

34th Euro-Global Summit on **Cancer Therapy & Radiation Oncology**
&
6th International Conference on **Big Data Analysis and Data Mining**
&
13th International Conference on **Orthopedics, Arthroplasty and Rheumatology**
July 25-27, 2019 London, UK



Gabor Somlyai

HYD LLC for Cancer Research and Drug Development, Hungary

Hydrogen/deuterium ratio is a key regulator of energy production and cell proliferation – submolecular dimensions of drug development

The concentration of deuterium (D) is about 150 ppm (over 16 mM/L) in surface waters and 12-14 mM/L in living organisms, which is clearly a biologically relevant ion considering that circulating Ca²⁺ is only 2.24-2.74 mM/L. In order to reveal the possible role of naturally occurring D in living organisms, the replacement of normal tap water with deuterium depleted water (DDW) in a range from 25 ppm to 135 ppm was investigated in cell cultures, animal studies, as well as in prospective blinded and retrospective clinical trials. DDW inhibited cell growth of multiple cancer cell lines in *in vitro* culturing studies and readily induced tumor xenograft regression in mice [1-3]. Double blind, controlled, human Phase II clinical trial with prostate cancer, in compliance with GCP principles exhibited a significant difference between the control (n=22) and DDW treated (n=22) patients with respect to end point parameters and confirmed significant antitumor efficacies [4].

To gain additional information on DDW efficacy, the data matrices of 1827 cancer patients consuming DDW were evaluated in an open label retrospective study. The cumulative follow-up period of patients covers over 6881 years from the diagnosis of the disease, with DDW consumption of 2265 cumulative years. Median survival time (MST) of the 1827 control patients treated with standard oncotherapy, which represent all major tumor types, was 121.2 months (10.1 years). MST correlated with the length of DDW consumption in treated groups.

The MST of small, homogenous prostate-, breast-, lung- and pancreas cancer populations was also calculated. The MST was 64.8 months in prostate cancer patients (n=20) having bone metastases within one year after diagnosis, which is a 3-fold increase when compared to 15-20 months in patients with standard oncological care without DDW [4]. The 74 breast cancer patients with stage IV disease with distant metastases in 135 cumulative number of organs the DDW-treated group showed an MST of 4.3 years in comparison with ~2.0 years MST [5] of control patients. The MST was 25.9 months in male patients (n=78) and 74.1 months in female patients (n=51) with lung cancer which is a 3 to 7-fold increase in comparison with control patients receiving conventional oncotherapy [6]. Unresectable pancreatic cancer patients entering DDW trial within or after 60 days of diagnosis were also evaluated. The MST for patients starting the DDW treatment within 60 days after diagnosis (n=18) achieved 39 months MST. In contrast, patients joining the DDW trial 60 days or later after diagnosis (n=14) showed a 16 months' MST [7]. The basic concepts of dosing DDW as part of standard oncotherapy will be discussed.

Thirty volunteers with decreased glucose tolerance underwent 90 days long DDW treatment. Fasting glucose decreased significantly after 90 days DDW treatment (6.06 ± 0.66 mmol/L at day 0 and 5.74 ± 0.94 mmol/L at day 90, $p=0.029$). Evaluation of individual cases showed that glucose uptake increased in 11 volunteers (6.9 ± 2.4 mg/kg/min at day 0, 8.6 ± 2.5 mg/kg/min at day 90, $p=0.0014$).

34th Euro-Global Summit on **Cancer Therapy & Radiation Oncology**
&
6th International Conference on **Big Data Analysis and Data Mining**
&
13th International Conference on **Orthopedics, Arthroplasty and Rheumatology**
July 25-27, 2019 London, UK

We suggest that the cells can regulate the D/H ratio and the changes in the D/H ratio trigger certain molecular mechanisms having key role in cell cycle regulation, metabolism. The decrease of D concentration can intervene in the signal transduction pathways.

Deuterium depletion opens new perspectives in drug development offering a completely safe and non-invasive treatment modality.

Recent Publications

1. Somlyai G, Jancsó G, Jáklí Gy, Vass K, Barna B. et al. Naturally occurring deuterium is essential for the normal growth rate of cells. FEBS Lett. 1993; 317: 1–4. doi: 10.1016/0014-5793(93)81479-J
2. Somlyai G., Laskay G., Berkényi, T. et al.: Naturally occurring deuterium may have a central role in cell signalling. In: Synthesis and Application of Isotopically Labelled Compounds (Ed.: J. R. Heys és D.G. Mellilo) John Wiley & Sons Ltd. New York, 1998.
3. Somlyai G., Laskay G., Berkényi T. et al.: The Biological Effects of Deuterium-Depleted Water, a Possible New Tool in Cancer Therapy. Z. Onkol. /J. Oncol. 1998. 30, 4.
4. Kovács A., Guller I., Krempels K., Somlyai I., Jánosi I.Z., et al. Deuterium depletion may delay the progression of prostate cancer. J. Cancer Ther. 2011; 2: 548-556. doi: 10.4236/jct.2011.24075
5. Krempels K., Somlyai I., Gyöngyi Z., Ember I., Balog K., Abonyi O., Somlyai G. A retrospective study of survival in breast cancer patients undergoing deuterium depletion in addition to conventional therapies. J. Cancer Res. Ther. 2013; 1(8): 194-200. doi:10.14312/2052-4994.2013-29
6. Gyöngyi Z., Budán F., Szabó I., Ember I., Kiss I., et al. Deuterium Depleted Water Effects on Survival of Lung Cancer Patients and Expression of Kras and Bcl2 Genes in Mouse Lung. Nutr Cancer. 2013; 65(2):240-246. doi: 10.1080/01635581.2013.756533
7. Boros, L. G., et al. (2014). Fumarate hydratase and deuterium depletion control oncogenesis via NADPH-dependent reductive synthesis: mitochondrial matrix water, DNA deuteration and epigenetic events. DOI: 10.1158/1538-7445.AM2014-1426 Conference: AACR, At San Diego, Volume: Cancer Res 2014;74 (19 Suppl)

Biography

Gabor Somlyai graduated as a biologist at József Attila University (now University of Szeged) in 1982. Between 1982 és 1990 he worked for the Department of Plant Pathology, Plant Protection Institute of the Hungarian Academy of Sciences. From 1983 to 1986 he had a scholarship of the Hungarian Academy of Sciences as a postgraduate student for obtaining PhD. In 1988 he defended his thesis in molecular biology. In the same year dr. Somlyai spent 6 months at the Georg-August University in Göttingen with a DFG scholarship and from the end of 1988 he held a postdoctoral fellowship at the University of Missouri (Columbia, Missouri, USA), where he worked in the field of genetic engineering and gene mapping. Gábor Somlyai is the inventor of numerous international patents granted in most developed countries.

gsomlyai@hyd.hu