The Impact of Laboratory Animal Diets on Autofluorescence Imaging in Animals

LabDiet

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Fluorescence optical imaging is a powerful technique used to monitor biological processes, and allows for longitudinal studies in individual animals. Diets containing alfalfa (chlorophyll) fluoresce naturally, causing the imaging quality to be compromised.

OBJECTIVE:

To determine whether a grain based diet, such as 5V75, is a suitable option to purified diets in fluorescence imaging studies in order to reduce per diem costs.

EXPERIMENTAL DESIGN:

Adult male C57BL/6 mice (5 mice/diet group) were assigned to one of three diet groups that contained a pre-imaging diet and imaging diet (Table 1). Each group were fed a pre-imaging diet for 10 days (day -9 to 0) then transitioned to an imaging diet for an additional six days (day 1-7). The mice were imaged at day 0 to day 7. The *in vivo* images were taken using the autoexposure setting for Alexa Fluor 680 (675 nm excitation – 720 nm emission, 640 nm excitation – 700 nm emission) and plum fluorescent protein (570 nm excitation – 640 nm emission, 605 nm excitation – 660 nm emission). The fluorescence efficiency (fluorescence emission proportional to incident excitation light intensity) was measured over the abdominal area of each animal. All images were taken using the IVIS Spectrum optical imaging system (Perkin Elmer, Waltham, MA).

Pre-Imaging Vs. Imaging Diet (Table 1)

GROUP #	PRE-IMAGING DIET	IMAGING DIET
1	LabDiet 5001	AIN-93M
2	LabDiet 5001	LabDiet 5V75
3	LabDiet 5V75	AIN-93M

5001: Ground corn, dehulled SBM, dried beet pulp, fish meal, ground oats, dehydrated alfalfa meal

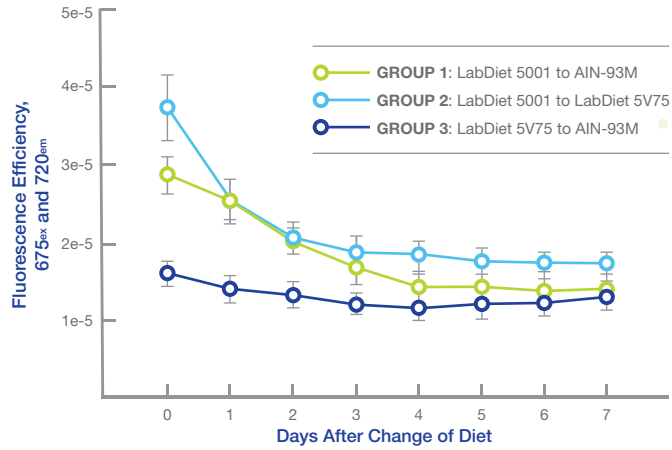
5V75: Ground corn, ground wheat, wheat middlings, corn gluten meal, cane molasses

AIN-93M: Cornstarch, dextrin, casein, sucrose

RESULTS:

Autofluorescence was higher with the animals fed the pre-imaging diet 5001 than 5V75 at both Alexa Fluor 680 wavelengths and one plum fluorescent protein (605 nm excitation – 660 nm emission) wavelength on day 0. Three to four days after changing to the imaging diets, autofluorescence decreased in groups 1 and 2 to similar levels seen with the mice originally on the 5V75 (Group 3) at the Alexa Fluor 680 wavelengths. For plum fluorescent protein wavelength, 605 nm excitation – 660 nm emission, a similar decrease in autofluorescence was seen after 4 days for group 1 and group 2. However, this was not true for wavelength at 570 nm excitation – 640 nm emission, in which there was no gradual decrease in autofluorescence for any dietary treatment.

Fluorescent Efficiencies



CONCLUSION:

Autofluorescence decreased in the mice within 4 days of receiving a diet containing no alfalfa (5V75 or AIN-93M). Because autofluorscence levels were similar between the purified AIN-93M and grain-based 5V75 diets, 5V75 can serve as a better cost alternative to purified diets for *in vivo* bio-imaging. 5V75 elicits minimal autofluorescence levels similar to AIN-93M that are needed for *in vivo* bio-imaging.

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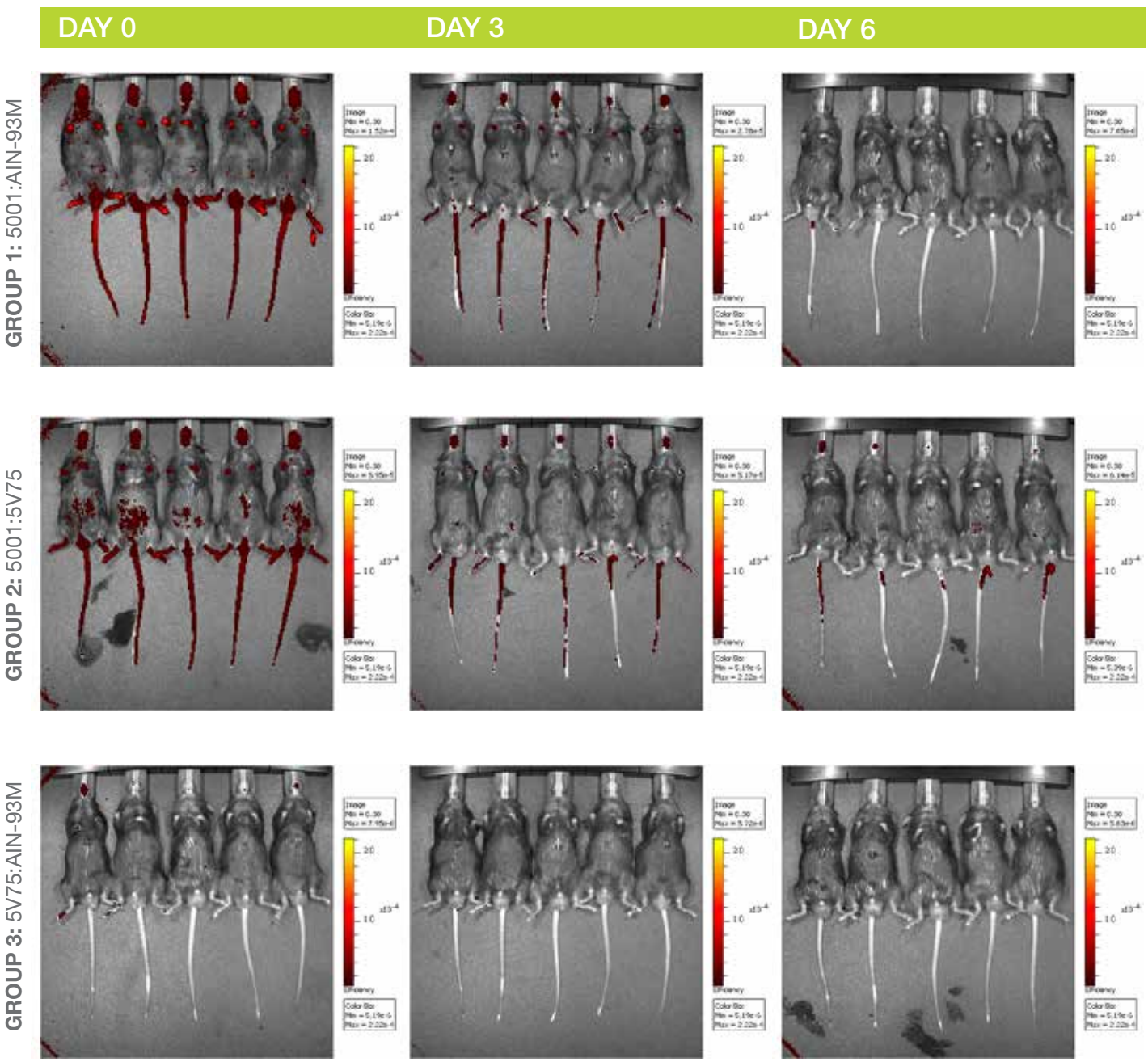
Grain based and purified diets reduce autofluorescence *in vivo* at wavelengths detecting Alexa 680

Each group (5 mice/group) were fed a pre-imaging diet for 10 days (day -9 to 0) then transitioned to an imaging diet for an additional seven days (day 1-6). The graph *(to the left)* shows the Fluorescence Efficiency for the 675 excitation /720 emission wavelength at 0 to 7 days after diet change (Mean ± SE). Fluorescent images are from the ventral side of C57B6 mouse fed a pre-imaging diet for 10 days, then transitioned to AIN-93M or 5V75 for 7 days. The images shown are at 0, 3, and 6 days after mice were transitioned to imaging diet.



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ALFALFA FREE OPTIONS:

GRAIN BASED

5V75, pelleted and meal

PURIFIED

AIN-93M (58M1), pelleted and meal

AIN-93G (57W5), pelleted and meal

AIN-73A (58B0), pelleted and meal

For complete details on imaging study, please contact LabDiet nutritionists at info@labdiet.com

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Your work is worth it.

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