no" to both questions.

Answer:

Based on this case's well documented hospital records, we have provided adequate physical examinations, diagnostic tests (biopsy, PSA levels, testosterone levels, bone scan, CT scan), details of the treatments given, as well as the clinical outcomes. We believe this case report has been presented with ample medical details.

Clinical physicians and patients are likely to appreciate the significance of this case study's findings, especially if they consider the following three perspectives:

I. Survival

Such a significantly prolonged survival time is rarely reported in the medical literature and should be of great interest for those physicians who has managed similar patients.

In the CHAARTED trial, a high volume of metastatic prostate cancer was defined by the presence of visceral metastases or four or more bone lesions with at least one beyond the vertebral bodies and pelvis⁵. This 80-year-old patient with a Gleason score of 9 met the definition of high volume metastatic prostate cancer as he had 5 bone metastases including one site beyond the vertebral body and pelvis (left 9th rib region). In the CHAARTED trial, the median life expectancy for an analogous patient was 32.2 months with patients seldom surviving longer than 60 months. Despite the multiple effective treatment for castration resistant prostate cancer, such as chemotherapy and second-generation anti-androgen therapy (zytiga, xtandi), provided by in this large clinical trial, the median life expectancy was just 32.2 months. In the non-academic medical community, the median life expectancy may be even shorter, perhaps around 27 months⁶. The patient in this study, who practiced FLG, survived a total of 61.4 months (263 weeks) post-diagnosis, which is longer than comparable patients in both the CALGB 9583 and CHAARTED studies.

II. Quality of life

Without any effective drug treatment options after developing castration resistance, the patient in this case lived without any symptoms, in excellent mental and spiritual health, with a good quality of life, without any cancer complications (such as bone pain, skeletal-related events, and urinary symptoms), or medication side effects. We believe that this case has been presented with sufficient evidence of the valuable clinical benefits this patient experienced from practicing FLG. This information is useful for physicians and patients alike who are searching for effective treatment options.

III. Cost

FLG practice is free, and anyone can start or stop the practice on his own. This may alleviate physicians and patients' financial concerns.

The patient himself was a rigorous scientist who received orthodox scientific training and had a very good reputation in the organic chemistry community. His personal experience of practicing Falun Gong made him realize that "there may very well be a set of supernormal science on human body that is quite unique, subtle, and highly deserving of greater attention and further studies by modern scientists."

We appreciate Dr. Klotz's comments and hope this response answers his questions and concerns properly.

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Competing Interests: We are authors of this article. Our competing interests have been disclosed in the main article.

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