

# Heavy hydrogen (deuterium) in living organisms may provide clues to prevent and treat cancer

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Sub-molecular cellular events, driven by hydrogen's replacements with deuterium, explain medical and economical failures of targeted molecular [cancer](#) drugs, which are the main conclusions of the 3<sup>rd</sup> International Congress on Deuterium Depletion held in Budapest, Hungary, in May 2015. The Hungarian Nobel-prize winning scientist Albert Szent-Györgyi envisioned cancer cures that go beyond large molecules including genes and proteins, but rather target sub-molecular mechanisms, where the electrons play a role. Dr. Gábor Somlyai, Hungarian "sub-molecular" biologist, had begun investigations in 1990 regarding naturally occurring deuterium (D; heavy hydrogen (H)) as the cause of cancer. Results presented at the meeting clearly show that the D/H ratio in cellular water pools and the transfer of their deuterium content to different structural and functional molecules via reductive synthesis are essential for maintaining normal cellular functions, DNA and protein integrity. Pharmaceutical manufacturing of deuterium depleted nutritional products, including deuterium-depleted water, the proprietary procedure established by HYD LLC for Cancer Research & Drug Development, has broad potentials to enhance the effectiveness of current oncotherapies, as well as to innovate new ones.

The pharmaceutical industry has been seeking magic bullets to target specific genes and gene products, which continue to produce significant medical and economical challenges via drug failures, narrow range of responders, anecdotal cures claiming false evidence, poor quality of life from severe compound toxicities with enormous and unsustainable treatment costs. Gábor Somlyai PhD, Hungarian molecular biologist, was the first who recognized the biological importance of heavy hydrogen, i.e. deuterium, which can replace hydrogens due to its high concentrations in hydrogen bonding networks with undesired consequences that affect DNA stability in mammalian cells.

In the early nineties, Gábor Somlyai, PhD, recognized that the shortage of this isotope in deuterium-depleted water (DDW) sensitized tumors to withdraw from repeated cell cycles and decreased their proliferation. Depletion of deuterium also induces changes in metabolism and gene expression, which are claimed to affect cancer outcomes using targeted therapies. The 3<sup>rd</sup> International Congress on Deuterium Depletion focused on the latest advances in research and clinical applications of deuterium depletion, its present and future role as anticancer, [diabetes](#) and neurological therapies (all lectures and interviews are available at [www.deuteriumdepletion.com](http://www.deuteriumdepletion.com)). Lead scientists from the USA, France, Spain, United Kingdom, Russia, Sweden and Hungary presented results of cutting-edge international research efforts. Gábor Somlyai, head scientist of HYD, LLC, presented a 3 to 9 fold increase of the median survival time (MST) upon DDW administration in almost 2,000 cancer patients, applied in combination with conventional therapies in prospective and retrospective studies. László G. Boros, professor at UCLA, presented biochemical groundwork related to deuterium depletion as

the natural cancer preventing function of properly working mitochondria, which are responsible for producing deuterium-depleted metabolic water to prevent epigenetic events that cause cancer.

It is well known that mitochondrial functions are damaged in all cancer cells, and the lack of metabolic water recycling may be the underlying cause of uncontrolled growth of **tumor** cells. Dominic D'Agostino (University of South Florida) talked about the use of ketogenic diet and experimental hyperbaric oxygen treatment in various cancer models, which offer therapeutic benefits in ongoing clinical trials in the US, consistent with the increased production of deuterium-depleted metabolic water to treat cancer. HYD, LLC also proved that different feedstuffs, altered in their deuterium content, determine overall cellular functions as the common sub-molecular biological phenomenon and key mechanism to explain natural and pharmacological deuterium depleting processes in healthy mitochondria or therapeutic deuterium depletion in cellular water.

HYD LLC for Cancer Research and Drug Development and its parent company, HYD Pharma Inc, completed the first facility in the world able to produce deuterium-depleted water (DDW) according to GMP rules, and having the completed protocol in hand will apply for ethical approval to start Phase 2 clinical trial. In 2015 the first patients will be recruited.