Cancer and Diet

OpenSource Diets-Creating A Clean Background for Oncology Research

2018 - Brief Scientific Literature Review
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Laboratory animal models are important tools in oncology research, as they allow scientists to test their in vitro-generated hypotheses in a mammalian, whole-animal system. Since many types of cancer can be affected by environmental factors, having control over these factors is key to generating reproducible, meaningful data.

Research Diets products are routinely used for oncology research. OpenSource diets contain purified ingredients, which provide a clean background (i.e. phytoestrogen and chlorophyll-free) to reduce 'noise' during in vivo imaging and to provide control over factors that may impact gene expression.

**Control Your Diet.
Get Clear Images.**
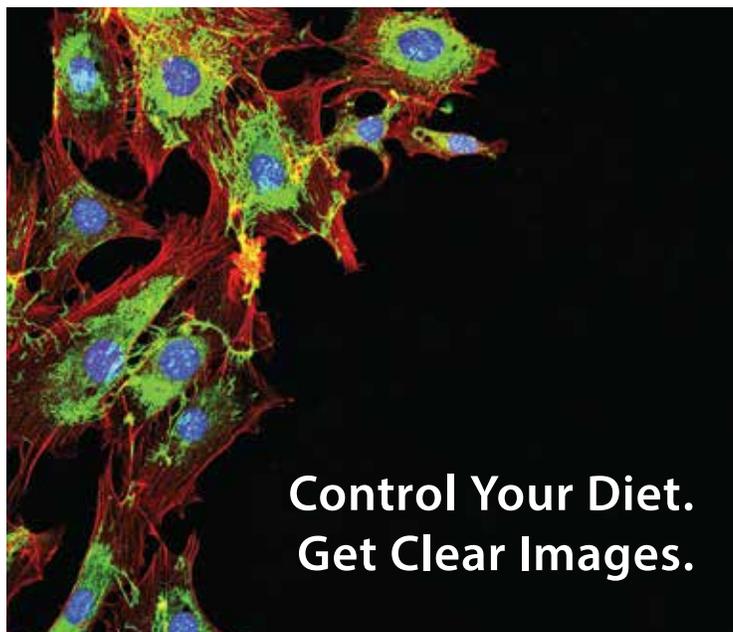
Effects of Phytoestrogens in Grain-Based (GB) Diets on Cancer and Related Endpoints

GB diets use ingredients containing biologically active compounds that can alter the cancer phenotype. One class of compounds called phytoestrogens, which are found in soybean meal and alfalfa, have all been shown to impact cancer endpoints (1, 2) and the concentrations of these compounds in GB diets can have meaningful biological effects on cancer and other phenotypes (3,4). Since the level of these compounds can vary from one lot to the next by as much as 3 – 6 fold (4) (Fig1), it is possible that they can mask the influence of experimental compounds.
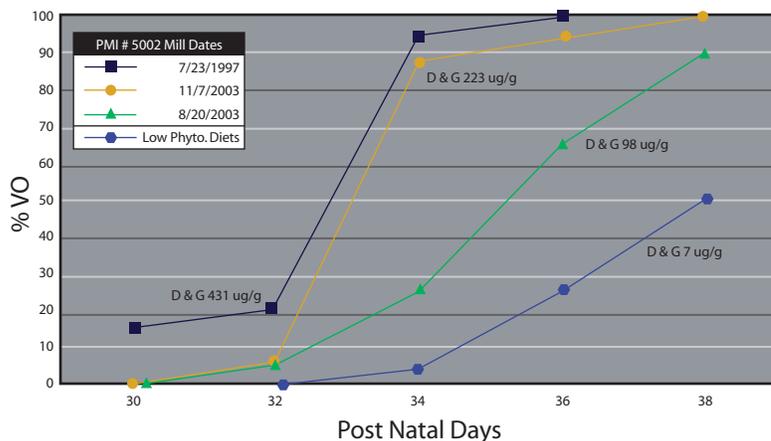
FIGURE 1. Batch-to-batch variation in total daidzein (D) and genistein (G) content versus vaginal opening (VO) data in F344 rats fed different mill dates of Purina Mills, Inc. (PMI) # 5002 diet. The total D & G content can vary 3-fold in different mill dates producing significant ($p < 0.05$) differences in the time of VO between different mill dates at postnatal days 34 and 36. The low phytoestrogen diet in the chart is PMI #5K96, but similar results were seen with Harlan Sprague Dawley (HSD) 2014S and HSD 2016S.
Graphic representation - for details see reference (10).

Genistein is a soy-based phytoestrogen that is commonly found in GB diets, and its influence on cancer is thought to be mediated by its ability to bind estrogen receptors (5, 6). Its potential impact on cancer (i.e. carcinogenic or anticarcinogenic) is related to factors including the dose, age, mode of cancer induction, and rodent model being studied (6). For example, exposure to genistein early in life (i.e. gestational and lactational phases) dose-dependently reduced tumor formation of a carcinogen-induced mammary cancer rat model (7). In contrast, dietary genistein dose-dependently increased mammary tumor area in the context of an estrogen-sensitive ovariectomized mouse model (8).

Effects on Gene Expression

In addition, effects of varying levels of phytoestrogens and other compounds in GB diets (i.e. arsenic), can impact the phenotype at the gene level, (9-11), which can compromise the process of determining the mechanism by which various treatments or genetic mutations influence gene expression. Furthermore, there may be as of yet undiscovered compounds in GB diets which could damage the phenotype further, potentially at the gene level.

Effects on In Vivo Imaging

Finally, the presence of chlorophyll in GB diet ingredients such as alfalfa can create background noise in studies where imaging technology is used. Therefore, it is essential to use chlorophyll-free diets in these studies.
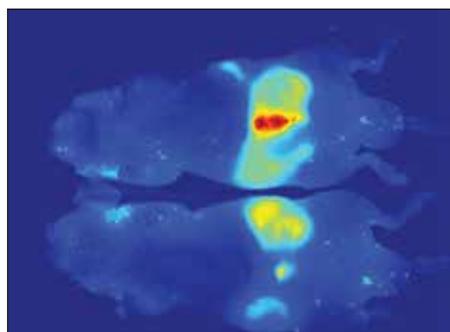
Mice fed a grain-based GB diets diet as seen through the CRi in vivo imaging system.
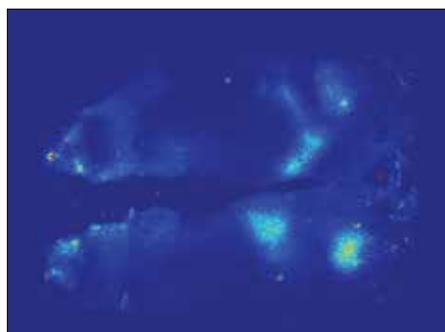
Mice fed OpenSource Diet # D10001 as seen through the CRi in vivo imaging system.

Cancer and Diet

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OpenSource Diets

Aside offering a clean background, the purified nature of OpenSource diets allows for easy customizations, which provide researchers an additional advantage in the cancer field. While certain genetic manipulations and carcinogen exposure are commonly used for cancer development in rodents, making select changes to various nutrients such as the level of fat, fiber, and certain vitamins and minerals are capable of influencing tumor incidence in wild-type mice without carcinogen exposure given a long enough timeframe (12, 13).

OpenSource purified ingredient diets lack phenotype influencing compounds such as phytoestrogens or chlorophyll and can be modified with ease. While the lack of these compounds makes purified diets important tools for oncology research, the very nature of OpenSource purified diets argues for their use in all lab animal research.

Incorporate Test Compounds

Research Diets, Inc. will incorporate your test compound into pelleted diets for simple, safe dosing. Feeding test compounds eliminates dosing related stress to the animal, eliminates vehicle effects, and saves time and labor. Consult with one of our scientists on the formula, determine the dosage required and the diet will be produced and shipped in 5 to 7 business days.

4 reasons why

| UNMATCHED Scientific Support | OPEN Formulas | CUSTOM Purified Diets | DIETS Ship in 5-7 days |

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Scientists Helping Scientists Control Their Research
. . . Let's start the conversation

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