Nutrition in Myeloproliferative Neoplasms
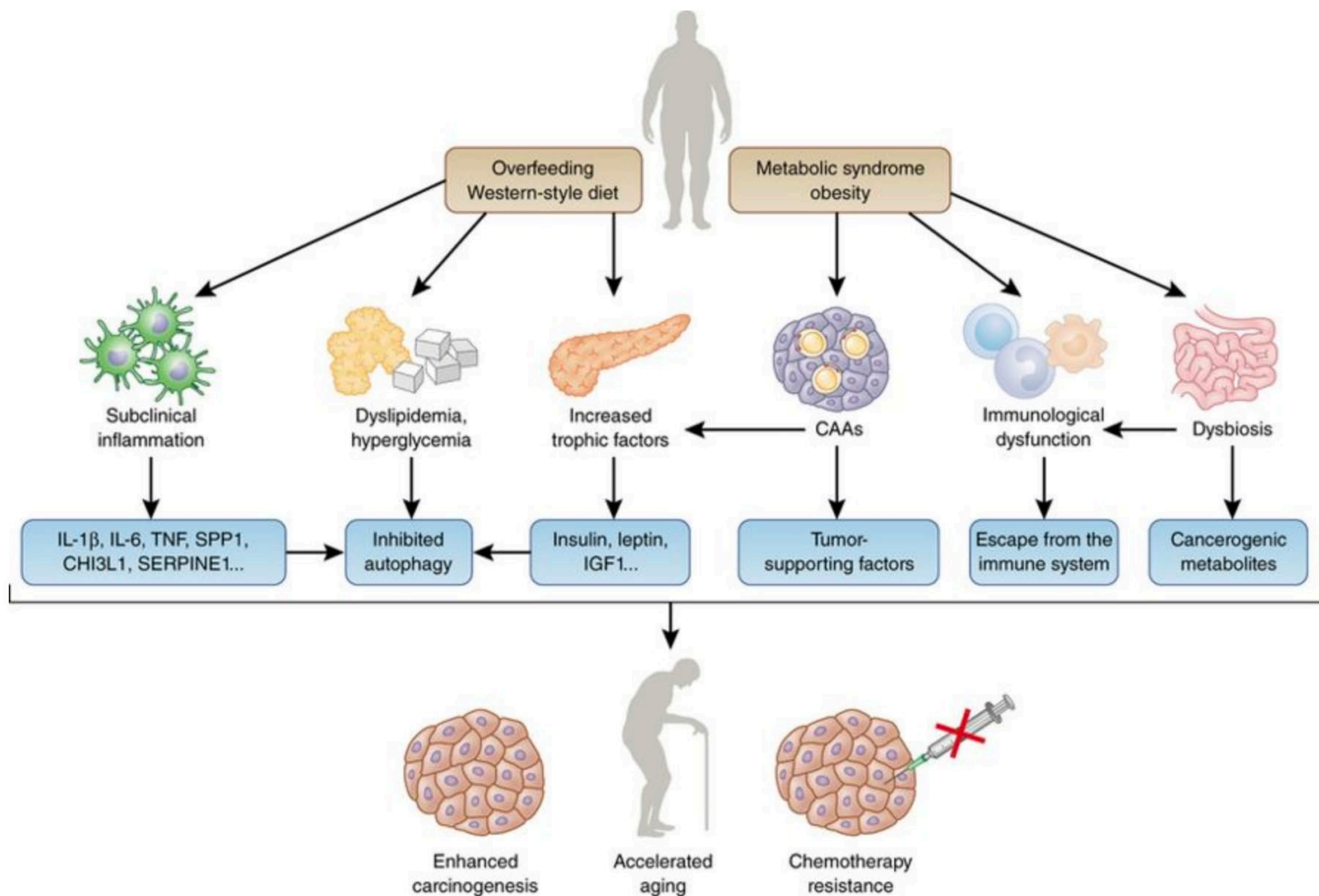
Robyn M. Scherber, MD MPH

Joyce Niblack Conference

March 3rd, 2019

Nutrition in Cancer?

Diets
Effective in Other Diseases

Blood Clots

Mortality

Inflammation

South Beach Diet?

Ketogenic diet?

Mediterranean diet?

Anti-Inflammatory Diet?

Vegan Diet?

Intermittent Fasting?

Paleo diet?

Juice Cleanses?

Atkins Diet?

MEATS AND SWEETS *LESS OFTEN*

WINE *IN MODERATION*

POULTRY, EGGS, CHEESE, AND YOGURT *MODERATE PORTIONS, DAILY TO WEEKLY*

FISH AND SEAFOOD *OFTEN, AT LEAST TWO TIMES PER WEEK*

DRINK WATER

FRUITS, VEGETABLES, GRAINS (MOSTLY WHOLE), OLIVE OIL, BEANS, NUTS, LEGUMES, SEEDS, HERBS & SPICES *BASE EVERY MEAL ON THESE FOODS*

Illustration by George Middleton

Mitrou et. al. Arch Intern Med. 2007;167(22):2461-2468.
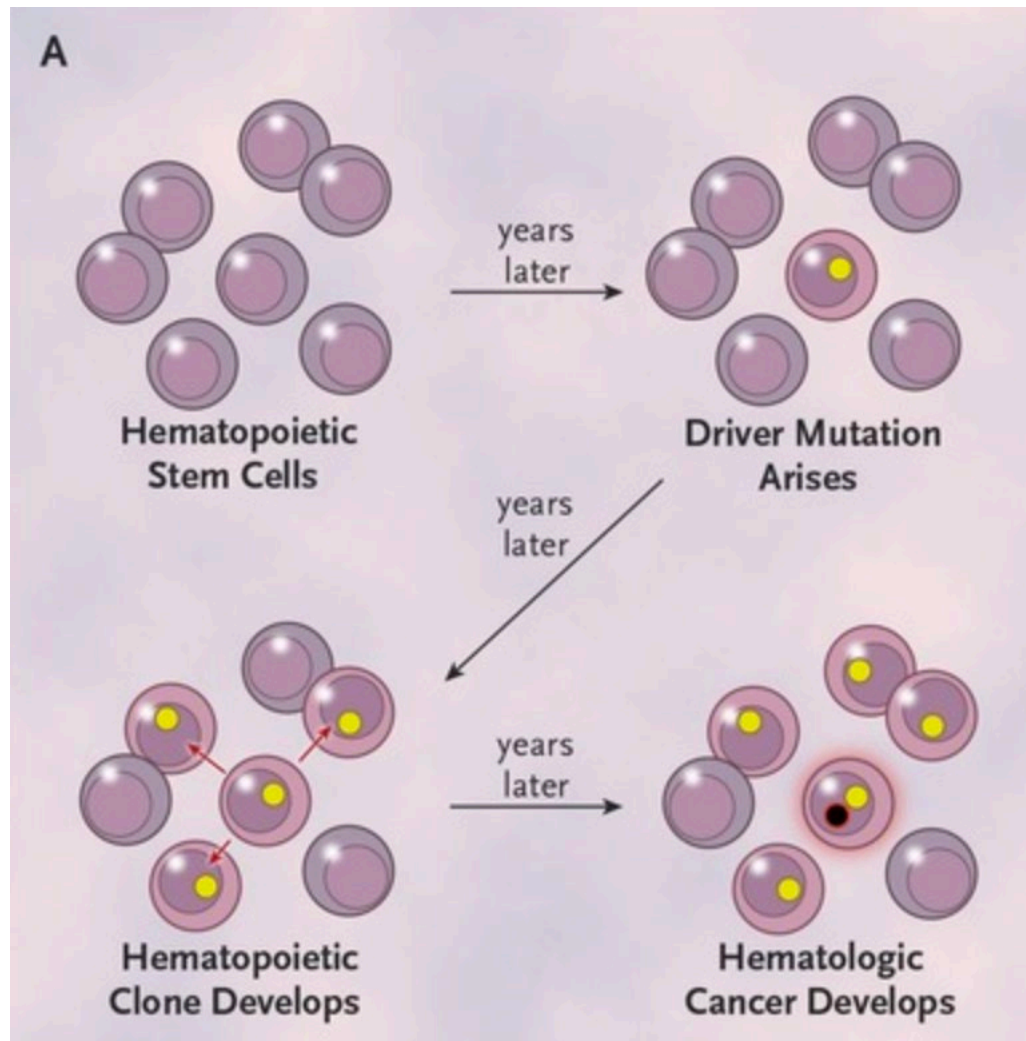Chrysohoou et. al. *J Am Coll Cardiol.* Jul 7 2004;44(1):152-158.

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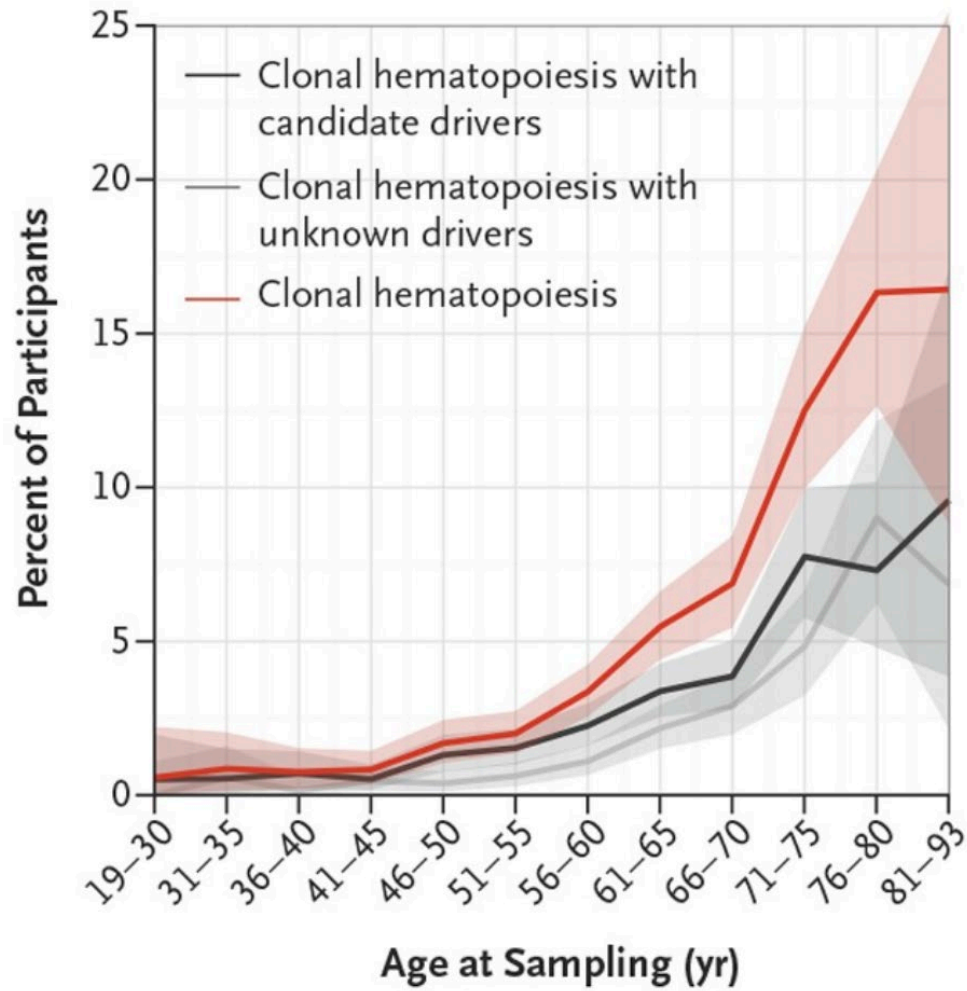UT Health San Antonio   MD Anderson Cancer Center

Vitamin B12 Rich Foods

- Fish
- Crab
- Cheese
- Chicken
- Eggs
- Red Meat
- Milk
- Almonds
- Vitamin B12
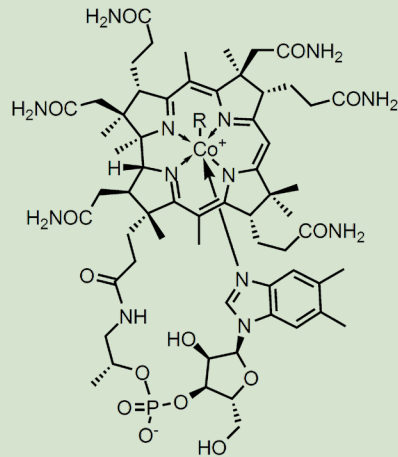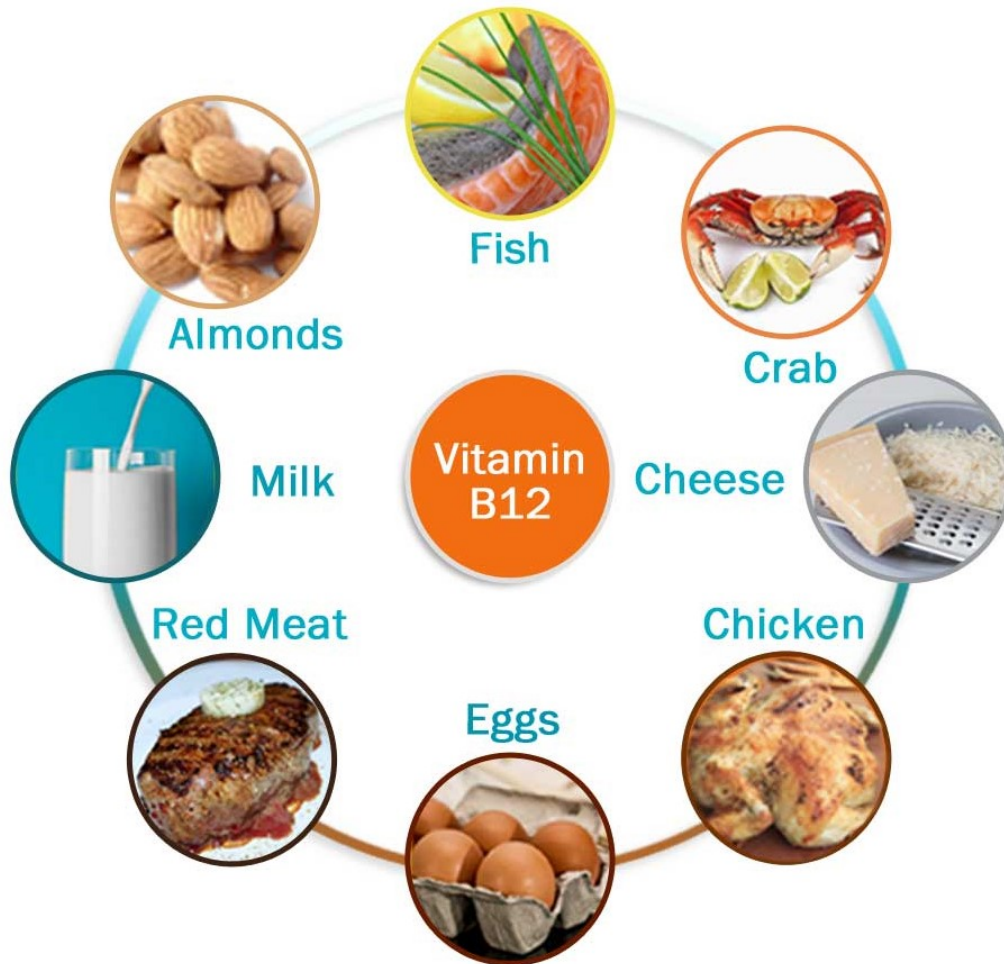
Key:

B12 can become elevated in inflammation: Methylmalonic Acid can help better identify B12 issues

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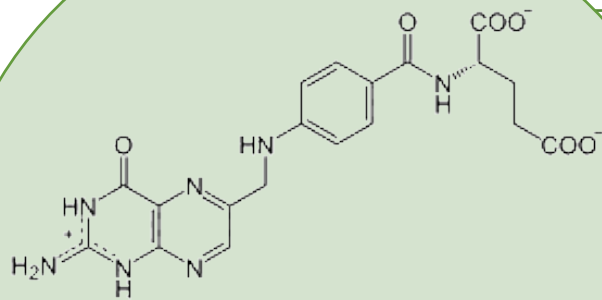
Folate Deficiency

Low Blood Counts

Mouth Sores

Fatigue

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Foods Rich in Folate
Our bodies need folate to make DNA and genetic material
INFOGRAPHIC

BELL PEPPERS · NUTS · OKRA · BEETS
SEEDS · BEANS · PEAS · LENTILS
CAULIFLOWER · PAPAYA · BROCCOLI · ORANGE
LEAFY GREENS · ASPARAGUS · BRUSSELS SPROUTS · AVOCADO
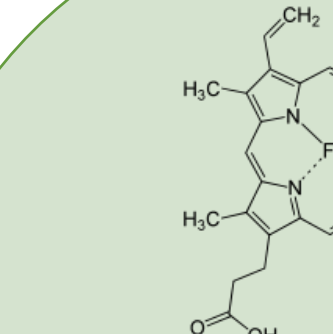
Key:
Sometimes other than testing for folate, I will test for
Homocysteine
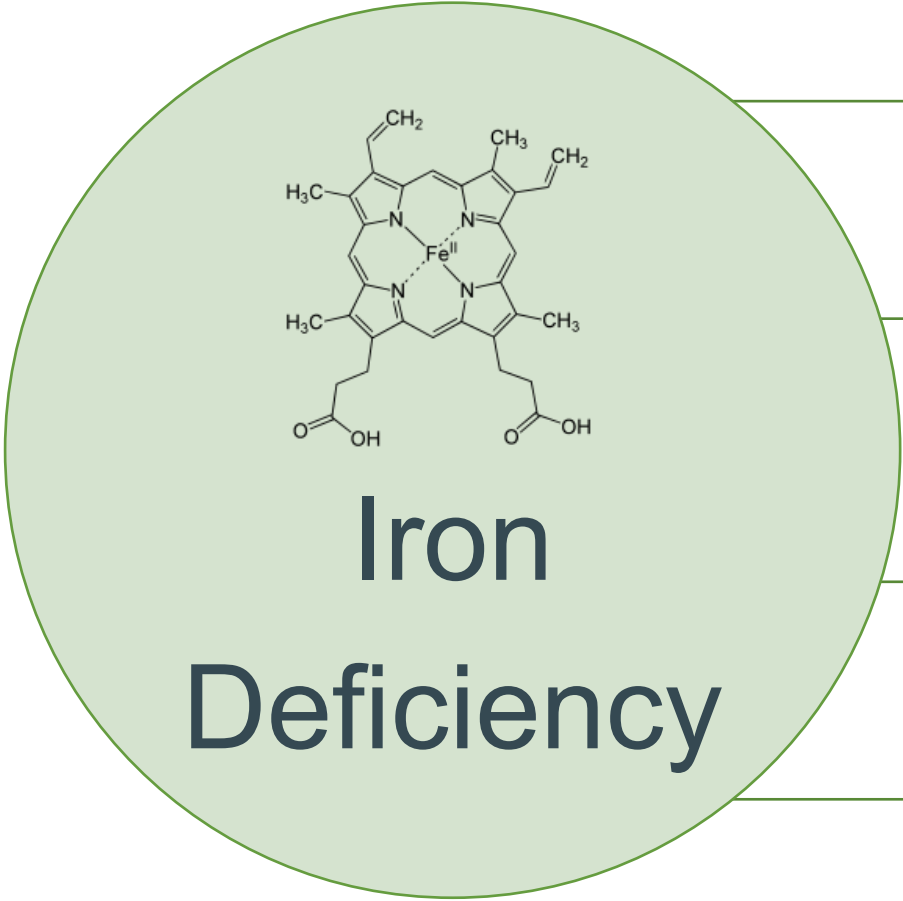
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Iron Deficiency

Low Blood Counts

Fatigue

Restless Leg Syndrome

Memory/Cognitive Issue

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IRON RICH FOOD:

CHICKEN
LIVER
PORK
BEEF
EGG YOLK
CLAMS
SHRIMP
BROCCOLI
POTATOES WITH SKIN
IRON FORTIFIED CEREALS
DRIED APRICOT
DRIED BEANS/ GREEN PEAS
SPINACH
RAISINS
WATERMELON
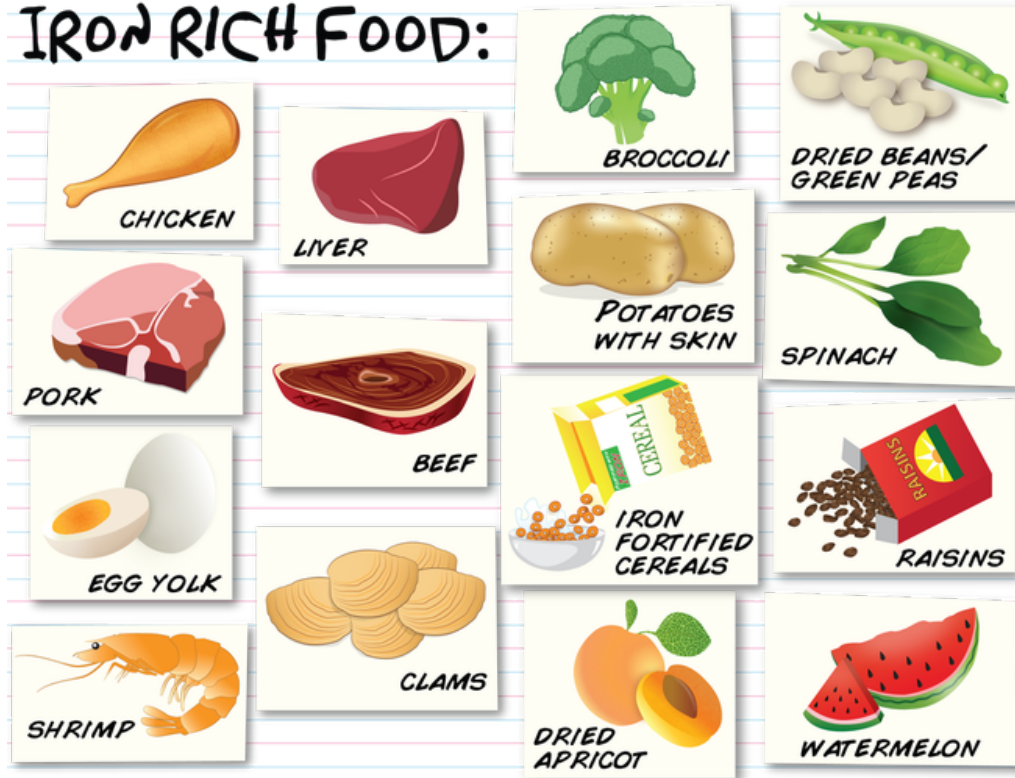
Ferritin can be elevated in inflammation, I also check Iron Studies

Keys to taking oral iron:
- Only once per day needed
- Phosphates inhibit absorption
  - No sodas, teas, coffee around the time of taking iron
- Vitamin C (ascorbic acid)
  - Take iron with a glass of orange juice

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monosaccharide (glucose)

disaccharide (sucrose)

polysaccharide (amylose starch)

Carbohydrates

Simple

Complex

Monosaccharides

Disaccharides

Polysaccharides

Glucose

Maltose

Starches

Fructose

Lactose

Fibers

Galactose

Sucrose

Glycogen
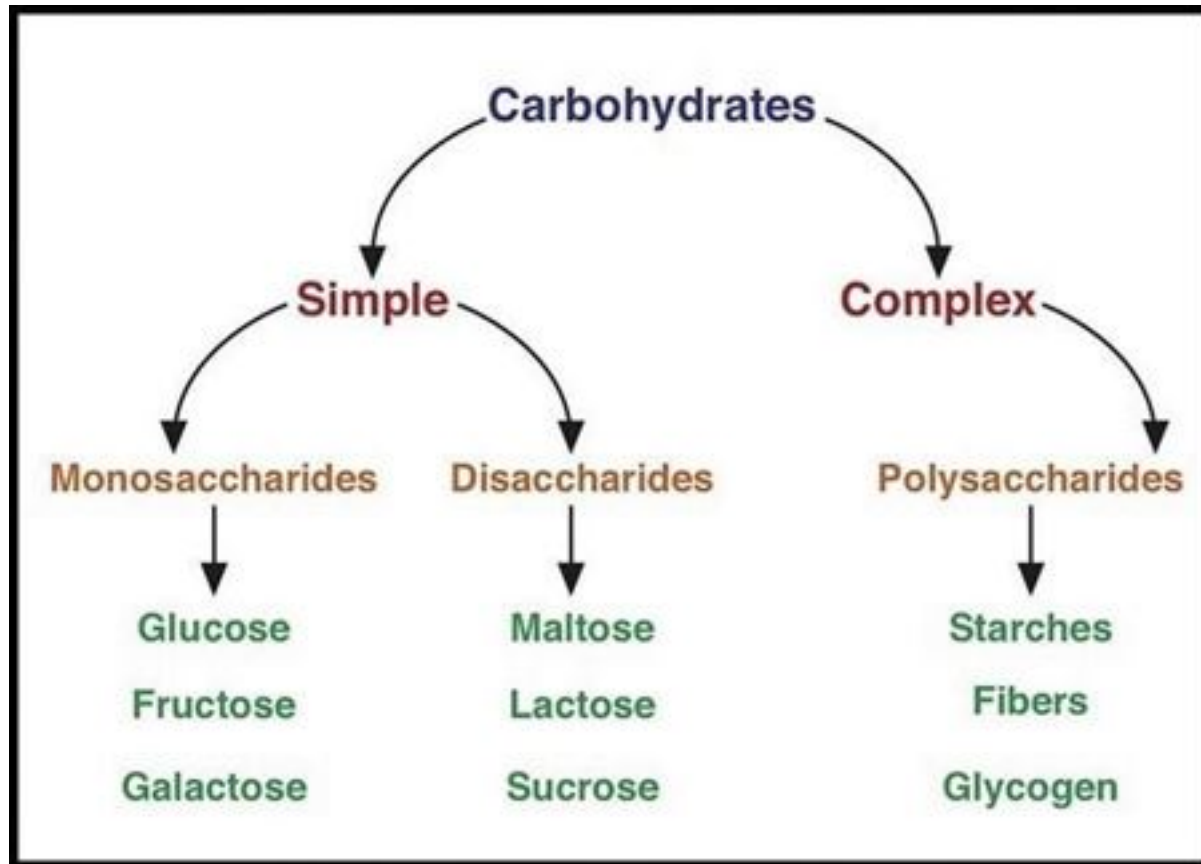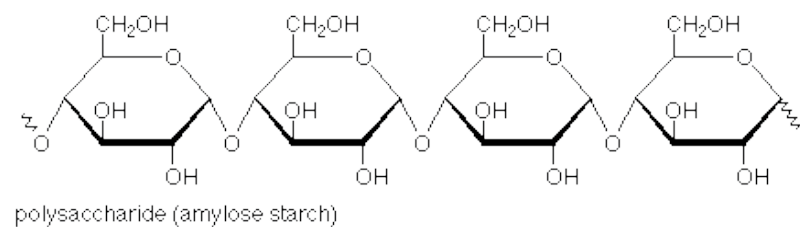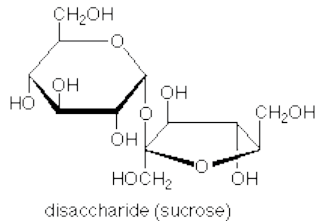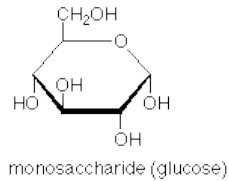
Fibers = Indigestible sugars (Good)

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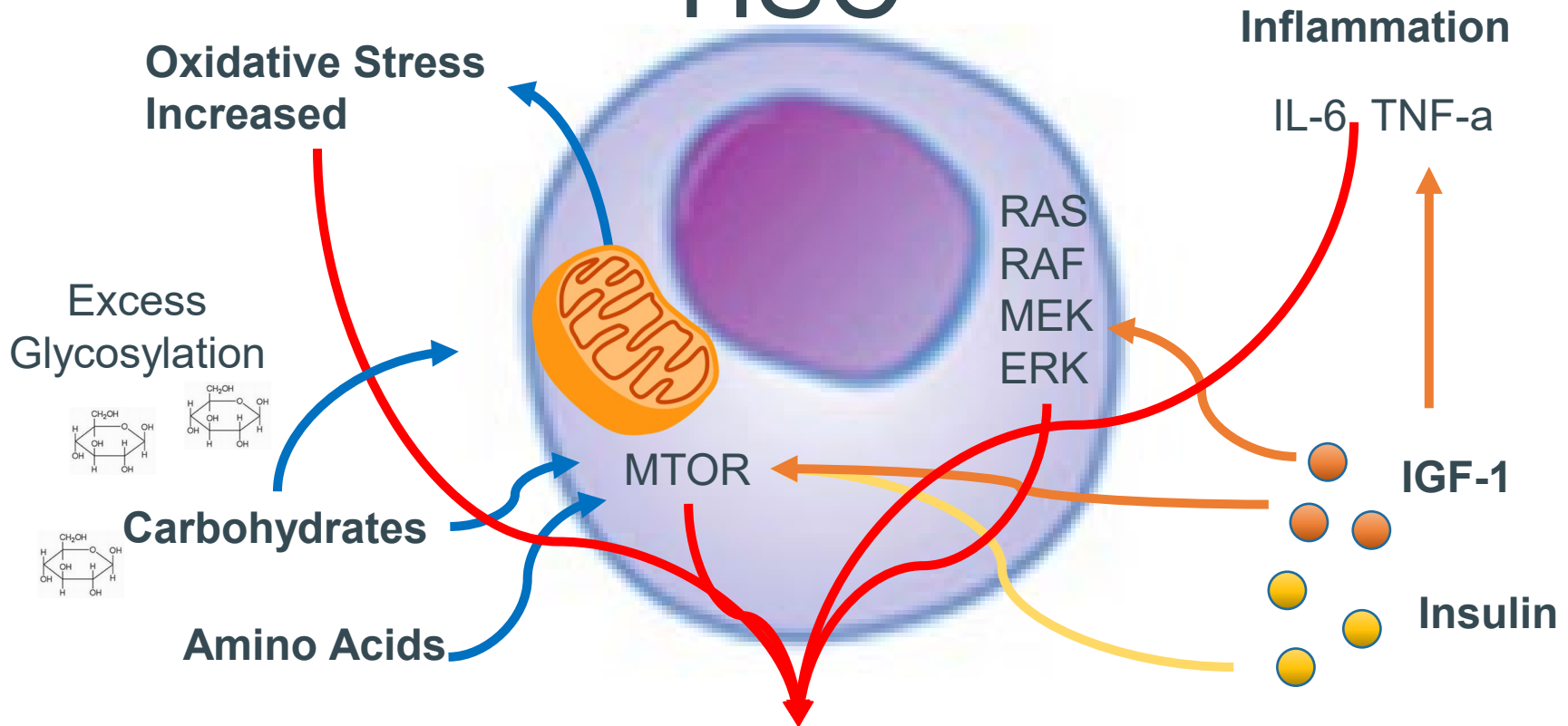
Inflammation
Driving MPN Mutant Cell Growth

MPN Development

Acquisition of the JAK2*v617f* mutation

Auto-production of inflammatory cytokines

TNF-a

Induce bystander cell production of inflammatory cytokines

Suppressed growth WT

Inflammatory cells

Production of IL-6, IL-8, IL1B, bFGF, LCN2

BM Stromal Cells

Production of TNF-a, VEGF, TGF-b, BMP2, RUNX2, osteoprogerin, collagen type I
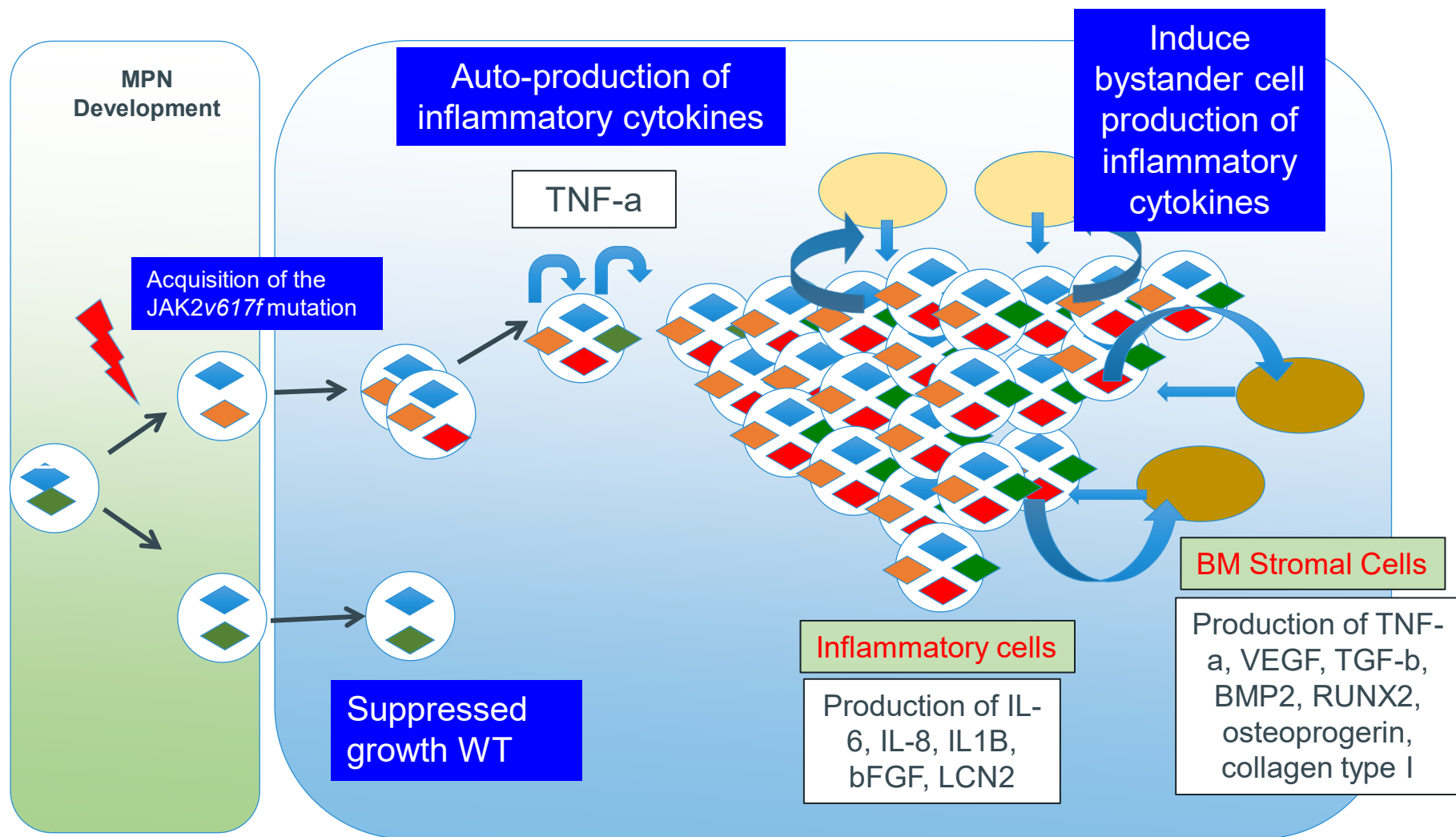
Fleischman, *et al. Blood* **118**, 6392-6398 (2011).
Koschmieder et. al. Leukemia 2016

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Sequelae of Inflammation

Inflammation contributes to…

Symptoms

Nutritional Deficiencies

Low blood counts

Thrombosis

Organ Dysfunction
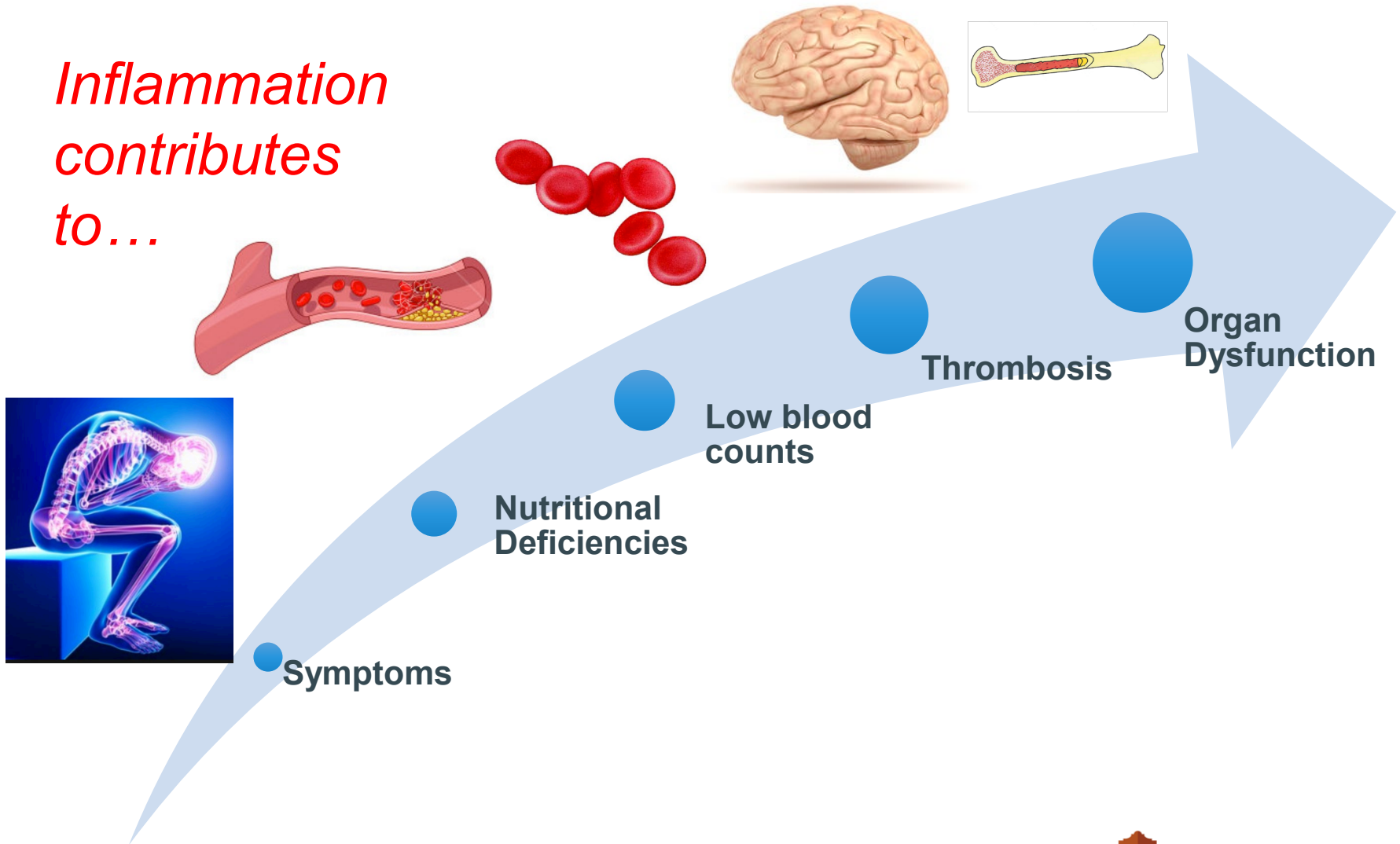
Scherber and Deloughery. "Thrombobosis in the MPNs". Hemostatsis and Thrombosisis. Deloughery Editor. 2017.
Thromb Haemost. 2010;104(1):151-6
Haematologica. 2009 ;94(11):1484-8.
Leukemia 2012(26): 563–571
JCO 2015 33(20):2288-2295

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Foods With Independent Anti-Inflammatory Potential

Fruits/Berries

Green Leafy Vegetables

Turmeric/Curcumin

Nuts

Dark Chocolate

Oily Fish

Green Tea

Garlic

Many other herbs and spices

Whole Grains

Just to name a few….

Intermittent Fasting: Anti-Inflammatory

TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
MIDNIGHT - 8 AM	SLEEPING	SLEEPING	SLEEPING	SLEEPING	SLEEPING	SLEEPING	SLEEPING
8 AM - NOON	FASTING 4 HOURS	FASTING 4 HOURS	FASTING 4 HOURS	FASTING 4 HOURS	FASTING 4 HOURS	FASTING 4 HOURS	FASTING 4 HOURS
NOON - 8 PM	8 HOUR EATING WINDOW	8 HOUR EATING WINDOW	8 HOUR EATING WINDOW	8 HOUR EATING WINDOW	8 HOUR EATING WINDOW	8 HOUR EATING WINDOW	8 HOUR EATING WINDOW
8 PM - MIDNIGHT	FASTING 4 HOURS	FASTING 4 HOURS	FASTING 4 HOURS	FASTING 4 HOURS	FASTING 4 HOURS	FASTING 4 HOURS	FASTING 4 HOURS

Improved Microbiome

Reduced Inflammation
IL-6 ($p < 0.001$), CRP ($p < 0.001$) and homocysteine ($p < 0.01$) levels
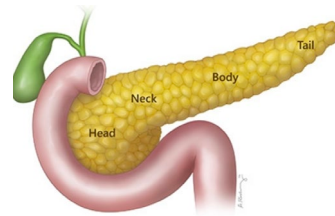
Improved Insulin Sensitivity

Lowers Resting HR

Ann Nutr Metab. 2007;51(1):88-95. Epub 2007 Mar 19.
Curr Biol. 2018 Jun 4; 28(11): 1714–1724.e4.
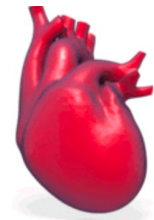
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BMI and Symptom Burden
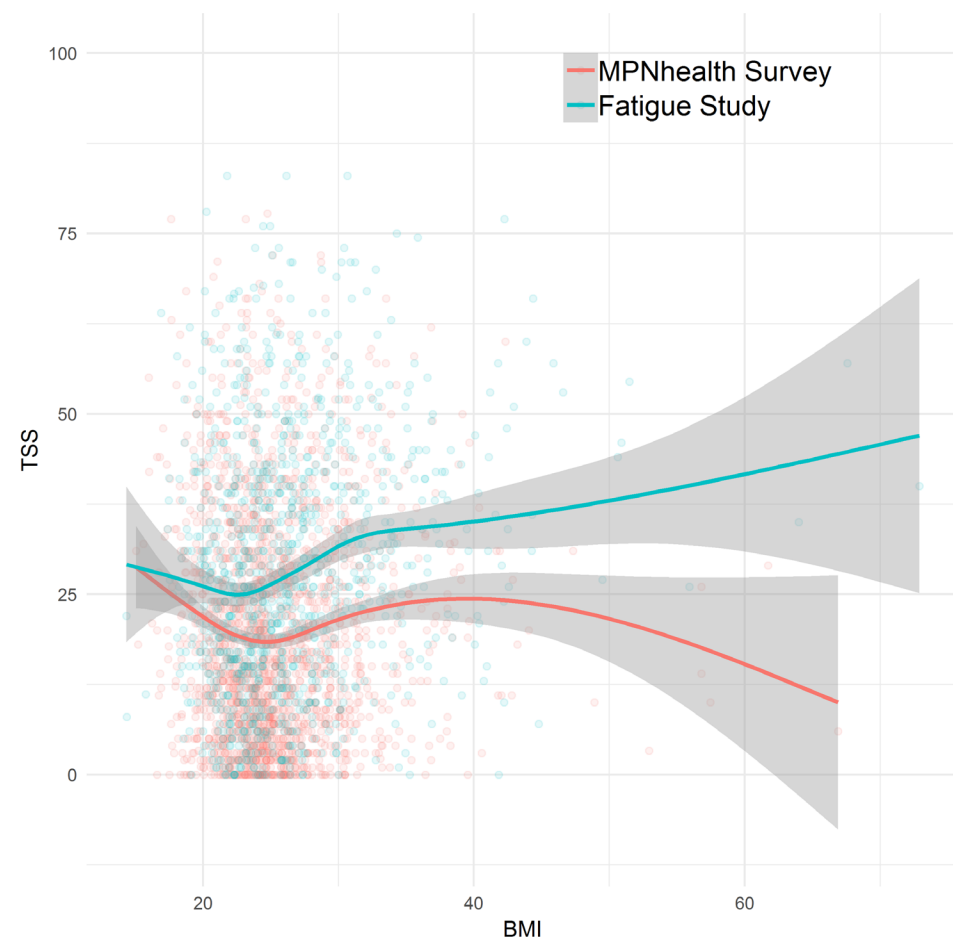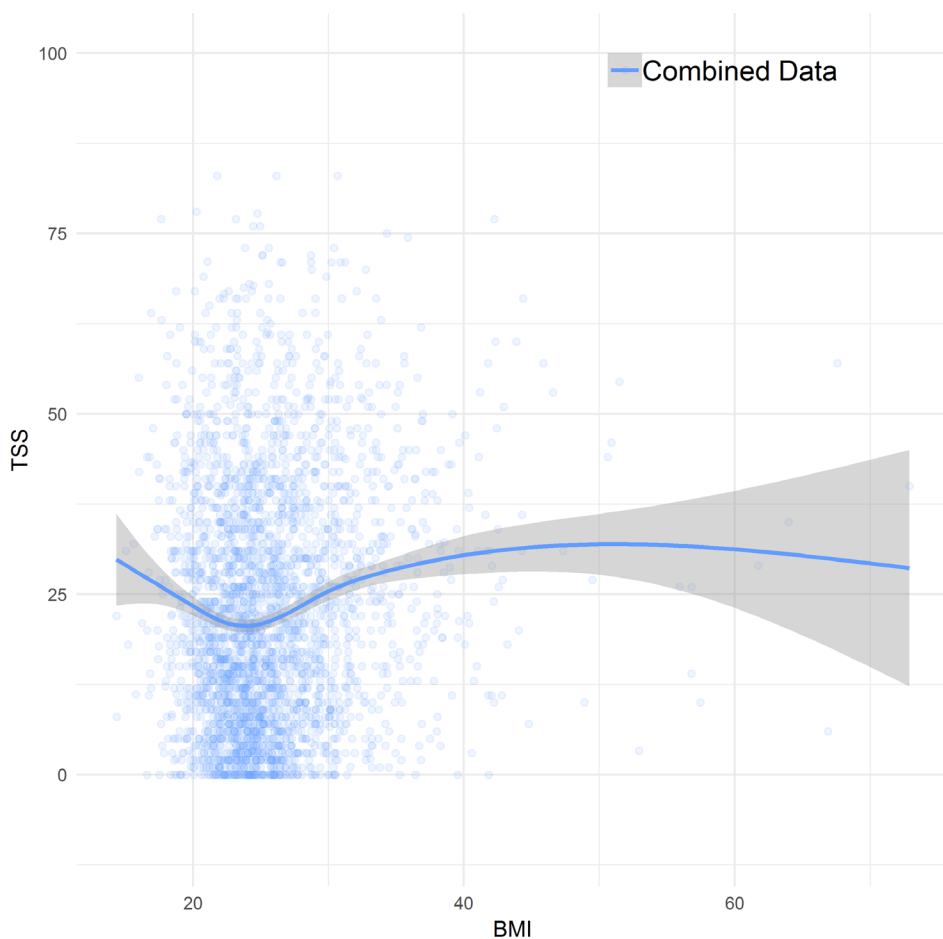
AACR 2019 abstract, being presented later this month

- An internet-based survey hosted by the Mayo Clinic Survey Research Center
- Promoted on multiple MPN-based forums, Facebook pages and websites during February of 2017.
- 55-item questionnaire regarding nutritional and supplement use habits, needs and preferences

N=1329 Respondents
75% Female
Median age 60 years

24% MF

37% PV

38% ET

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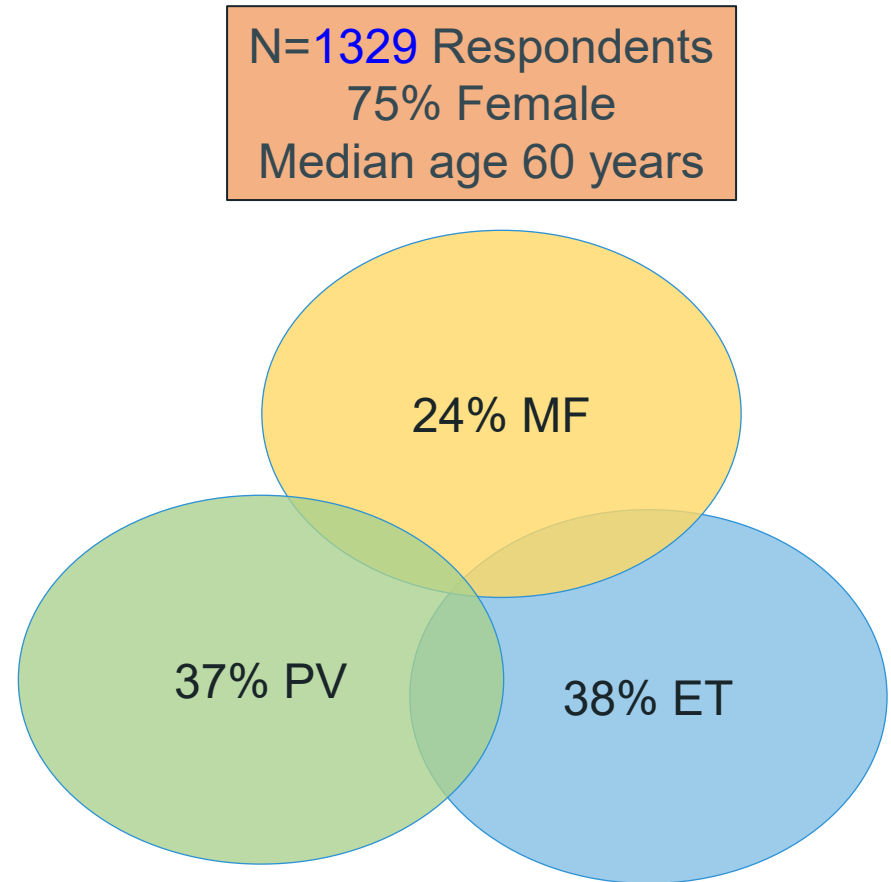
The NUTRIENT Trial
Nutritional Survey International Respondents
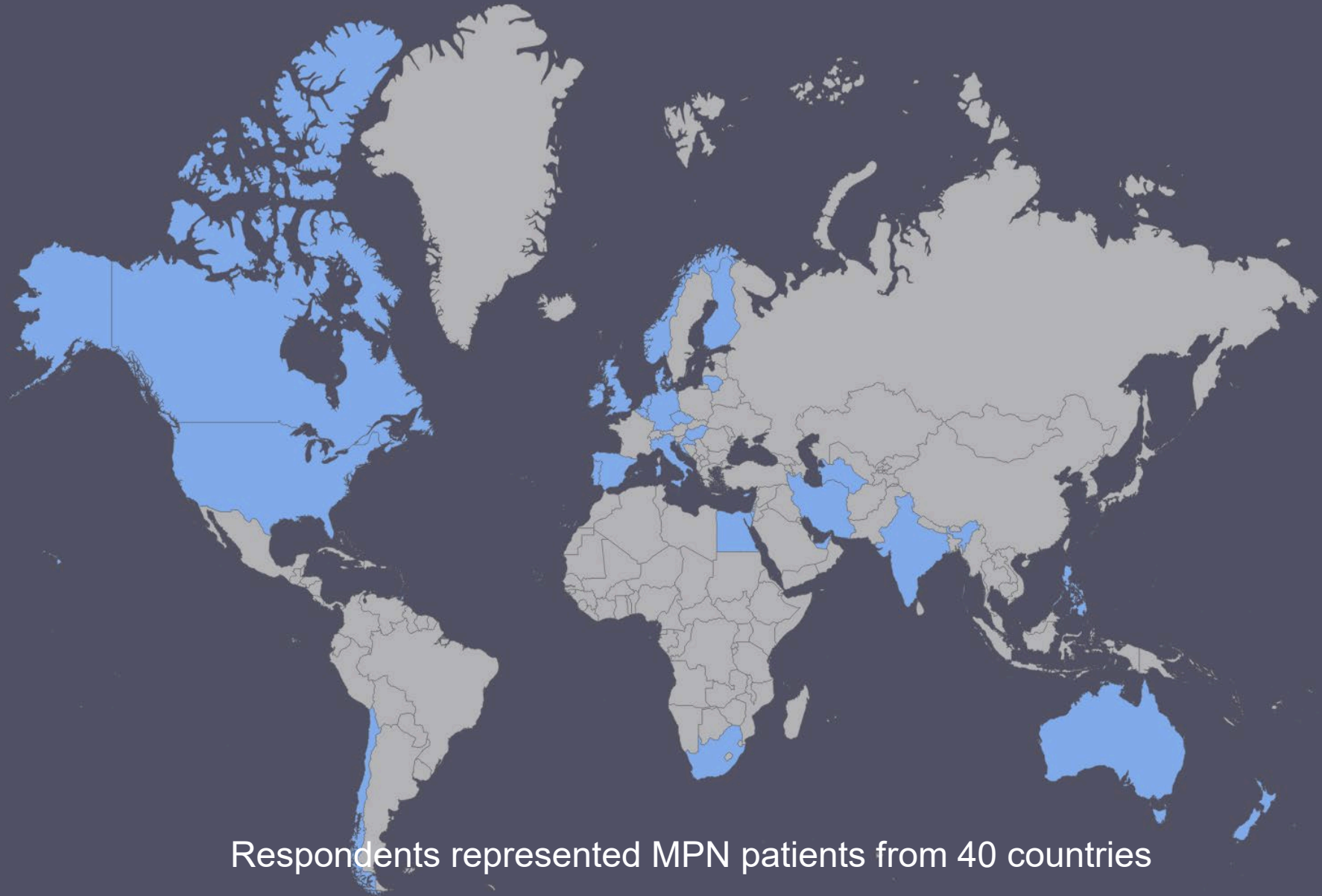
Respondents represented MPN patients from 40 countries

The NUTRIENT Trial
Nutritional Survey Diet Alteration Frequencies

Food allergies and/or Intolerances	Frequency among all respondents
Milk	8.3%
Wheat	6.9%
Fruit	4.1%
Shellfish	2.8%
Soy	2.3%
Peanuts	1.7%
Egg	1.4%
Tree Nuts	1.4%
Fish	1.3%
Dietary Restrictions	
Low salt	6.6%
Gluten-free	6.5%
Mediterranean diet	6.0%
Vegetarian	5.7%
Low fat	5.3%
Anti-inflammatory	5.1%
Lactose intolerant	3.9%

34.0% of patients endorsed **using diet** to help control their **symptoms** or **MPN disease**.

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Nutritional Survey in Chronic Blood Cancers

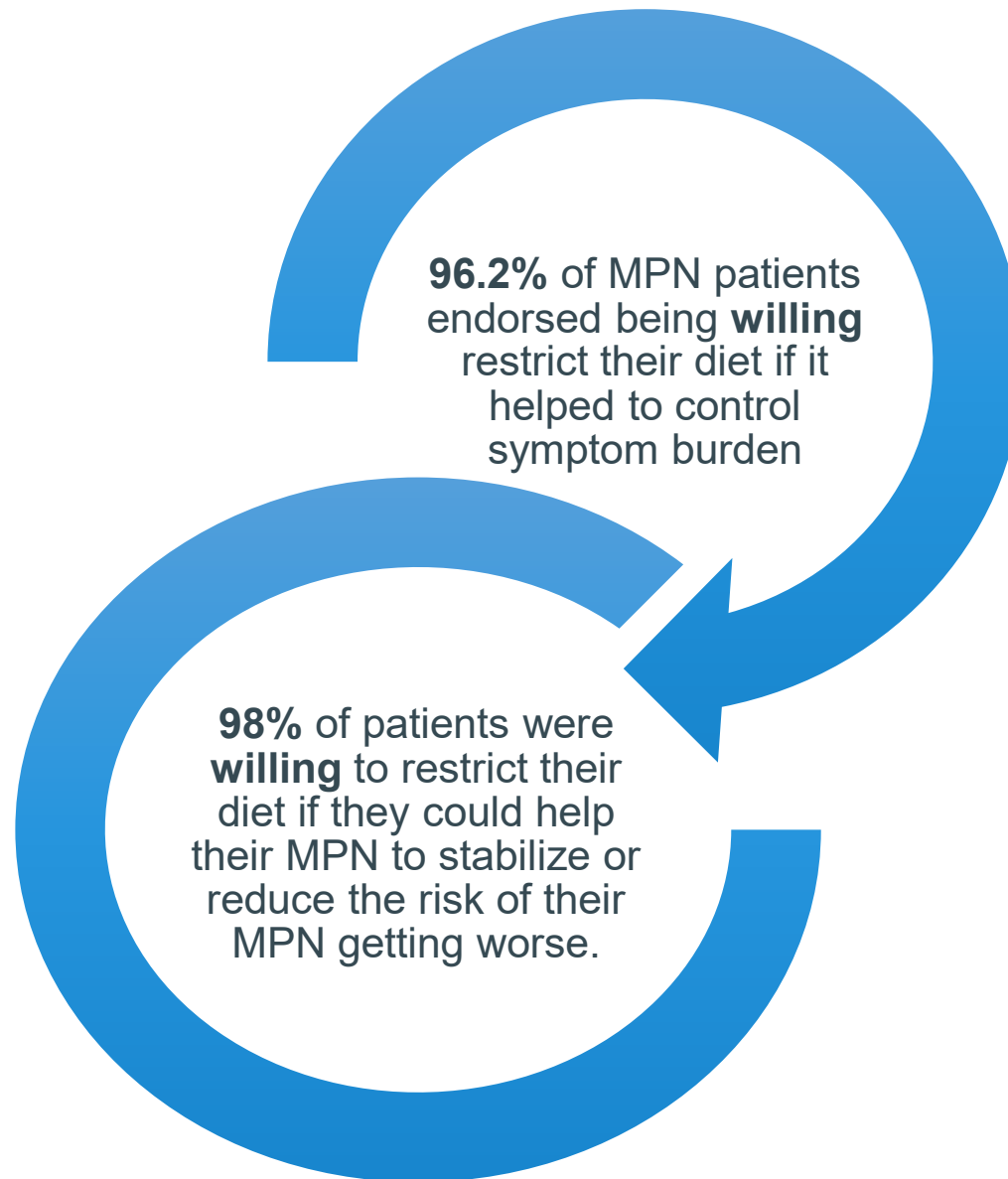| Correlative	Mean symptom burden (MPN-10)		P-value
Diet	**Not Following Diet**	**Following Diet**	**Pr >ltl**
Diabetic diet	3.33	4.67	<0.0001
Lactose Intolerant	3.35	3.87	0.0433
Food Intake (Dichotomous)	**Never**	**At Least Once Per Week**	**Pr >ltl**
Alcohol	3.62	3.11	<0.0001
Fast Food	3.24	3.59	0.0015
Fried Foods	3.22	3.46	0.0198
Rice	3.57	3.30	0.0452
Soda	3.22	3.72	<0.0001
Food Intake (Continuous)		**Pearson Correlation**	**P-value**
Alcohol	-	-0.139	<0.0001
Baked Goods	-	-0.070	0.0212
Dairy other than Cheese (milk, cream)	-	-0.069	0.0240
Fast Food	-	0.104	0.0007
Fried Foods	-	0.086	0.0051
Pasta	-	-0.072	0.0183
Pre-made Snack Foods	-	0.067	00296
Soda	-	0.121	<0.0001
Refined Sugars	-	0.075	0.0139
Tacos	-	0.068	0.0277

Foods associated with worsened symptom score in red, foods associated with improved score in green

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Nutrition Intervention
Patient Willingness

96.2% of MPN patients endorsed being **willing** restrict their diet if it helped to control symptom burden

98% of patients were **willing** to restrict their diet if they could help their MPN to stabilize or reduce the risk of their MPN getting worse.

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Nutritional Focust Groups

- MPN participants recruited from the "We are MPN" participant conference in Irvine, California in April 2017.
  - N=13, 77% female, 45% from the Irvine, California area

Patients frequently have **food restrictions or intolerances that are related** to their MPN disease course and symptoms

Patients are **enthusiastic** regarding participation and execution of a dietary intervention
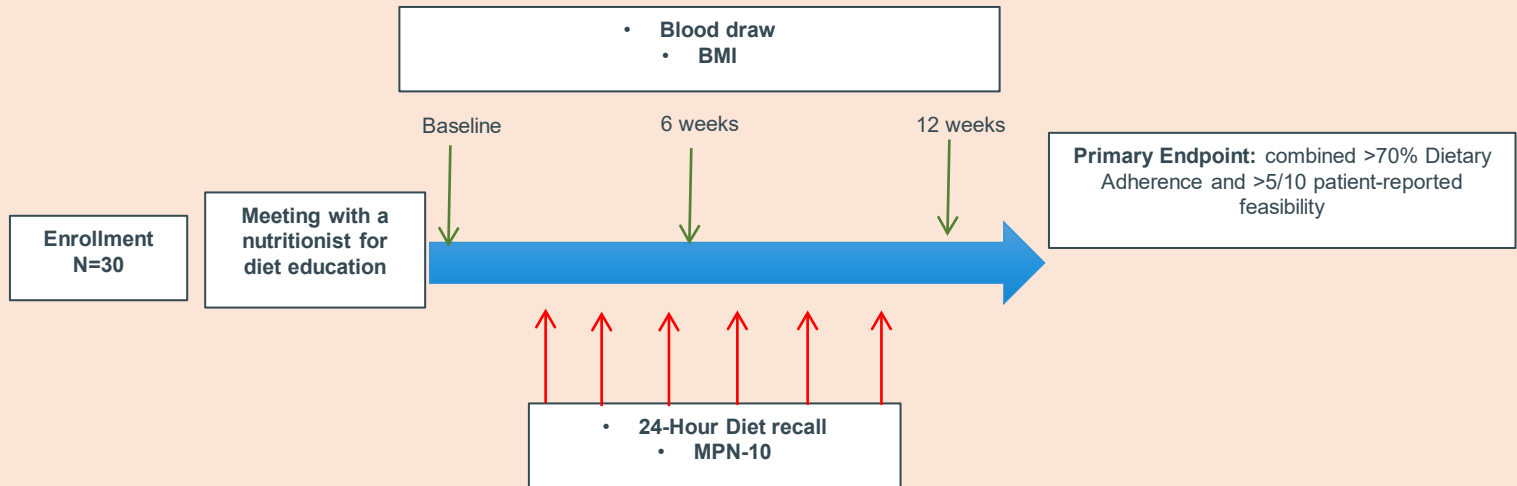
Patients desired the ability to **connect with each other** and with **researchers**

Patients express concern over the **lack of resources** regarding diet
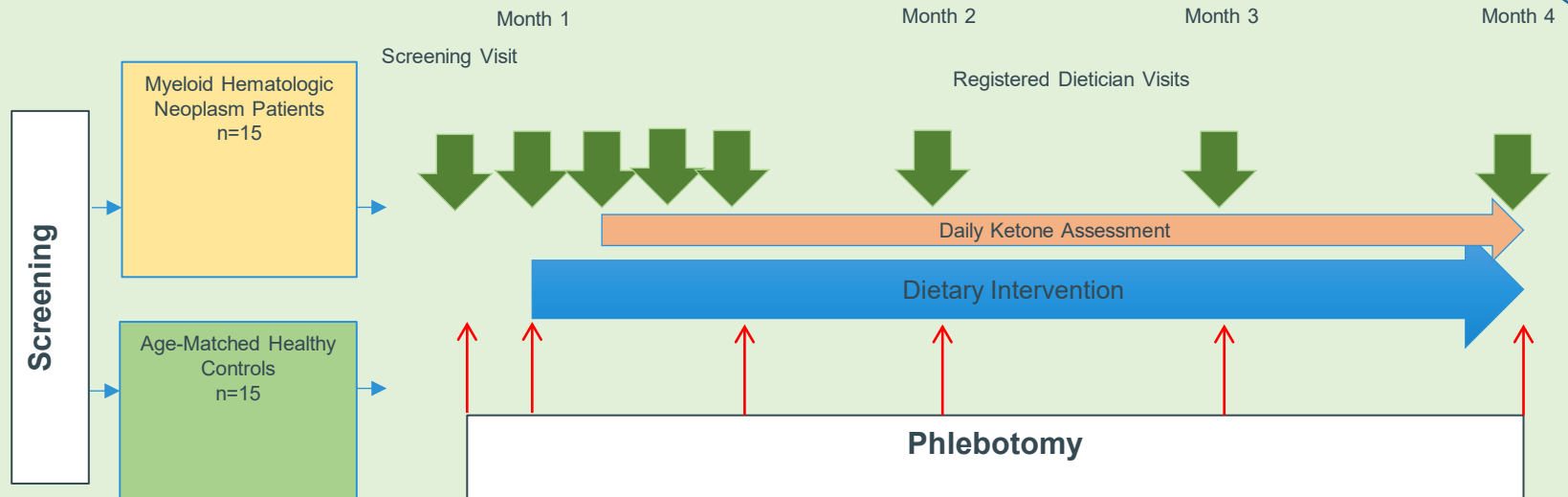
Patients desire a **tailored dietary intervention** which addresses their needs and preferences
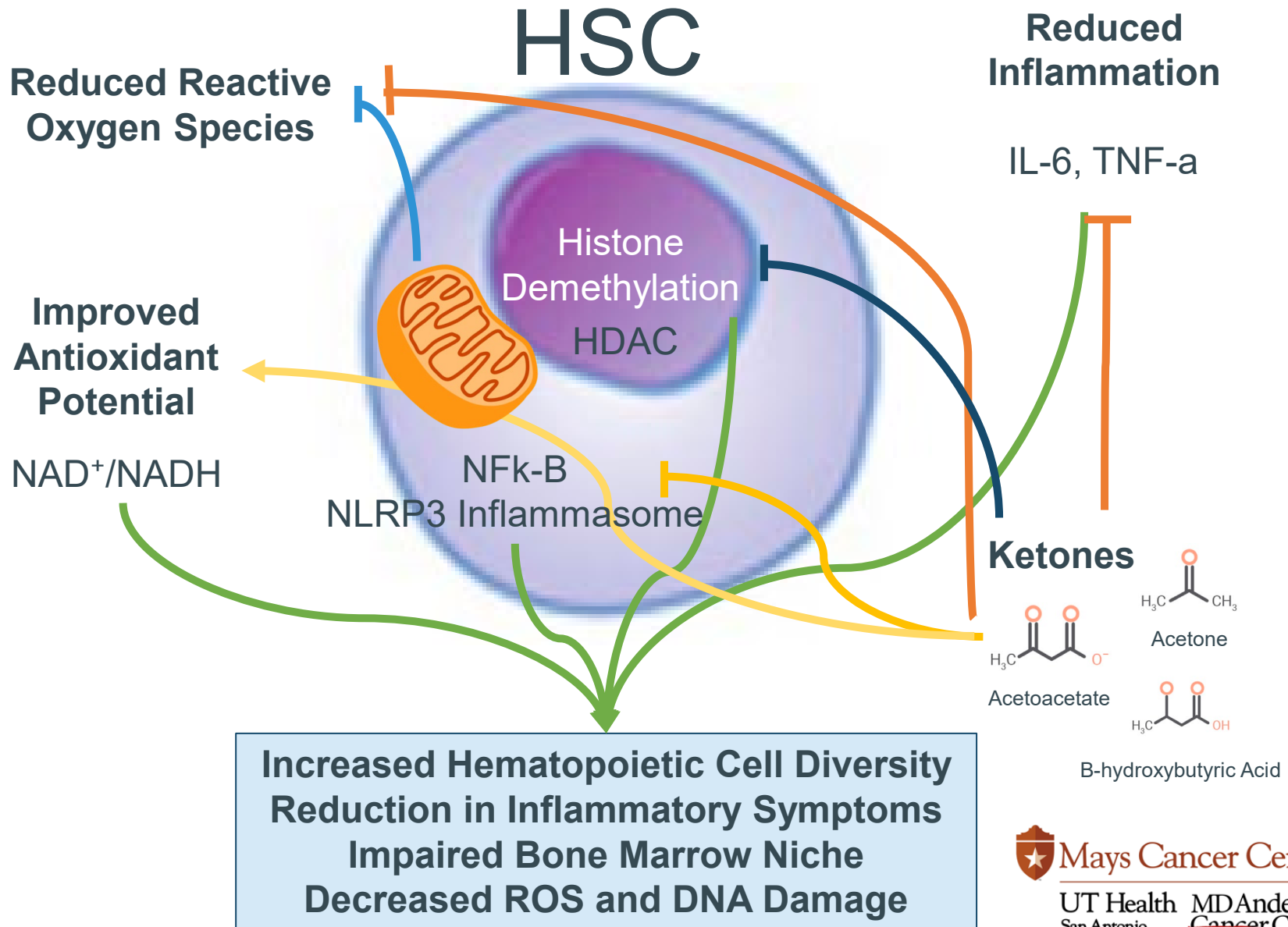
MPN Nutritional Trials

NUTRIENT Study UCI/Mays Collaboration

- Blood draw
- BMI

Baseline   6 weeks   12 weeks

Enrollment N=30

Meeting with a nutritionist for diet education

Primary Endpoint: combined >70% Dietary Adherence and >5/10 patient-reported feasibility

- 24-Hour Diet recall
- MPN-10

Nutritional Ketosis /Mays Collaboration

Month 1   Month 2   Month 3   Month 4

Screening Visit

Registered Dietician Visits

Screening

Myeloid Hematologic Neoplasm Patients n=15

Age-Matched Healthy Controls n=15

Daily Ketone Assessment

Dietary Intervention

Phlebotomy
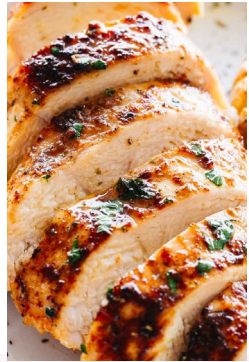
Potential changes with a Diet….
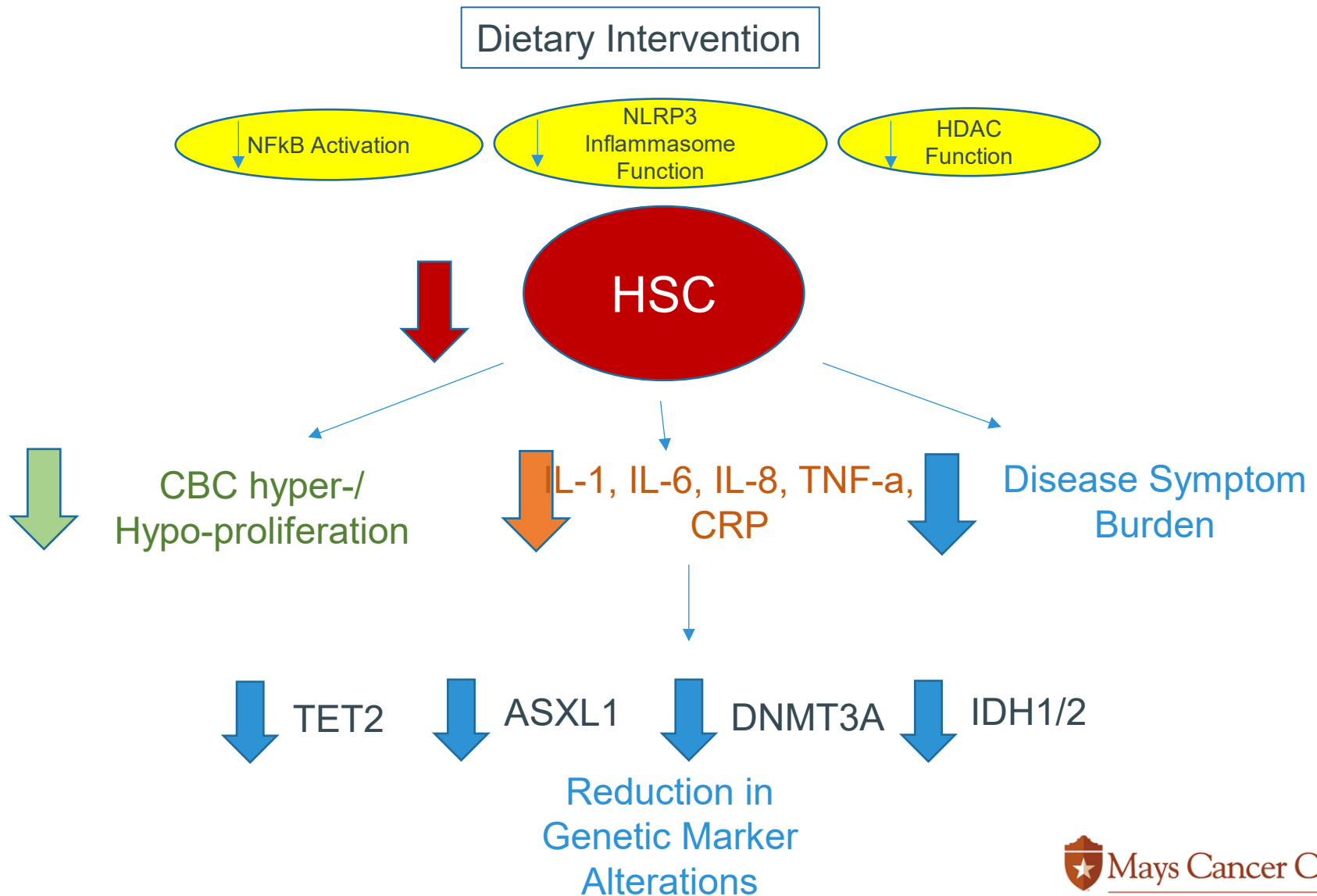
So, Dr. Scherber, What Should I Eat?

No data yet on what diet is best
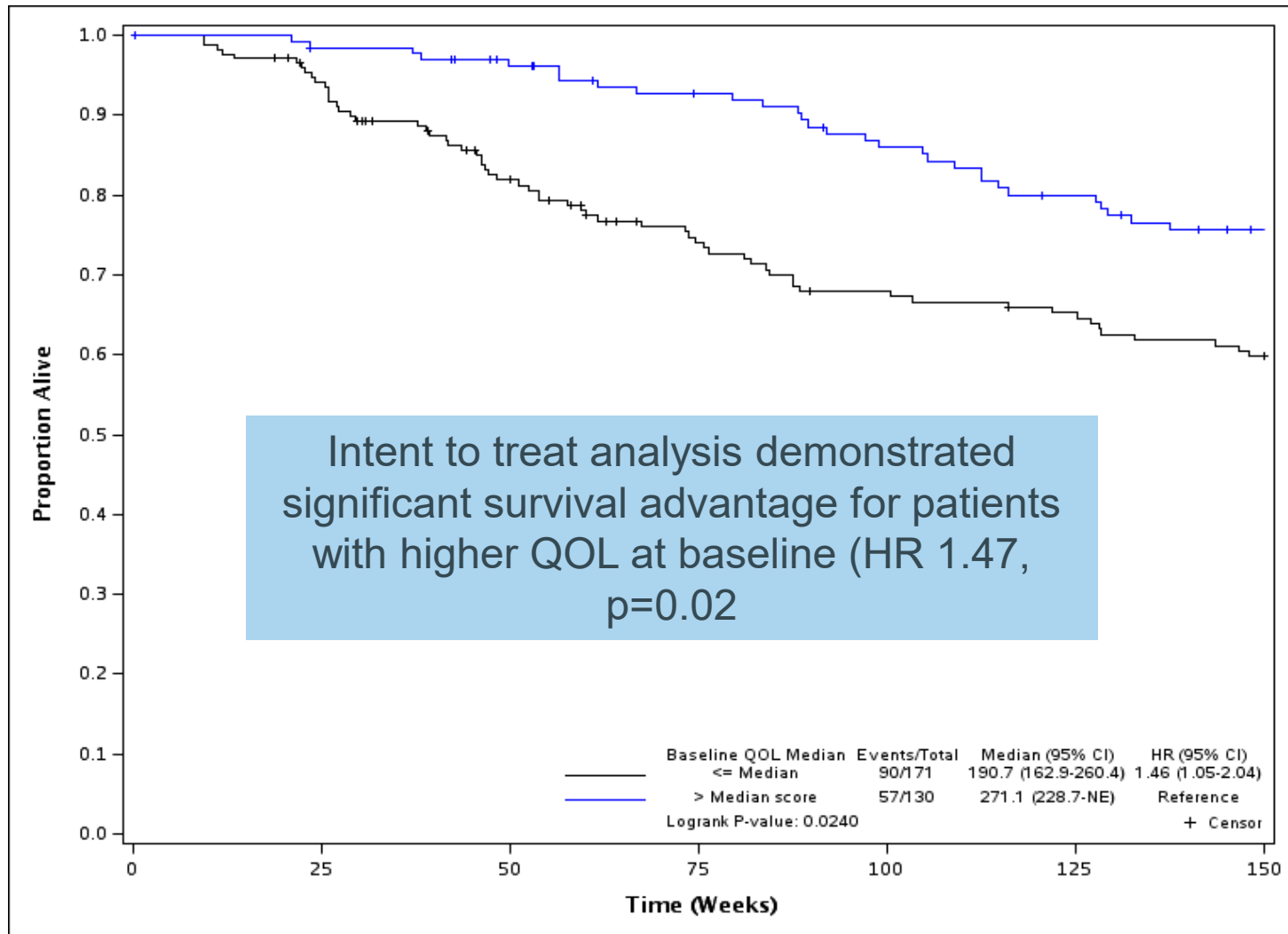
But you can't go wrong with general principals:

Eat Lots of:

Limit intake of:

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QOL and Survival in MF

Intent to treat analysis demonstrated significant survival advantage for patients with higher QOL at baseline (HR 1.47, p=0.02

Baseline QOL Median	Events/Total	Median (95% CI)	HR (95% CI)
<= Median	90/171	190.7 (162.9-260.4)	1.46 (1.05-2.04)
> Median score	57/130	271.1 (228.7-NE)	Reference

Logrank P-value: 0.0240   + Censor

Scherber et. al. Haematologica 2017. 102 (S1) E1351

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Summary

Early data suggests nutrition may play an important role in the care of MPN patients

Efforts to look at this closer are ongoing – not enough evidence to suggest dietary change as of yet!

For now, a healthy diet and focusing on QOL is key!

Scherber@uthscsa.edu