Development of Empirical Dietary Inflammatory Pattern (EDIP) scores with different food groups and biomarkers

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Introduction

- DARC is a receptor that binds chemokines and mediates immune responses. Women without DARC expression are often diagnosed with the most aggressive type of breast cancer, triple negative breast cancer (TNBC).
- Inflammation is a common condition in some cancers. Diet can directly impact inflammatory response and gene expression.
- EDIP is a hypothesis-driven dietary pattern that assesses the inflammatory potential of diet in the US population.
- EDIP also predicts concentrations of inflammatory plasma biomarkers.

Aims:

- To derive our own EDIP scores for a noncancer control sample.
- Ultimately, apply these findings to a sample of women with TNBC.

Methods

Study participants & Questionnaire

- 67 noncancer women controls
- **24-hour recalls:** Food items organized in 17 food groups, then reorganized into 14 food groups.
- **Chemokines:** *CCL2*, *CCL19*, *CCL21*, *CXCL8*, *CXCL9*, *IL-6*, *TNF-a*, *PAI-1*, *Leptin*, *Adipsin*, *Adiponectin*.

Development of 4 EDIP scores

1. Calculate mean daily intake of all food groups.
2. Reduced Rank Regression (RRR) to derive a dietary pattern associated with inflammatory biomarkers.
3. Multivariable regression analyses to identify most important food groups.
4. Intake of food groups weighted by regression coefficients and summed.
5. Biomarkers plotted against EDIP scores.
6. Steps repeated 4x with different biomarkers and food groups.

The 4 models are:

- **EDIP-Limited (EDIP-L):** 17 food groups & IL-6 and TNF-a
- **EDIP-All Inclusive (EDIP-AI):** 17 food groups & all biomarkers
- **EDIP-Limited New (EDIP-LN):** 14 food groups & IL-6 and TNF-a
- **EDIP-All New (EDIP-AN):** 14 food groups & all biomarkers

Statistical analysis

- Linear regression and distribution
- Significance level: p = 0.05

Results

- The components of EDIP-AI were: fruit juice, snacks, leafy green vegetables, low-energy beverages, red meat, fruit and whole wheat grains.

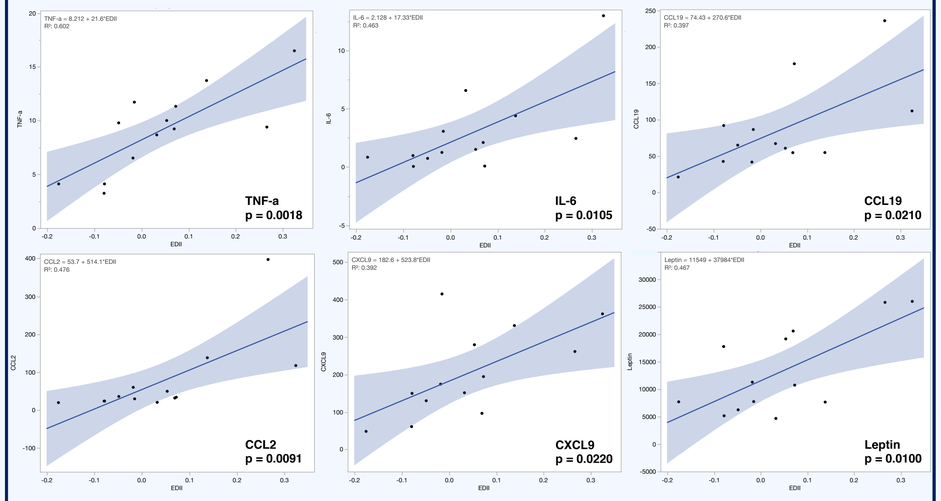
Table 1. Components of EDIP-AI with 17 food groups and 11 biomarkers

Group #	Food Groups	Food Items	Mean intake	P value	Weights [1]
1	Fruit juice	100% juice drink like orange juice, apple juice, or grape juice	0.403	0.0009	-0.161379
2	Snacks	Potato chips, tortilla chips, Cheetos, corn chips, or other snack chips	0.627	0.0008	0.1934998
3	Leafy green vegetables	Lettuce, any green vegetables like spinach, green beans, broccoli, other greens	0.716	0.0074	-0.124367
6	Low-energy beverages	Diet sodas or soft drinks	0.313	0.0098	-0.07809
11	Red meat	Hamburger, hot dogs, chorizo, steak, bacon, ribs	0.552	0.0038	-0.121147
12	Fruit	Fruits are all fresh, frozen, canned or dried fruits	1.239	0.0002	0.2621347
13	Whole Wheat Grains	Dark bread, buns, bagels, tortillas, or rolls or corn tortillas	0.463	0.0138	-0.078844

[1] Values are regression coefficients for each EDIP-AI food component obtained from the last step of the multivariable regression analysis.

- The distribution of EDIP-AI suggests the majority of participants had a pro-inflammatory diet.

Figure 1. A high inflammatory diet determined by EDIP-AI correlates with higher pro-inflammatory markers (TNF-a, IL-6, CCL19, CCL2, CXCL9 and Leptin)



Results Continued

- The components of EDIP-AN were: fruit juice, snacks and fruit.

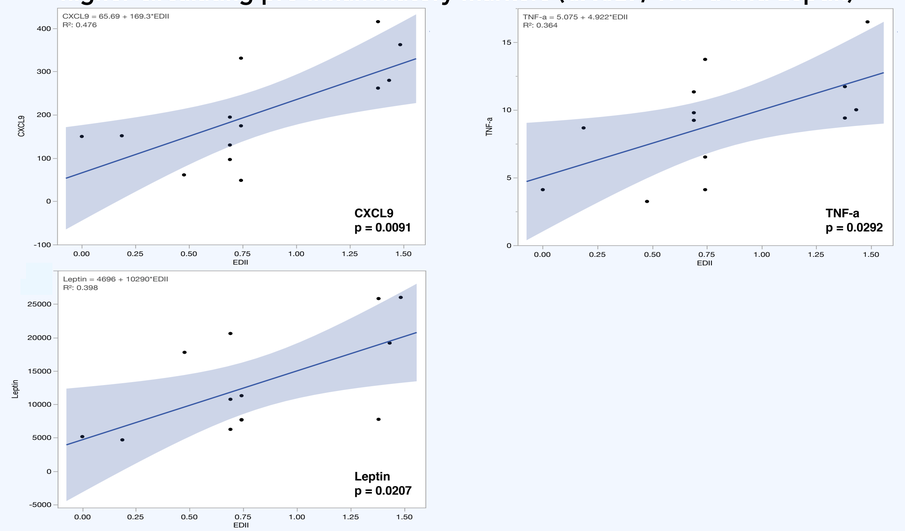
Table 2. Final components of EDIP-AN with 14 food groups and 11 biomarkers

Group #	Food Groups	Food Items	Mean intake	P value	Weights [1]
1	Fruit juice	100% juice drink like orange juice, apple juice, or grape juice	0.403	0.0107	-0.504049
2	Snacks	Potato chips, tortilla chips, Cheetos, corn chips, or other snack chips	0.627	0.0116	0.6905991
10	Fruit	Fruits are all fresh, frozen, canned or dried fruits	1.239	0.0026	0.7423546

[1] Values are regression coefficients for each EDIP-AN food component obtained from the last step of the multivariable regression analysis.

- The distribution of EDIP-AN suggests all the controls had a pro-inflammatory diet.

Figure 2. A high inflammatory diet determined by EDIP-AN correlates with higher circulating pro-inflammatory markers (CXCL9, TNF-a and Leptin)



- For both models, Adiponectin, an anti-inflammatory biomarker, was expected to have an inverse correlation with EDIP scores but showed a non-significant positive association.

Literature cited

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Acknowledgments

I would like to thank the Laidlaw Foundation for funding this project, and Dr. Davis and Rachel Martini for their mentorship and supervision.

Conclusions

- Findings demonstrate the EDIP scores differ based on the inflammatory biomarkers and food groups used in the analysis on the same noncancer controls.
- Depending on the methods used, an individual's diet may be considered more pro- or anti-inflammatory.
- Most participants seemed to have a pro-inflammatory diet.
- These associations could be due to confounding factors, such as BMI and the use of supplements, but these have not been further studied.
- It is our goal to apply these methods on food frequency questionnaire (FFQ) data obtained from Duffy-Null African women with TNBC to study the effects of dietary patterns on inflammation and improve chances of survival.