

ORIGINAL ARTICLE

What is the connection between serum phosphorus, cancer and heroin? A medical hypothesis based on observational studies

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Summary

Considering the results of a previous study in which 2321 regular heroin addicts who died without having stopped taking the drug since they had started – from various causes but none from cancer, may mean something. Our first thought was: Can't we hypothesize, reinforcing our previous view that heroin is a "barrier" against cancer and as the user gets in the methadone program he/she lacks the "barrier" and therefore is liable to develop cancer? We have already reported that the amount of blood phosphorus in heroin addicted is significantly lower than in healthy ones. Additionally we have introduced the potential clinical impact of serum phosphorus as a screening test for cancer. Phosphorus regulated by heroin might be the key for preventing the development of cancer in human organism, in terms of

keeping the phosphorus in normal levels in the blood. Cases of cancer patients after methadone detox treatment are reported. In the present study, in 200 cancer patients who underwent radical radiotherapy (RT), the phosphorus level is generally returning to normal levels three months post-irradiation. Phosphorus and cancer seem to be significantly associated, with heroin adapting phosphorus in normal values. The pharmaceutical companies should look deep inside the molecule of heroin, by means of an analogue with the potential impact against cancer but without the addictive effect to humans. It's obvious that further research is needed to obtain reliable statistical data.

Key words: cancer, heroin, phosphorus, prevention

Introduction

Phosphorus is a vital element for the cells and organisms [1]. It has been already reported, few decades ago, that phosphorus increases in the blood in various conditions and especially in cancer due to the increased requirements of the rapidly growing cells. It seems that we might face the axiom that "there is no growth of cancer in the body without an increase of phosphorus in the blood" [2]. The main explanation might be the fact that phosphorus is the nutrient for the cancer cells [3,4].

On the other hand, heroin is an opioid painkiller and the 3,6-diacetyl ester of morphine. Heroin is prescribed as an analgesic, cough suppressant and as an antidiarrhoeal. It is also used as a recre-

ational drug for its euphoric effects. Frequent and regular administration is associated with tolerance and physical dependence. In some countries it is available for prescription to long-term users as a form of opioid replacement therapy alongside counseling [5]. It was originally synthesized by Alder Wright in 1874 by adding two acetyl groups to the molecule of morphine, a natural product of the opium poppy. It is generally illegal to manufacture, possess, or sell heroin without a license. It is also known that heroin affects the normal function of the organism [6]. World-wide medical organizations try to help and detoxicate heroin addicts making use of the methadone treatment.

Methods

In a retrospective study with 200 cancer patients, referred to radiotherapy department of "Attikon" University Hospital, we reviewed the files and we recorded the serum phosphorus at baseline and 3 months post irradiation. The retrospective study was approved from the local ethics committee. A peripheral blood sample was obtained before initiation of indicated therapy along with three months post RT during follow-up, and the values of phosphorus were evaluated. The samples were centrifuged and serum phosphorus was measured using the nephelometric method (Beckman Coulter, Image Immunochemistry System, Minneapolis USA)/photometric method. The values of phosphorus considered as normal were 2.4–4.1 mg/dL. The patient characteristics are shown in Table 1. All patients had inoperable stage I-III cancer and had undergone radical RT with dose range 60-70Gy with a VARIAN LINAC 2100Clinac, while the RT technique was in all cases three dimensional conformal based on ECLIPSE VARIAN treatment planning. We analyzed the difference between the two measurements by using the Wilcoxon non-parametric test. The significance level was set at 0.05. The analysis was performed with the SPSS10 software (Chicago, IL, USA).

Table 1. Patients' characteristics referred for radical radiotherapy

Characteristics	n
Age, years, median (range)	57 (36-72)
Location of disease	
Head Neck cancer	
Stage I	11
Stage II	25
Stage III	9
Prostate cancer	
Stage I	47
Stage II	23
Stage III	38
Non small cell lung cancer	
Stage IIIa	12
Stage IIIb	14
Cervical cancer	
Stage IIb	11
Stage III	10

Results

As shown in Figure 1, the serum phosphorus before and three months post RT was 6.65 ± 1.63 mg/dl and 3.47 ± 0.85 mg/dl, respectively ($p < 0.01$, Wilcoxon test). Before initialization of radical RT, only 5 out of 200 samples (2.5%) were within normal range. Three months after RT, samples returned to normal except 29 cases (14.5%).

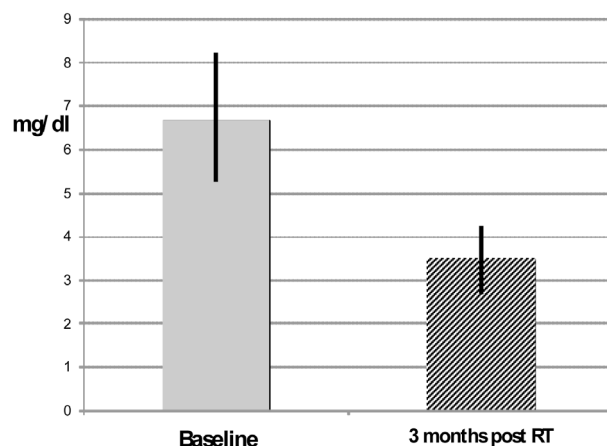


Figure 1. Serum phosphorus at baseline and three months post radiotherapy ($p < 0.01$, Wilcoxon test).

Besides the above, we reviewed the files of heroin-addicted people after methadone detox treatment, who had been referred to our department for RT due to cancer. Two cases were extracted after complete detoxification after methadone treatment. The first case was a male who started heroin at the age of 17 years. He stopped heroin and started methadone detox treatment at 38. He developed non small cell lung cancer at the age of 42. He underwent chemoradiotherapy, but he relapsed with bone, brain and liver metastases and died when he was 46 years old. The second case was a female who started heroin at the age of 13 years. She stopped heroin and started methadone detox treatment at the age of 31 years. She developed breast cancer when she was 35 years and underwent mastectomy and adjuvant chemoradiotherapy. She relapsed with skin, bone and liver metastases and she died at the age of 42 years.

Hypothesis - Discussion

In a previous study, it had been reported that in regular heroin addicts (those who had never stopped, even for a short time taking the drug since they started), the amount of phosphorus in their blood was within normal levels [7]. In another study in 2321 deaths of regular heroin addicts there was not even one death from cancer [8].

Those two studies were a stimulant for a further investigation. On one hand we assumed that heroin might acts as a "barrier" against cancer and on the other hand we tried to find out what happens to those "regular heroin addicts" if they undergo a heroin detox treatment with methadone. Taking into consideration that in 2321 deaths of regular addicts during the decade 2001-2010 there were various cases of death but there was not, even one, from cancer made us suspect that "there is something at the bottom".

It is known since 1949 that “methadone in very dilute solution does not affect the rate of uptake of phosphorus by the red blood cells” [9]. When the heroin addicts get into methadone detox program the normal function of the organism has already been “disturbed” from the previous destructive effect of the heroin and try to treat it by increasing the phosphorus uptake, and in most of the cases achieves this without any consequence.

But, owing to the diminished resistance of the organism on one hand and the “fertile soil”, which had been created from the previous facts, on the other the growth of cancer is favored despite the young age of most of the subjects. Having all these in mind we decided to try and find out how many heroin addicts under methadone detox treatment develop side effects as cancer. Very soon we realized that it was impossible to obtain official/accurate statistics because it was very difficult to cooperate with those people. After they entered to the program they were advised to report to the detox center for follow up in fixed dates. Most of them either disappeared or in some cases they visited the centers not at the ordered time but whenever they liked, usually to claim assistance or support. In such conditions, our efforts to enroll a big number of subjects in the study and obtain accurate information were in vain. The only thing we managed to do and use it as an example was to collect two cases that had been in the methadone detox treatment and developed cancer.

Eventually, based on the above observations, we did some “arbitrary suggestion”. Since heroin regulates the amount of phosphorus in the blood, keeping it in normal range, then heroin might be a barrier against cancer. On the other hand, increased levels of phosphorus might be a simple screening test for the detection of cancer somewhere in the human body [10]. In another study we have already reported the prognostic significance of serum phosphorus in patients with lung cancer, emphasizing the fact that all cases at diagnosis of cancer had elevated levels of phosphorus [11].

Consequently, our first thought was: Can't we hypothesize, reinforcing our previous view, that heroin is a “barrier” against cancer and as the user gets in the methadone program he/she lacks the “barrier” and therefore is liable to develop cancer? Phosphorus regulated by heroin might be the key for preventing the development of cancer in humans by keeping serum phosphorus in normal levels. Cases of cancer patients after methadone detox treatment are reported. In the present study, in 200 cancer patients who had undergone radical RT, the phosphorus level returned within normal range three months post-irradiation. Beyond that, normal phosphorus level in the blood might be an indicator of no-cancer; on the other hand, increased levels of phosphorus might predispose to cancer, if comorbidities are excluded, such as hereditary, chronic inflammation, various hormone administration, etc [1,9,10]. Decrease of phosphorus levels to one half in a cancer patient (when it is increased) as an effect of any treatment, might reduce the tumor size to two-thirds [2,3,11].

As a conclusion, phosphorus and cancer seem to be significantly associated, with heroin adapting phosphorus in normal values. The pharmaceutical companies should look deep inside the molecule of heroin, by means of an analogue with the potential impact against cancer but without the addictive effect to humans. It's obvious that further research is needed to obtain reliable statistical data.

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Conflict of interests

The authors declare no conflict of interests.

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