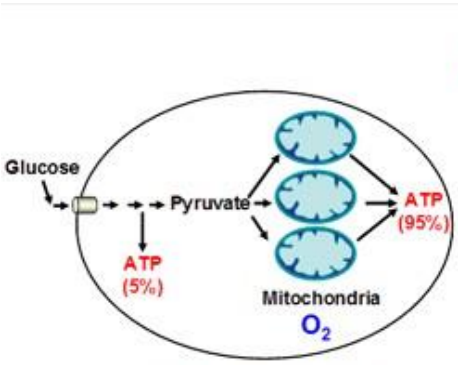
Bromopyruvate Infusion

Dayspring Cancer Clinic is one of only a few cancer clinics in the USA that is currently making available the product 3-Bromopyruvate (3-BP) to patients with all types of cancer, not just liver cancer. Dayspring has an IRB accepted proposal to make this compound available to patients. 3-BP far surpasses targeted therapies as targeted therapies are quickly made obsolete by intratumoral heterogeneities (the cancer cells are too varied for a targeted therapy to have a long lasting effect). But 3-BP works on all PET scan positive cancer cells. These cancer cells all have a unique cellular metabolism that can be attacked by a small molecule such as 3-BP. Dr. Peter Pedersen's lab at Johns Hopkins in Baltimore Maryland has thoroughly investigated 3-BP and a formulation for 3-BP has been worked out to increase efficacy, decrease toxicity and nuance the delivery to cancer cells.

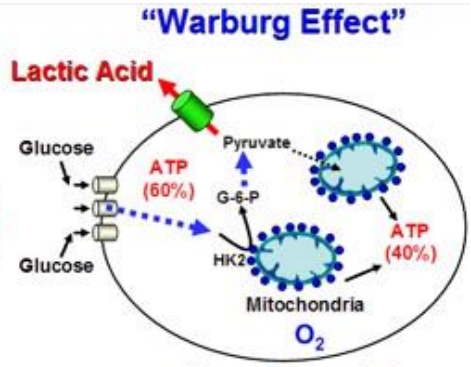
What is 3-bromopyruvate (3-BP) and how does it works as a potent anti-cancer agent?

Patients, scientists and many others are frequently interested in knowing whether 3-BP is more effective and less toxic to cancer patients than currently approved chemotherapy drugs.[1] Certainly this is the case for experimental animals. In fact 3-BP is one of the most effective anti-cancer drugs, and in some cases perhaps the most effective.[2] 3-BP targets the essential energy production machinery of cancer cells while leaving the same machinery in normal cells preserved. This discovery has been instrumental in propelling a new direction in cancer research focused on selectively targeting the cancer cells' energy production factories. In fact, Dr. Peter Pedersen's lab of Johns Hopkins, is the pioneer in conceptualizing/inventing this new strategy. From the brief descriptions numbered sequentially below, one will see how and why 3-BP works so effectively as an anticancer agent.

1. There are two energy (ATP) production factories inside the cell, i.e., glycolysis and mitochondrial oxidative phosphorylation. In normal cells (Fig. 1), about 5 % of the total cellular energy (ATP) production is derived from glycolysis and about 95 % from the mitochondria.[3] In cancer cells (Fig. 2), the energy production by glycolysis is significantly increased (up to 60 %).[4] This dramatic increase in glycolysis in cancer cells results in a significant increase in lactic acid production.



Normal Liver Cell
(Very Low HK2 Expression)
Fig. 1



Liver Cancer Cell
(Very High HK2 Expression)
Fig. 2

2. Most cancers (> 90 %) exhibit this common metabolic phenotype. This is called the "Warburg Effect", i.e., significant increase in glycolysis in cancer cells even in the presence of oxygen. The most frequently used cancer detection method clinically, i.e., Positron Emission Tomography (PET), is based on this metabolic phenotype, i.e., the "Warburg effect".

3. Cancer cells that exhibit the “Warburg effect” pump out the produced lactic acid via a transporter (Fig 2, depicted as a green cylinders). The number of these transporters (considered as doors or gates) in cancer cells is much greater than in normal cells.

4. 3-BP, a lactic acid analog, is a small chemical and mimics the lactic acid chemical structure. It is depicted as a small red diamond in Fig. 3. Therefore, 3-BP disguised as lactic acid can “trick” the cancer cells and enter as a Trojan horse (Fig 3). It has little effect on normal cells as these contain very few lactic acid transporters under normal physiological conditions.

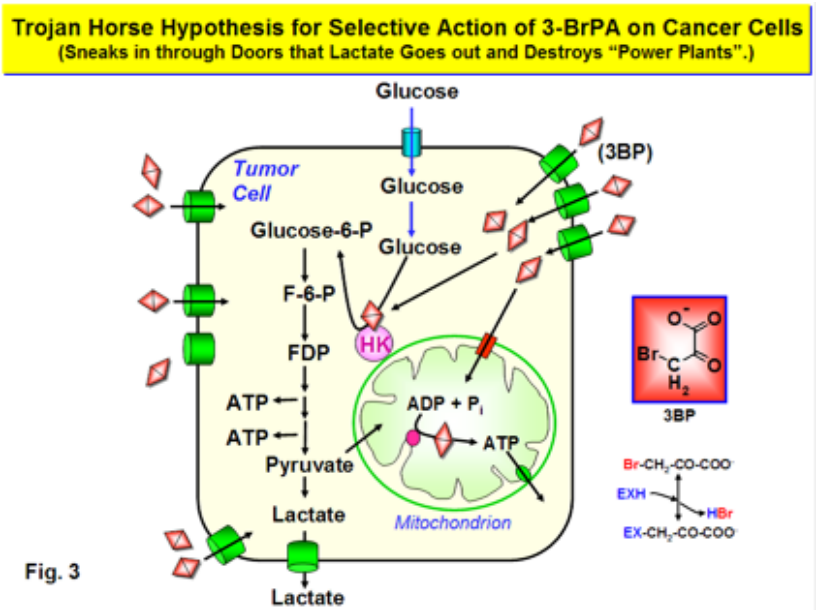
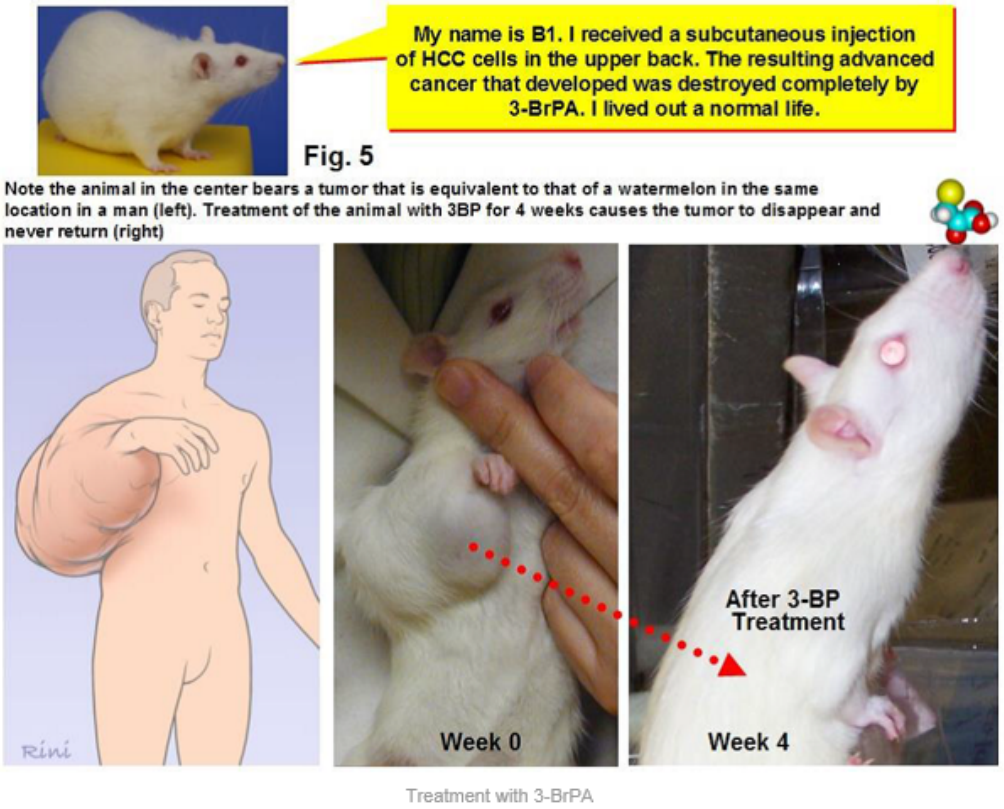


Fig. 3

5. Because of 3-BP’s highly reactive nature, it destroys the two energy production factories (Fig. 3; one red diamond above the HK means that 3-BP is destroying one energy production factory, i.e., glycolysis, and another red diamond inside the mitochondrion means that 3BP is destroying also this energy production factory). Now, the cellular energy (ATP) is depleted very rapidly as 3-BP attacks the two factories at the same time causing the cancer cells to rapidly explode (cell membrane rupturing). As an example of this in action, see Fig. 4. Here, the healthy cancer cells are round and iridescent (left picture). However, when such cells are treated with 3-BP the cell membranes rupture (middle picture) and they die (see cell debris in the far right picture).

Most types of cancer are difficult to eradicate and some, like liver carcinomas, are almost always fatal. Significantly, direct intraarterial delivery of 3-bromopyruvate (3-BP), a potent inhibitor of cell ATP production, to liver-implanted rabbit tumors, inflicts a rapid, lethal blow to most cancer cells therein. Moreover, systemic delivery of 3-BP suppresses “metastatic” tumors that arise in the lungs.

In both cases, there is no apparent harm to other organs or to the animals. Thus, intraarterial delivery of agents like 3-BP directly to the site of the primary tumor, followed by systemic delivery when necessary, may represent a powerful new strategy for arresting the growth of liver and other cancers while minimizing toxic side effects.[5]



Why Is 3BP More Beneficial than Other Metabolic Inhibitors e.g., Dichloroacetic acid (DCA) and/or 2-Deoxyglucose (2DOG) in Killing Cancer Cells? The answer below is

As a small molecule inhibitors, all three molecules above can target the energy production pathways in cancer cells. However, 3BP is more effective and beneficial for the following reasons.

First, 3BP is less toxic and more effective than DCA and 2DOG due to its preferential entry into cancer cells and its capacity to target simultaneously the two major energy production pathways (glycolysis and mitochondrial oxidative phosphorylation). DCA and 2DOG are more cytotoxic because they enter both normal healthy and cancerous cells. Their chemical structures do not provide for specificity to cancer cells. In fact, they enter more normal cells than cancer cells and harm normal cellular functions.

Secondly, DCA and 2DOG are less effective than 3BP in killing cancer cells because each agent targets primarily only one of a cell's two energy production pathways, thus allowing such cells to rely on the other pathway for survival. For example, 2DOG will slow down only the glycolytic pathway but not mitochondrial function. Consequently, cancer cells will thrive utilizing mitochondrial functions. DCA improves mitochondrial function but not the glycolytic energy production pathway. Unlike 2DOG and DCA, 3BP while leaving normal cells unharmed will destroy both energy production pathways of cancer cells upon its preferential entry via monocarboxylate transporters (MCTs). That is why 3BP is much more effective than DCA and 2DOG while exhibiting little to no toxicity.

The Matryx cancer strategy is based on one of the most comprehensive treatment concepts ever developed which incorporates the best modalities of "both worlds", mainstream and alternative, customized for your individual needs. Accordingly, we consider the Dayspring Cancer Clinic treatment program to be superior to stand alone conventional medicine. It centers on non-toxic modalities that enable the body to heal itself by normalizing its natural regulatory, repair and defense mechanisms. In this way the body is encouraged to do what it was designed to do and so much more effectively than conventional interventions.

The Dayspring Cancer Clinic offers a total program utilizing various modalities such as chelation, hyperthermia, non-GMO Vitamin C IVs, dietary changes, enzymatic therapy, and immune re-regulations. All without damaging the immune system unlike toxic and immune damaging chemotherapy!

Matryx Cancer Clinic is now making available the product 3-Bromopyruvate (3-BP) to patients with all types of cancer. Matryx Center Network has an IRB accepted proposal to make this compound available to patients. 3-BP far surpasses targeted therapies as targeted therapies are quickly made obsolete by intratumoral heterogeneities (the cancer cells are too varied for a targeted therapy to have a long lasting effect). But 3-BP works on all PET scan positive cancer cells.

References:

[1] BMC Research Notes 2013, 6:277 doi:10.1186/1756-0500-6-277

[2] J Bioenerg Biomembr. 2012 Feb;44(1):1-6. doi: 10.1007/s10863-012-9425-4.

[3] Annual Review of Cell and Developmental BiologyVol. 27: 441-464 (Volume publication date November 2011)

[4] The Hexokinase 2 Dependent “Warburg effect” and Mitochondrial Oxidative Phosphorylation in Cancer: Targets for effective therapy with the powerful small molecule 3-bromopyruvate. Prepublication paper June 6, 2014 Paweł Lis, Young H. Ko, Peter L. Pedersen*, Andre Goffeau and Stanisław Ułaszewski.

[5] Cancer Res. 2002 Jul 15;62(14):3909-13. PMID: 12124317