Advances in Nutrition Therapies and Technology in IBD and Cirrhosis

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UNIVERSITY OF CALGARY

Ascend

CALGARY DIVISION OF GASTROENTEROLOGY & HEPATOLOGY

Objectives

- Describe the rationale for using diet as therapy in IBD and present supportive pilot data
- Discuss the role of nutrition optimization and anti-inflammatory diets in the treatment of IBD
- Discuss nutrition optimization and implications in cirrhosis on clinical outcomes
- Introduce an approach to using technology to empower patients to self-manage diet and stress in chronic diseases

Microbiota

- GI tract is densely colonized with 100 trillion diverse microbes
- Healthy individuals microbiota live symbiotically with host
  - Digestion of otherwise indigestible CHO's to produce SCFA's
  - Regulate fat metabolism
  - Synthesize vitamins / essential AA, transform conjugated bile acids
  - Protect against epithelial injury
  - Maintain epithelial barrier function
  - Intestinal immune homeostasis

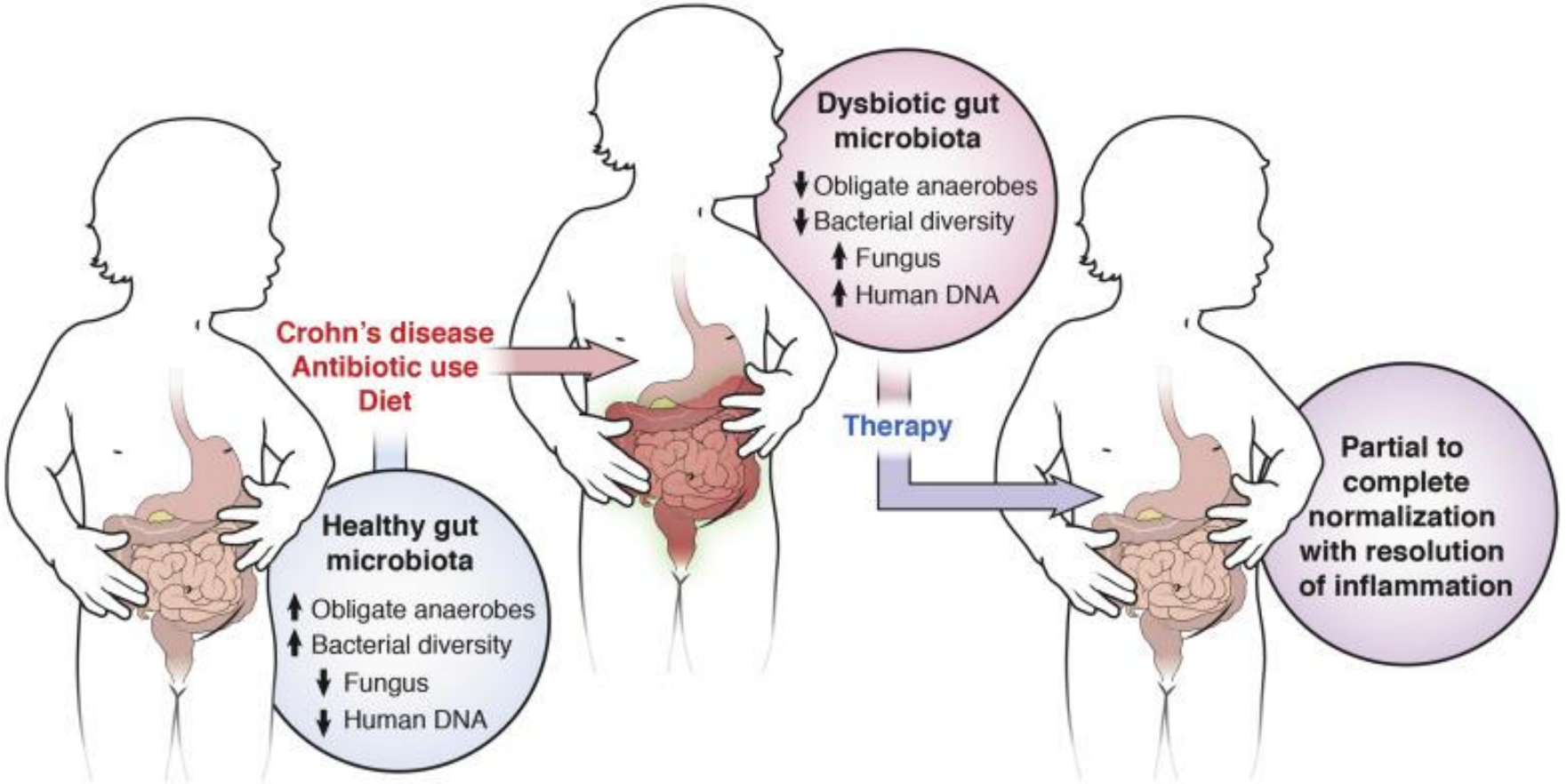
Ahmed et al. Microorganisms 2016;4(2) epub

The microbiome in IBD

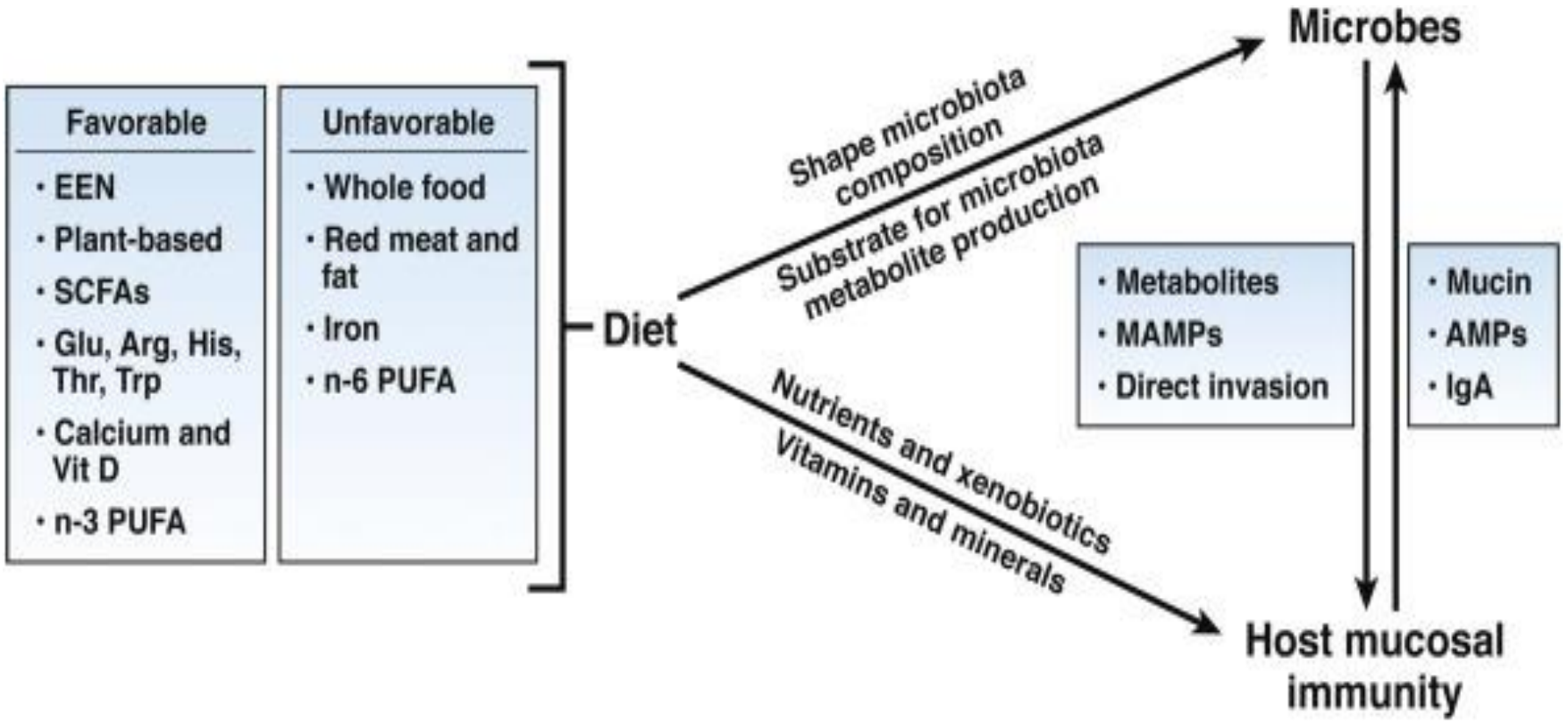
Table 1. Changes in the Microbiome Linked to IBD	
Microbial composition	Decrease in α diversity Decrease in Bacteroides and Firmicutes Increase in Gammaproteobacteria Presence of E coli, specifically adherent-invasive E Coli Presence of Fusobacterium Decrease in Clostridia, Ruminococcaceae, Bifidobacterium, Lactobacillus Decrease in F prausnitzii
Microbial function	Decrease in SCFAs, butyrate Decrease in butanoate and propanoate metabolism Decrease in amino acid biosynthesis Increase in auxotrophy Increase in amino acid transport Increase in sulfate transport Increased oxidative stress Increase in type II secretion system, secretion of toxins

Kostic et al. Gastroenterology 2014;146:1489-1499

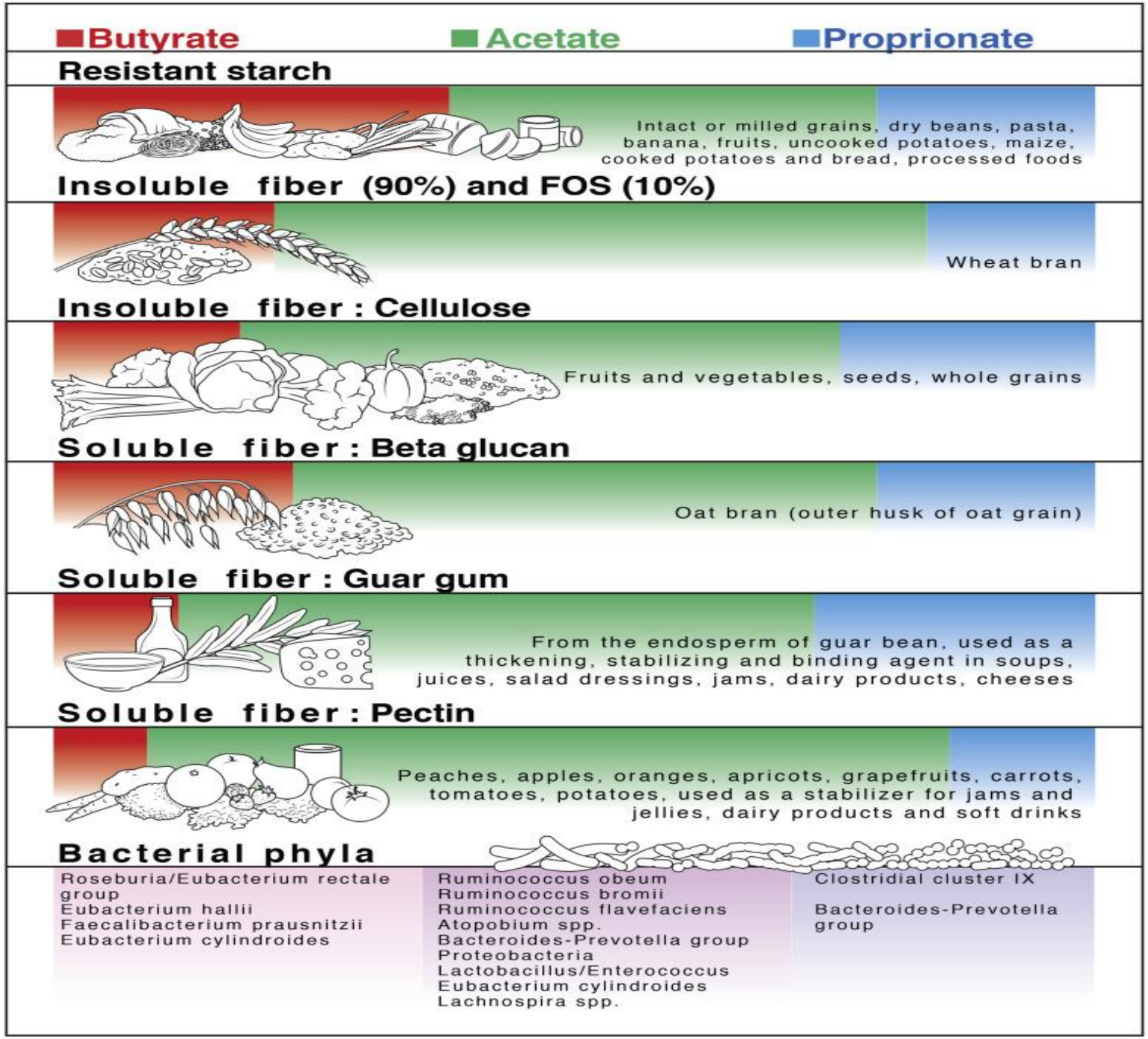
Effects of dietary and pharmacologic interventions on dysbiosis in patients with CD



Lewis. Gastroenterology, 152(2) 2017, 398–414



Lee et al. Gastro 2015;148(6):1087-1106



Lewis and Abreu. Gastro 2016

Limitations of dietary studies in IBD

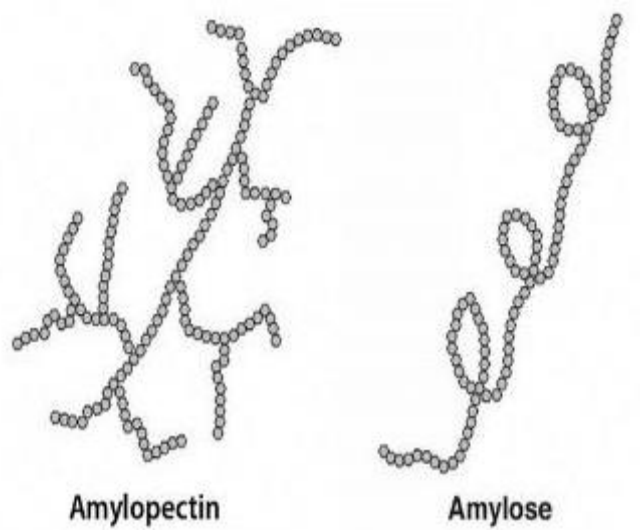
- Largely Retrospective, few prospective, food recall studies
- Single nutrient interventions
  - Fiber Supplements
  - Probiotics
  - Omega-3 Fatty Acids
- Few studies exploring efficacy of holistic diverse diets

Specific carbohydrate diet (SCD)

- Evolved from a diet for celiac disease mid-20th century

  - Based on hypothesis that patients with IBD have a dysfunction of disaccharidases, necessary to digest and absorb disaccharides and amylopectin

  - Therefore, higher amounts of disaccharides would enter the colon, leading to bacterial overgrowth, bowel injury and intestinal permeability



Mean Clinical Disease Activity Index and Mean Laboratory Measures for Patients with IBD on the SCD (Mean ± SD)

Elements	Enrollment	2 wk	8 wk	12 wk
PCDAI	28.1 ± 8.8	14.8 ± 12.8	7.9 ± 11.23	4.6 ± 10.3
PUCAI	28.3 ± 23.1	8.3 ± 2.9	6.7 ± 2.9	6.7 ± 11.6
CRP (mg/L)				
Seattle (normal < 8.0)	24.1 ± 22.3	18.3 ± 27.0	7.9 ± 1.6	7.1 ± 0.4
Atlanta (normal < 4.9)	20.7 ± 10.9	13.4 ± 15.4	12.0 ± 14.6	4.8 ± 4.5
Sedimentation rate (mm/h)				
Seattle (normal 0-20)	15.3 ± 11.0	11.0 ± 9.6	8.3 ± 6.0	7.4 ± 5.5
Atlanta (normal 0-32)	35.7 ± 1.2	26.7 ± 16.6	11.7 ± 6.4	12.0 ± 12.7
Albumin (g/dL)				
Seattle (normal 3.8-5.4)	4.1 ± 0.77	4.1 ± 0.7	4.5 ± 0.6	4.4 ± 0.4
Atlanta (normal 3.5-5.5)	3.2 ± 0.76	3.4 ± 0.5	3.7 ± 0.6	3.4 ± 0.7
Calprotectin (µg/g)				
Seattle (normal < 50)	642.3 ± 648.6	—	—	202.6 ± 245.2
Atlanta (normal < 50)	110.0 ± 100.0	—	—	209.0 ± 159.8

PCDAI indicates pediatric Crohn's disease activity index; PUCAI, pediatric ulcerative colitis activity index.

Autoimmune protocol diet

Extension of paleolithic diet with avoidance of:

- Gluten, Refined sugar
- Food Additives
- Initial phase – dairy, eggs, legumes, nightshades
- Fresh, nutrient dense, fermented

	Week 0	Week 6	*P* (week 6 vs 0)	Week 11	*P* (week 11 vs 0)
Crohns Disease					
HBI, mean (SD)	6.7 (1.5)	3.3 (1.8)	0.001	3.4 (2.6)	0.004
UC					
Partial Mayo score, mean (SD)	5.8 (1.2)	1.2 (2.0)	0.01	1.0 (2.0)	0.007
Stool frequency, mean (SD)	2.0 (0.9)	0.2 (0.4)	0.012	0.2 (0.4)	0.012
Rectal bleeding, mean (SD)	1.8 (0.8)	0.5 (0.8)	0.025	0.3 (0.8)	0.017
Physician global assessment, mean (SD)	2.0 (0.0)	0.5 (0.8)	0.007	0.5 (0.8)	0.007
Fecal calprotectin (µg/g) , mean (SD), n=6	471 (562)			112 (104)	0.12
Baseline FC > 50 µg/g, mean (SD), n=4	701 (563)			139 (113)	0.09

Konijeti GG et al. Inflamm Bowel Dis 2017;23(11):2054-2060.

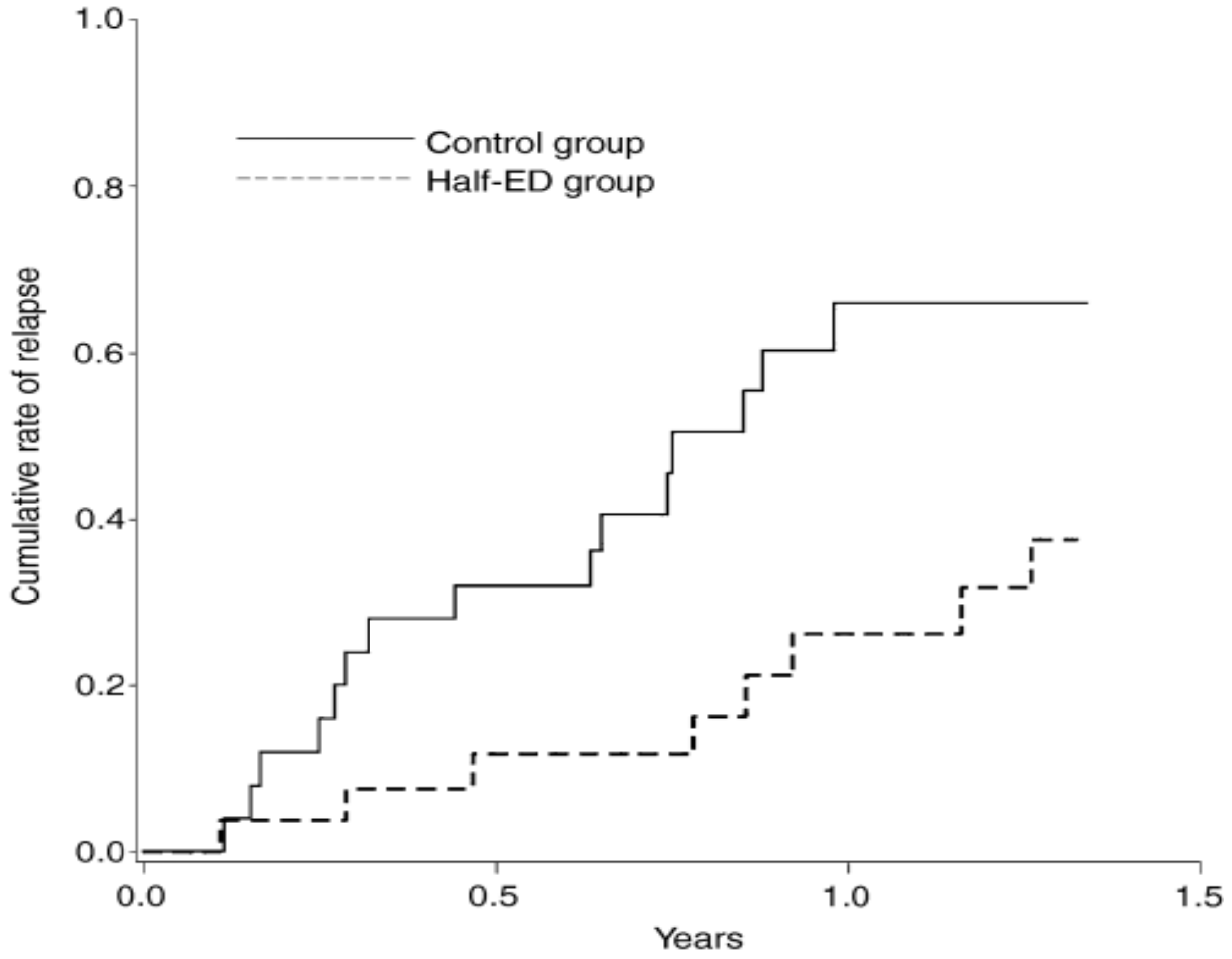
Partial enteral nutrition vs regular diet, N=51

- To examine the effectiveness of half elemental diet + half regular meals compared to habitual diet alone in Crohn's patients in remission
- RCT
- Elemental formula (900-1200kcal/day)
- Primary Outcome was the occurrence of relapse over the 2-year intervention period

Characteristics	Half ED (*n* = 26)	Free diet (*n* = 25)	*P*-value
Men	20	17	0.48
Mean age (s.d.; years)	30.8 (11.1)	28.9 (8.1)	0.49
Mean body mass index (s.d.)	20.1 (3.1)	20.0 (3.6)	0.85
Duration of disease (s.d.; years)	4.1 (4.2)	5.6 (6.5)	0.32
Disease site			
Small bowel only	8	7	0.50
Colon only	3	6	
Both	15	12	
Perianal lesions	12	10	0.66
Previous gut operation	11	11	0.90
Frequency of relapse			
High (not <0.5/year)	10	9	0.98
Low (<0.5/year)	7	7	
First attack	9	9	
Administration of azathioprine	2	4	0.42
Inductive therapy (+surgery)			
Total enteral nutrition	12 (0)	10 (3)	0.67
Total parenteral nutrition	12 (1)	13 (1)	
Administration of prednisolone	0 (0)	1 (0)	
Administration of infliximab	2 (0)	1 (0)	

Konijeti GG et al. Inflamm Bowel Dis 2017;23(11):2054-2060.

Partial enteral nutrition vs regular diet and relapse rates



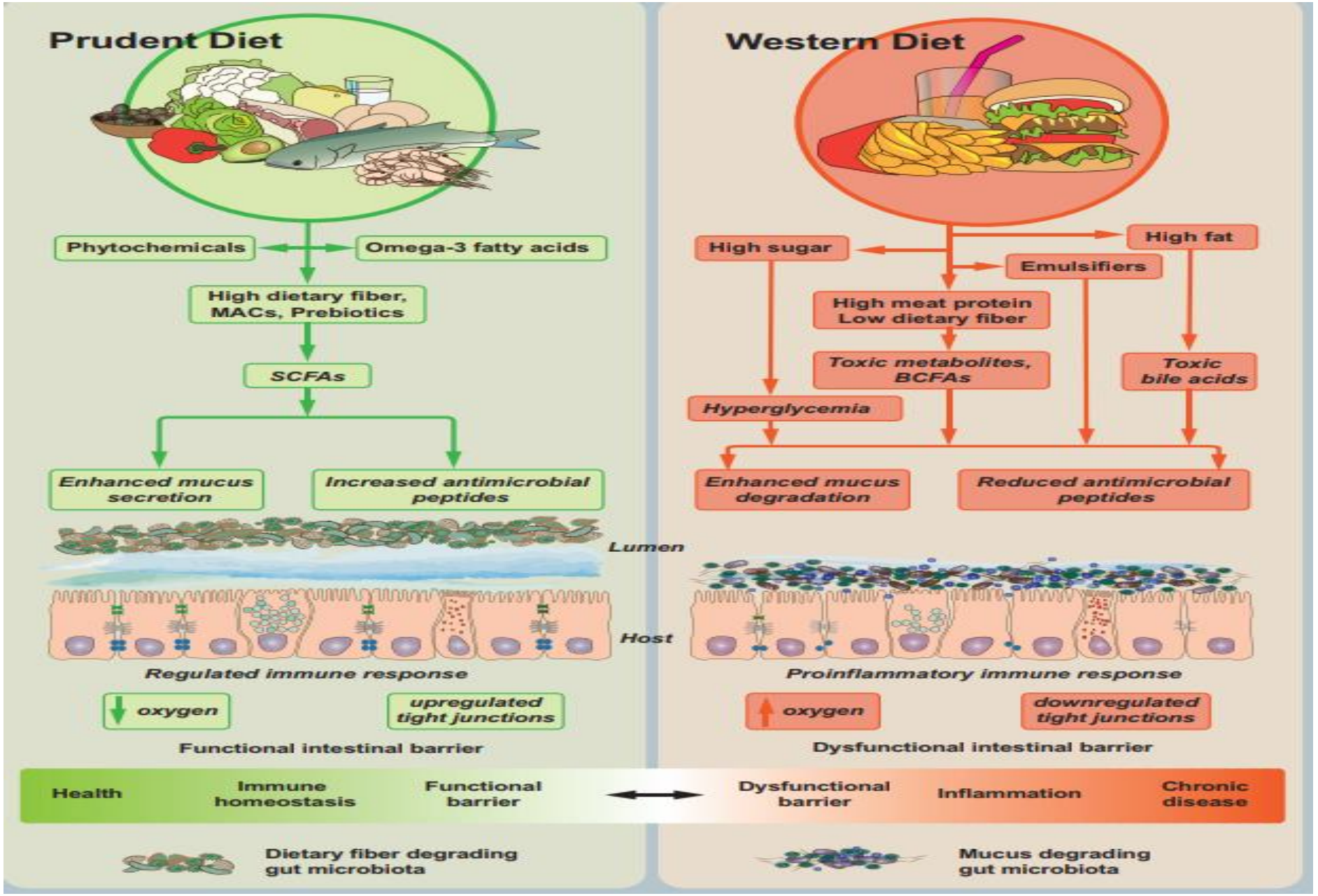
	Treatment Half ED	Treatment Free Diet
Number of cases	9	16
Age and sex adjusted HR (95% CI)	0.36 (0.15-0.83)	1.00 (reference)
Multivariate HR (95% CI)	0.40 (0.16-0.98)	1.00 (reference)

Takagi et al. APT 2006; 24(9):1333-40

Crohn's Disease dietary intervention Objectives

1) To characterize the gut microbiome in patients with CD in remission stratified by dietary diversity.

2) To examine the effect of a personalized dietary intervention on the microbiome in patients consuming a non-anti-inflammatory diet (NAID)



Makki et al. Cell Host and Microbe 2018

Hypotheses

- Crohn's patients in remission consuming a NAID will have a significantly different gut microbiome compared to patients consuming an anti-inflammatory diet (AID)

- **NAID (Non-anti-inflammatory Diet)**
  - $\leq$ 3 servings Fruit/Veg/day
  - $\geq$ 3 servings Red Meat per week
  - $\leq$ 15g/day dietary Fiber

Methods

- Prospective intervention study
- Patients in remission recruited from IBD clinics at U of C
- Maintenance of remission using biologic therapies
- Excluded if on antibiotics, probiotics or corticosteroids
- RD assessment and if NAID = intervention x 3 months
- Stool Samples = Baseline x 3, monthly x 3

Dietary intervention

- Emphasize an AID using Mediterranean diet Principles
  - ➢ Move away from emphasizing single nutrients
- 25-30 kcal/kg (Remission)
- 0.8-1.2 g/kg protein
- Fat intake 20-35% energy (PUFA + Monounsaturated)
  - – < 10% saturated fat
- < 10% energy refined sugars
- Fiber 25 g/day females and 38 g/day males
  - ➢ Emphasis on prebiotic rich foods
- Fruits/Vegetables 7 servings/day
- Poultry < 3 X/week
- Fish = 2 servings / week
- 2 servings probiotic, fermentable foods (minimum 10 billion CFU)

Patient demographics and health information

	Female N=34	Male N=33
Age in years (mean, SD)	44.7 (14.4)	49.7 (12.7)
BMI (kg/m^2; mean, SD	27.8 (6.1)	26.7 (3.9)
Anti-TNF n, (%)	30 (88.2%)	24 (72.7%)
IMM n, (%)	15 (44.1%)	14 (42.4%)
Previous bowel surgery n, (%)	7 (20.6%)	11 (33.3%)

Taylor LM et al. Nutrients. 2018; 10(100) pii:E1761

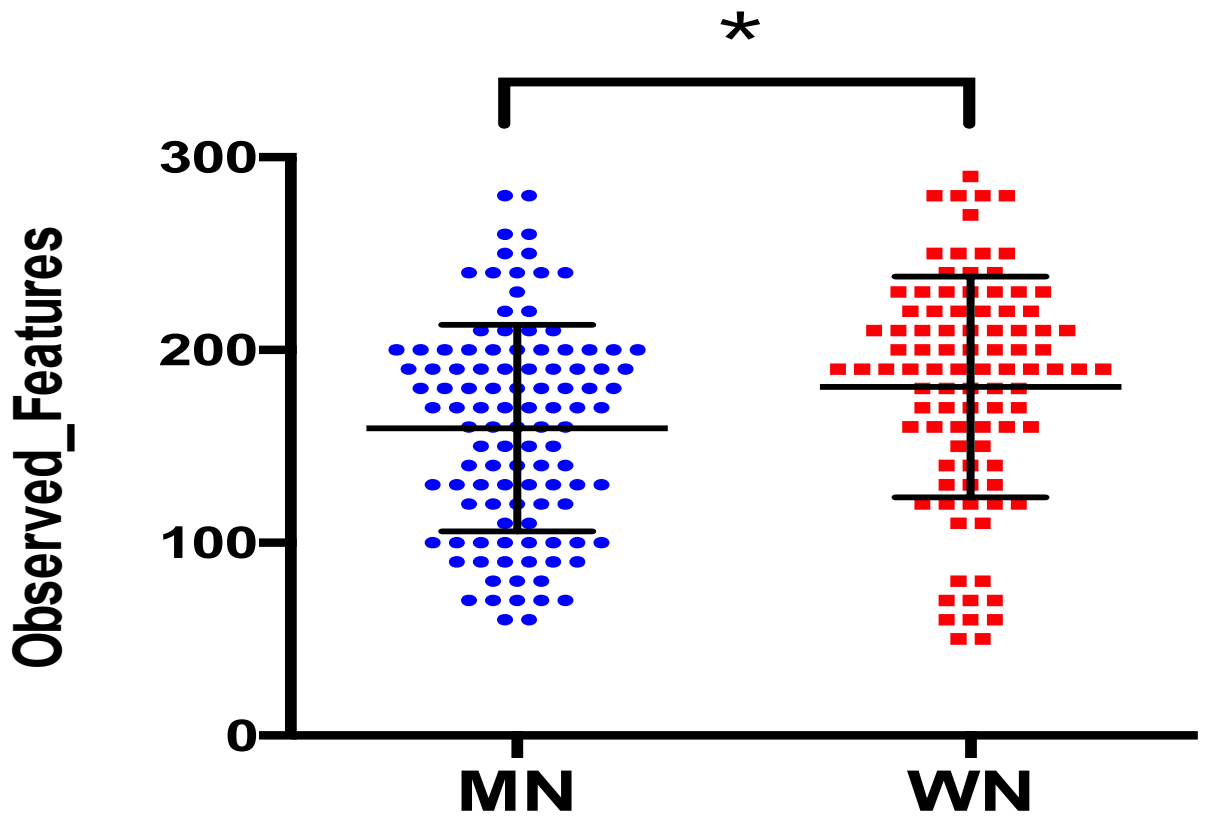
Macronutrient composition compared to current guidelines

Macronutrient	DRI Acceptable Macronutrient Distribution Range (AMDR) and Adequate Intake (AI) [29]	Academy of Nutrition and Dietetics [30]	Crohn's Patients (*N* = 67; Mean ± SE)		Representative Sample (*N* = 1547; Mean ± SE) [27]	
			M (*N* = 33)	F (*N* = 34)	M (*N* = 721)	F (*N* = 826)
Total energy intake (kcal/d)	Male = 662 − (9.53 × age (y)) + PA × {(15.91 × weight (kg)) + (539.6 × height (m))}, Female/Women = 354 − (6.91 × age (y)) + PA × {(9.36 × weight (kg)) + (726 × height (m))}		2358 (95.3)	1881 (86.5)	2346 (61)	1730 (42)
Protein (% total energy)	10–35% total energy		18.3 (1.0)	18.0 (0.7)	17.0 (0.4)	16.8 (0.3)
Carbohydrate (% total energy)	45–65% total energy		47.1 (1.5)	48.1 (1.1)	48.7 (0.9)	48.5 (0.6)
Fiber (g/day) ^	M: 30–38 F: 21–25		22.8 (1.4) *	20.9 (1.6) *	19.2 (0.6)	13.9 (0.5)
Total fat (% total energy)	20–35% total energy		33.7 (1.2)	34.3 (1.0)	31.0 (0.8)	32.4 (0.6)
PUFA (% total energy)	5–10% total energy	3–10% total energy	4.5 (0.4) *	3.9 (0.3) *	5.6 (0.2)	5.6 (0.1)
Omega-6 (linoleic)	5–10% total energy	3–10% total energy	3.3 (0.4) *	2.8 (0.2) *	4.5 (0.1)	4.5 (0.2)
Omega-3 (α-linolenic)	0.6–1.2% total energy	0.6–1.2% total energy	0.6 (0.15)	0.5 (0.09) *	0.8 (0.04)	0.8 (0.02)
MUFA (% total energy)	No AI level	15–20% total energy	8.2 (0.6)*	7.1 (0.5) *	12.6 (0.4)	12.8 (0.2)
SFA (% total energy)	As low as possible	7–10% of total energy <7% to reduce CVD risk 5–6% to lower lipids	10.7 (0.4)	11.1 (0.5)	9.8 (0.2)	10.7 (0.3)
TransFA (% total energy)	As low as possible	<1% total energy	0.4 (0.1)	0.3 (0.1)	unavailable	

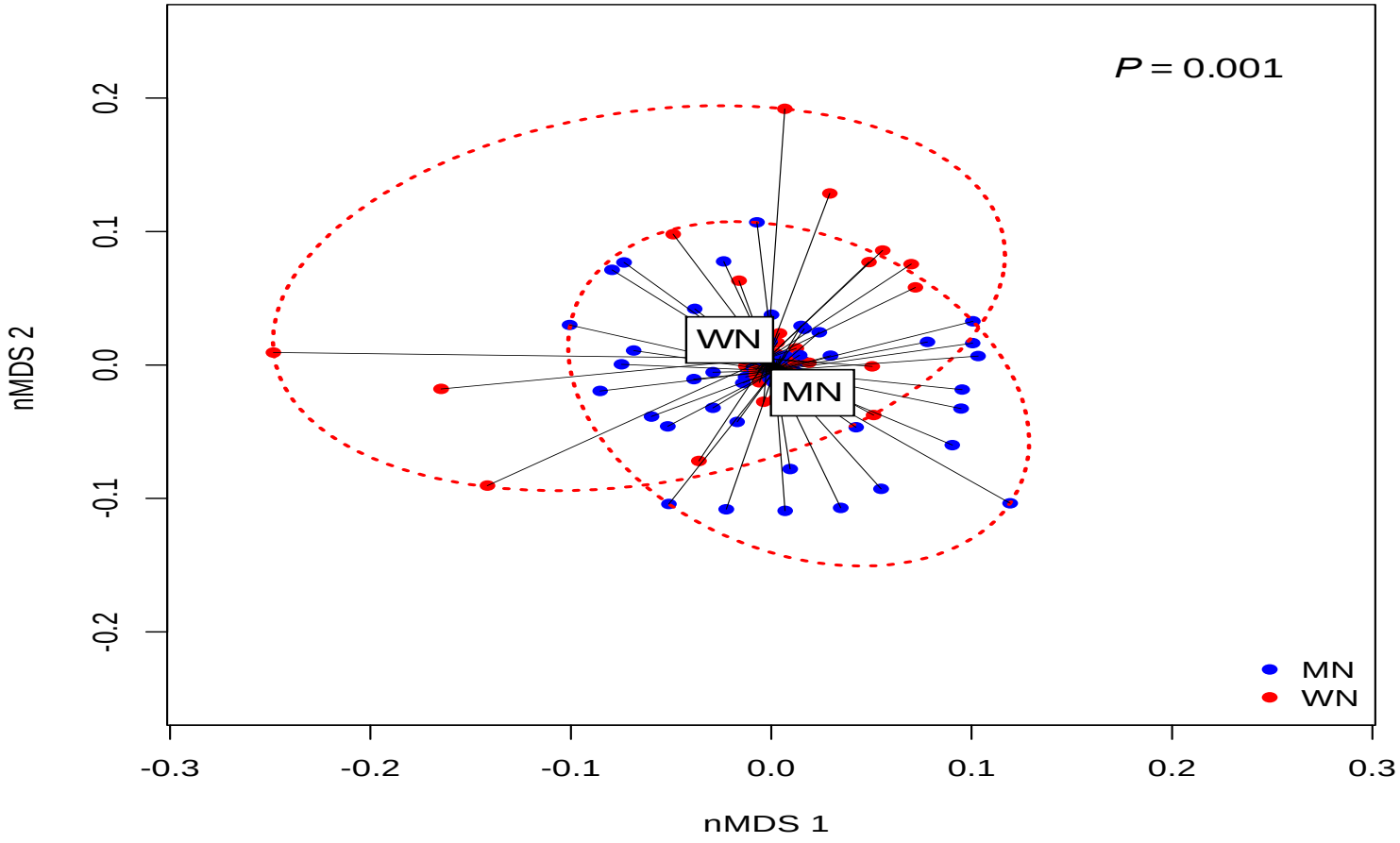
Vitamin composition compared to healthy population

Vitamins	DRI Adequate Intake/day (AI)[1]		Crohn's Patients (N=67)				Healthy Population (N=1547)	
	Males	Females	M (n=33) % of DRI	F (n=34) % of DRI	M (n=33) Daily intake (M±SE)	F (n=34) Daily intake (M±SE)	M (n=721) Usual intake[2] (M±SE)	F (n=826) Usual intake[2] (M±SE)
A RAE µg	900	700	69 (55)%	97 (162)%	609 (86)	682 (195)	667 (33)	577 (28)
D µg@	15-20		21 (20)%	16 (17)%	3 (0.5)**	2.5 (0.4)**	5.9 (0.3)	5.0 (0.3)
E α-tocopherol mg	15		48 (59)%	32 (28)%	5 (1.5)	7.1 (0.7)	n/a	n/a
K µg	120	90	52 (46)%*	106 (101)%*	61 (9.7)	97 (15.7)	n/a	n/a
C mg (N=1484)	90	75	121 (78)%	108 (84)%	106 (12)**	82 (11)**	143 (8) 92 (7)	113 (4)
Thiamin, B1 mg	1.2	1.1	115 (60)%*	82 (41)%*	1.4 (0.12)**	0.9 (0.08)**	2.0 (0.07)	1.4 (0.04)
Riboflavin, B2 mg	1.3	1.1	141 (67)%	113 (52)%	1.8 (0.15)	1.3 (0.10)**	2.1 (0.07)	1.6 (0.05)
Niacin, B3 NE	16	14	212 (113)%*	161 (76)%*	34 (2)**	23 (2)**	46 (2)	32 (1)
Pantothenic Acid, B5 mg	5		87 (46)%	68 (35)%	4.4 (0.4)	3.4 (0.3)	n/a	n/a
Pyridoxine, B6 mg[t]	1.3-1.7	1.3-1.5	119 (64)%*	86 (45)%*	1.8 (1.0)	1.2 (0.7)**	2.1 (0.1)	1.6 (0.1)
Biotin, B7 mg	30		47 (42)%*	25 (19)%*	14 (2.2)	8 (1.0)	n/a	n/a
Folate, B9 DFE µg	400		72 (32)%	61 (59)%	287 (34)**	244 (33)	488 (15)	325 (41)
Cobalamin, B12 µg	2.4		177 (123)%	130 (109)%	4.2 (0.5)	3.1 (0.5)	4.9 (0.3)	3.5 (0.2)
Choline mg^	550	425	43 (26)%	39 (23)%	229 (25)	165 (17)	n/a	n/a

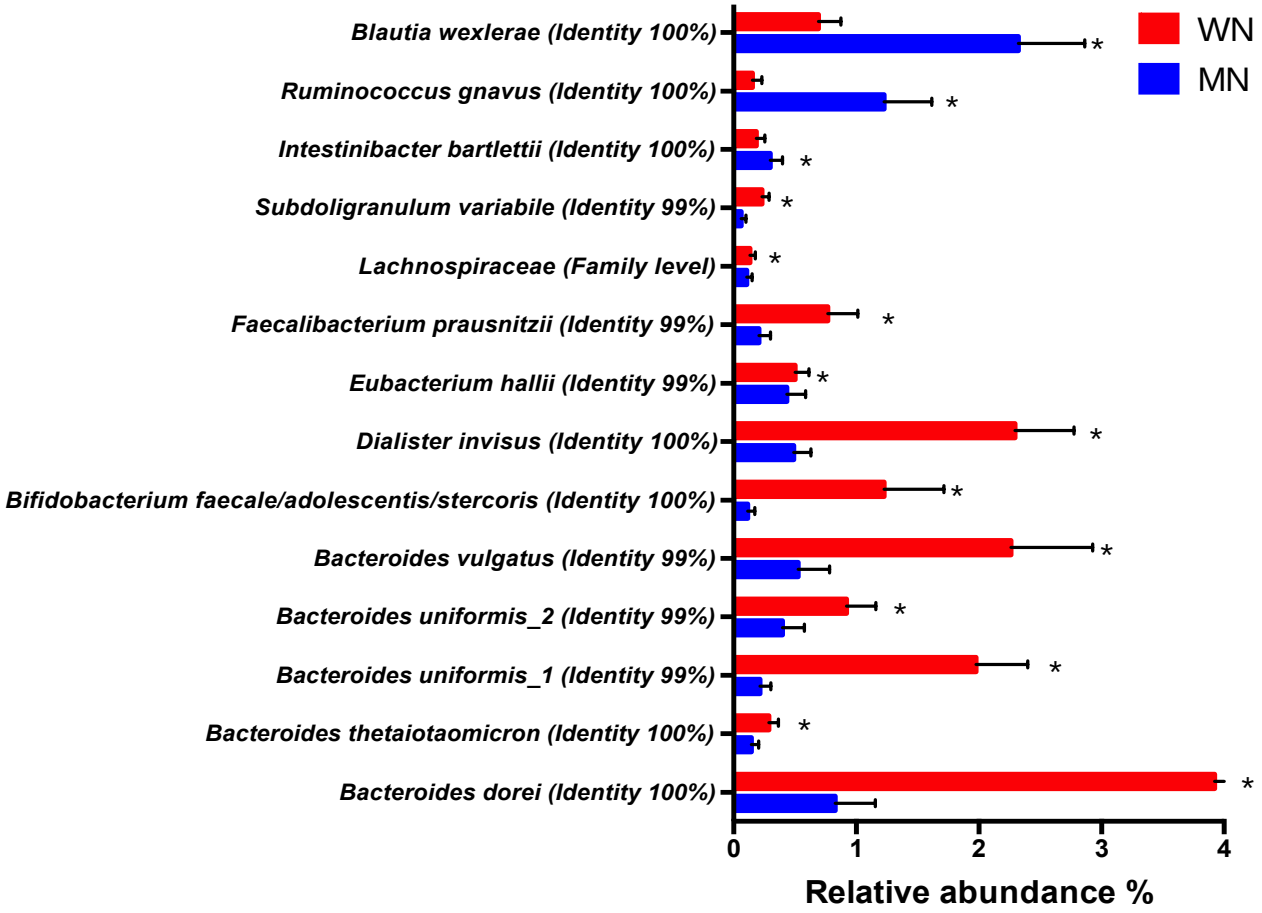
Comparison of α-diversity (richness) of gut microbiota between patients who have intake of AID vs NAID



Comparison of β-diversity (richness) of gut microbiota between patients who have intake of AID vs NAID



14 bacterial features in the gut microbial community show different relative abundance between AID and NAID



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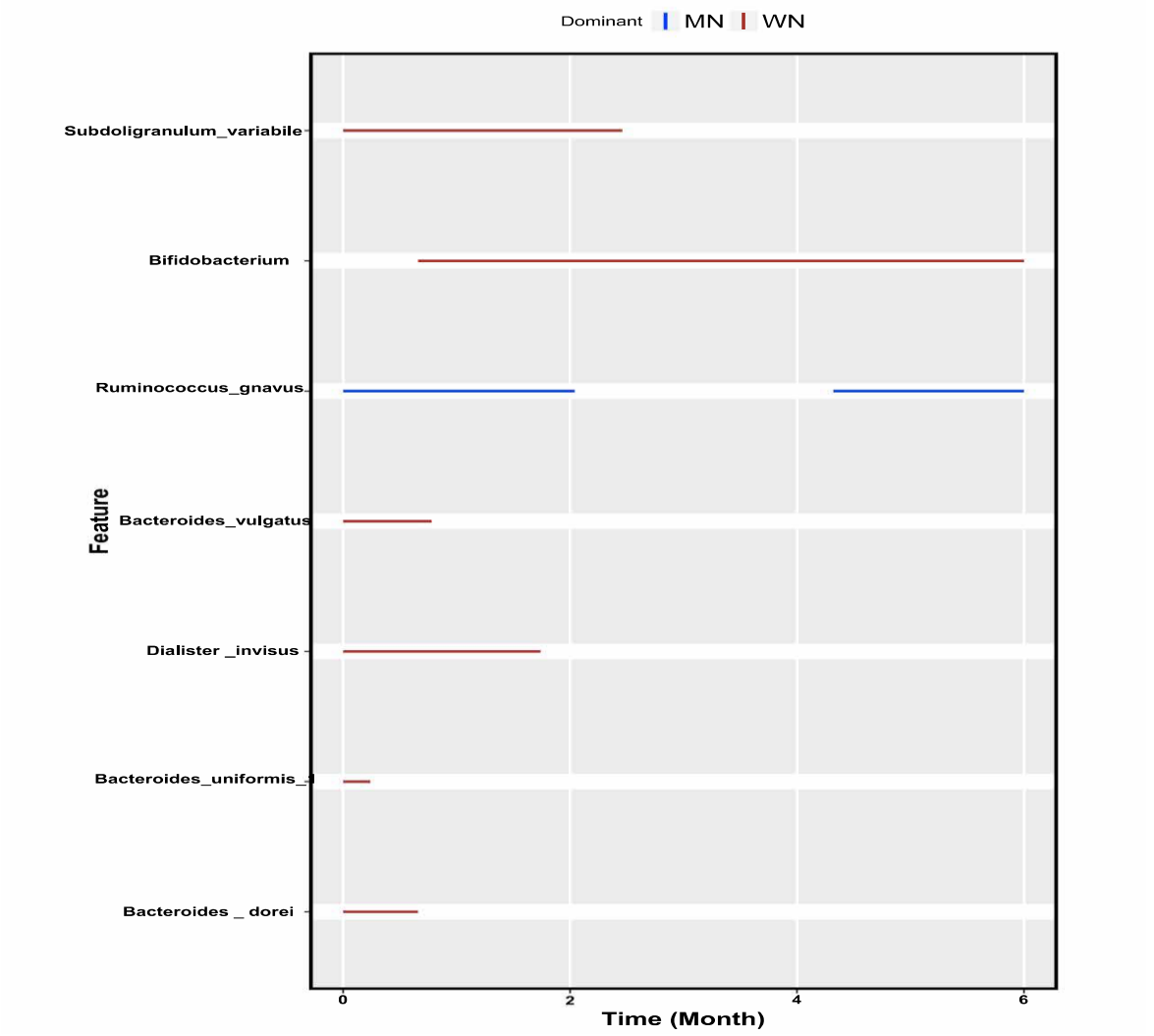
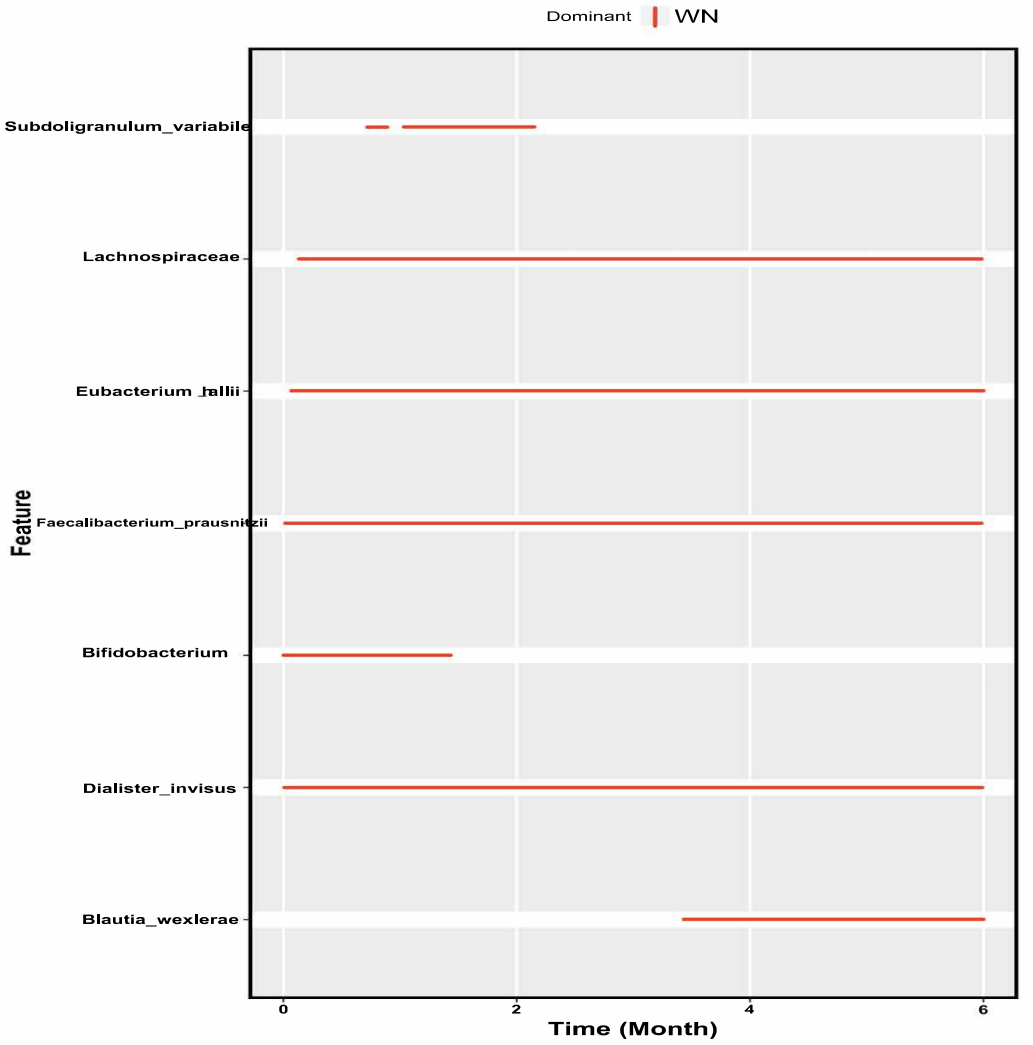
Shift in bacterial species dominance over time





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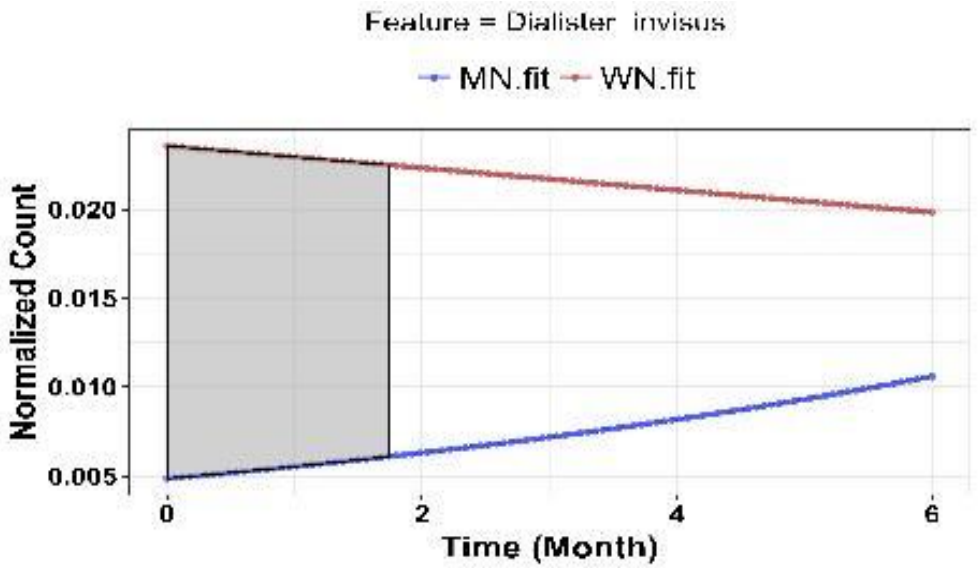
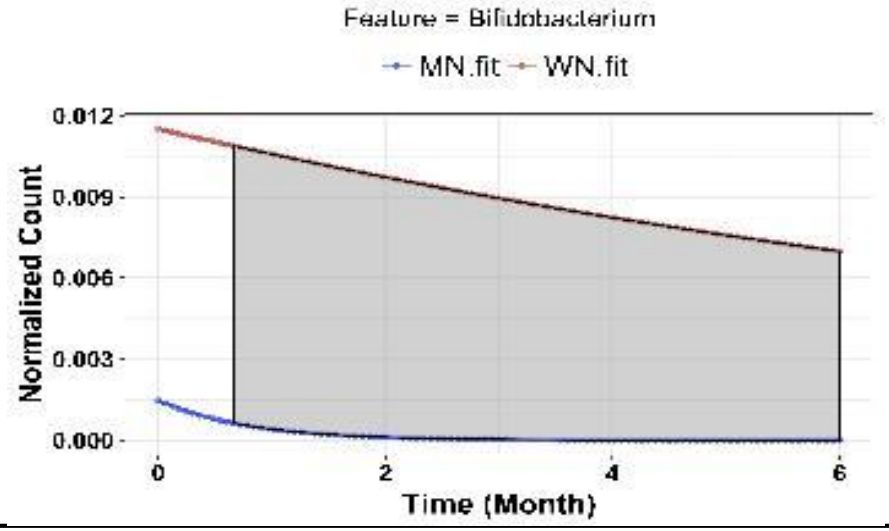
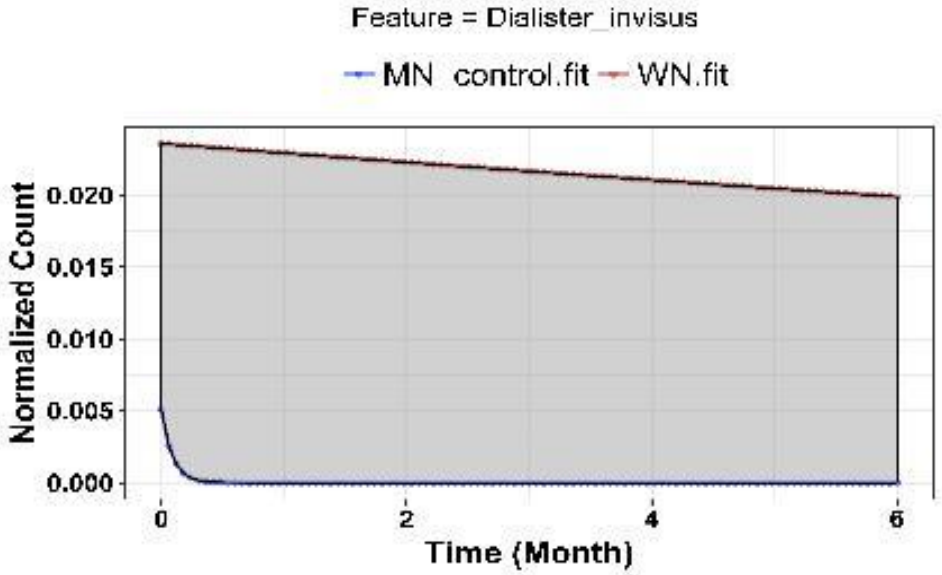






Relationship between MDS food groups and fecal calprotectin

MDS and Food Group Servings, mean (SD)	Fecal Calprotectin <250ug/g	Fecal calprotectin >250ug/g	P-value
MDS score out of 13	4.5 ±1.6	3.7 ±1.5	0.19
Total vegetables/day	2.2 ± 2.2	1.4 ± 1.1	0.26
Leafy greens/day	0.7 ± 0.8	0.1 ± 0.2	**<0.01**
Fruit/day	1.8 ± 1.4	1.9 ± 1.7	0.83
Red and processed meat/wk	0.5 ± 0.7	0.9 ± 1.1	0.24
Legumes/wk	0.7 ± 1.3	0.0 ± 0.0	**0.01**
Fish/wk	5.1 ± 6.4	1.5 ± 3.3	**0.04**

MDS score components and relationship with peripheral cytokines

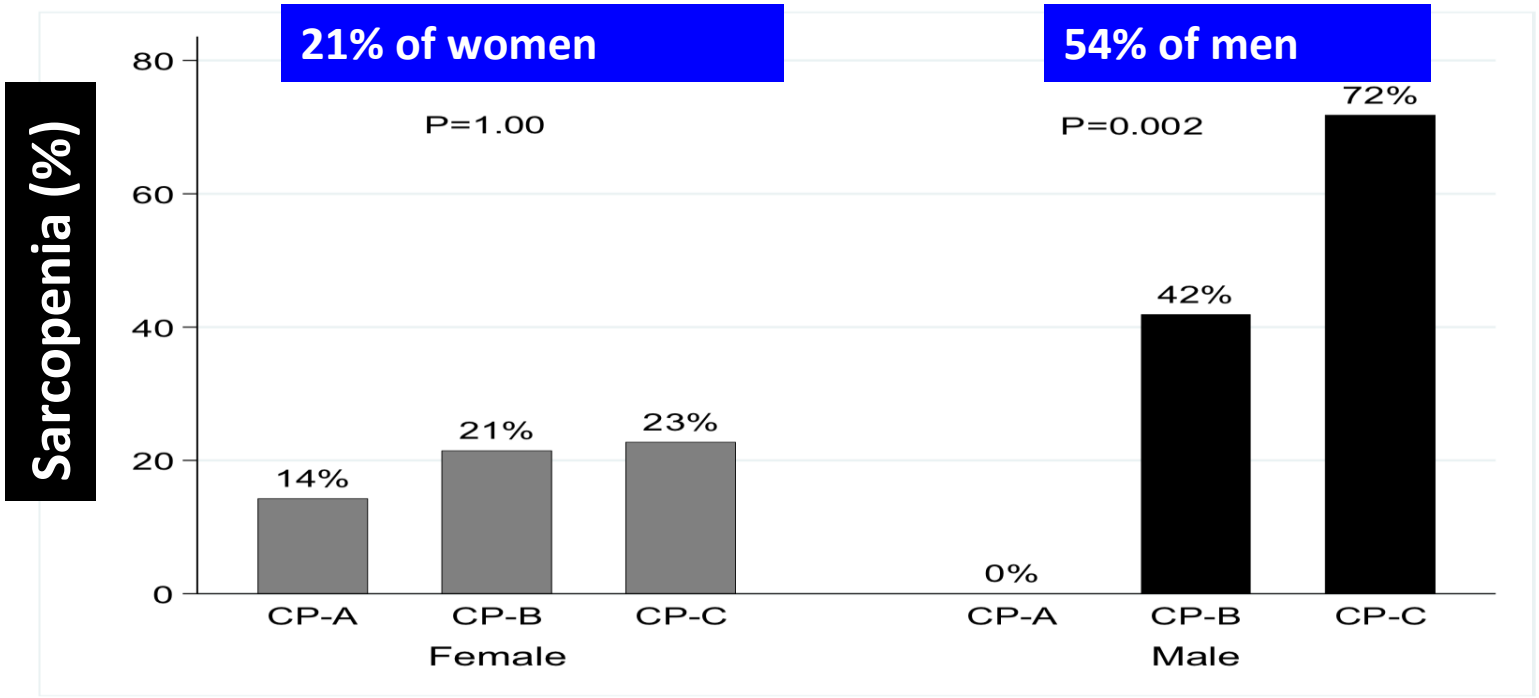
Dietary measure	Significant cytokines at month 3	Correlation
MDS Totals (mean, SD)	IFN-g	-0.4
Fruit *plus juice CFG servings (mean, SD)	IL-1b F: IL-1b F: IL-17A	0.4 0.5 0.5
Total veg CFG servings (mean, SD)	IFN-g	-0.5
Red and processed meat CFG servings (mean, SD)	F: IFN-g M: IL-27	0.7 -0.6
Legumes CFG servings / week (median, IQR)	CRP F: IL-6	-0.4 -0.6

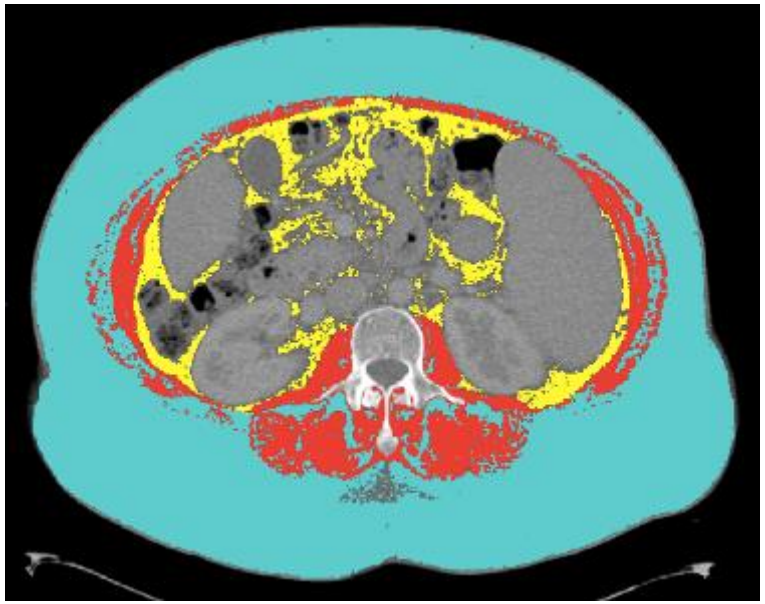
Diet IBD conclusions

- Greater interest in exploring dietary patterns and composition
- Signals for clinical improvements
  - Anti-Inflammatory diets
  - SCD
  - Mechanistically plausible
    - Microbiome
    - Inflammatory markers
    - Relationship with fecal calprotectin
- **Further high quality trials needed**

Prevalence of malnutrition in cirrhosis

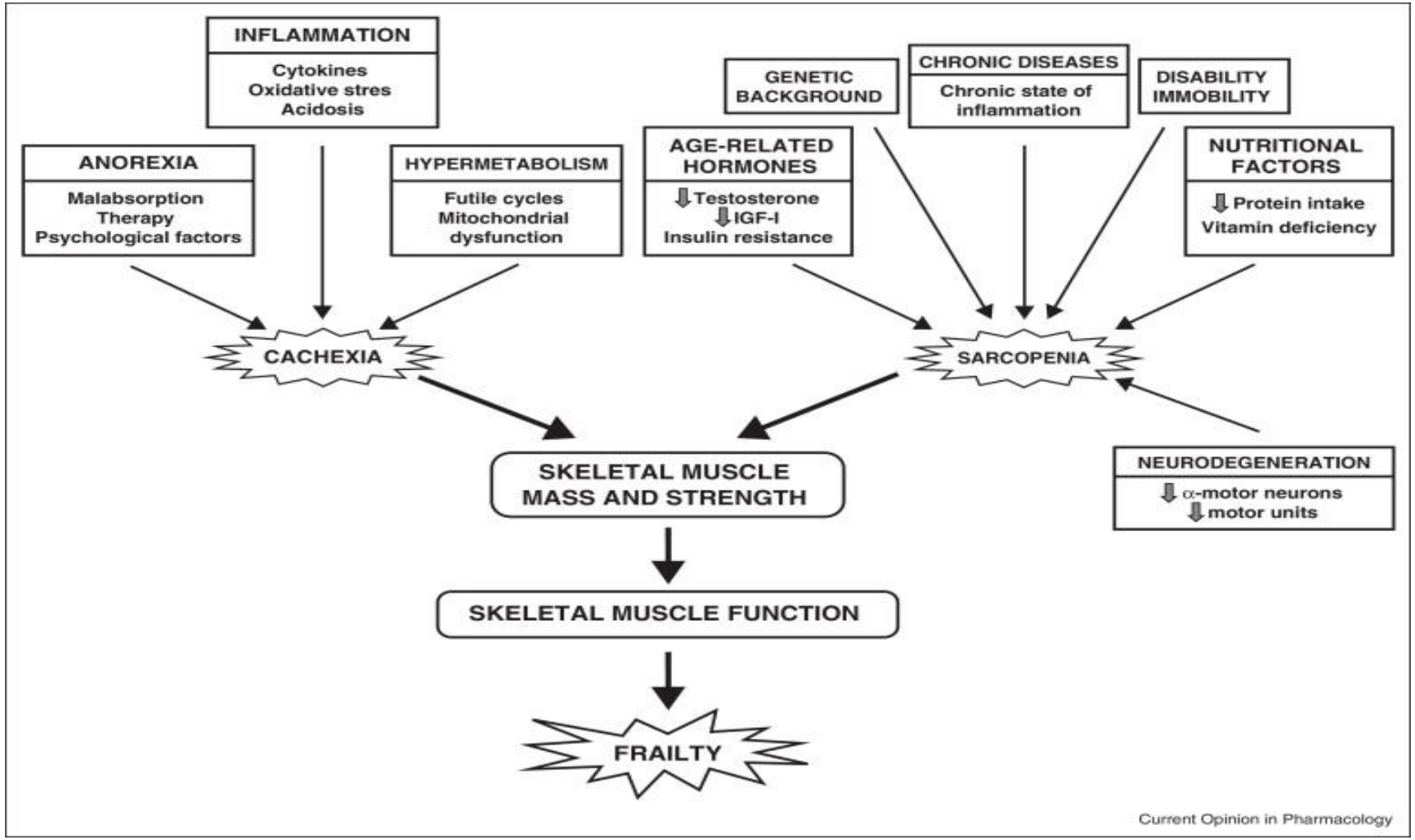
- **Malnutrition is common**, varies with the tool for measurement
- Prevalence increases with worsening liver disease severity





Tandon P, Liver Transplantation 2012

Differential factors involved in cachexia and sarcopenia



Research tools and clinical tools for diagnosing sarcopenia

Measurements of muscle mass, strength, and function in research and practice		
Variable	Research	Clinical practice
Muscle mass	Computed tomography (CT) MRI Dual energy x-ray Absorptiometry (DXA) Bioimpedance analysis (BIA) Total or partial body potassium per fat-free soft tissue	BIA DXA Anthropometry
Muscle strength	Handgrip strength Knee flexion/extension Peak expiratory flow	
Physical performance	Short physical performance battery (SPPB) Usual gait speed Timed get-up-and-go test Stair climb power test	SPPB Usual gait speed Get-up-and-go test

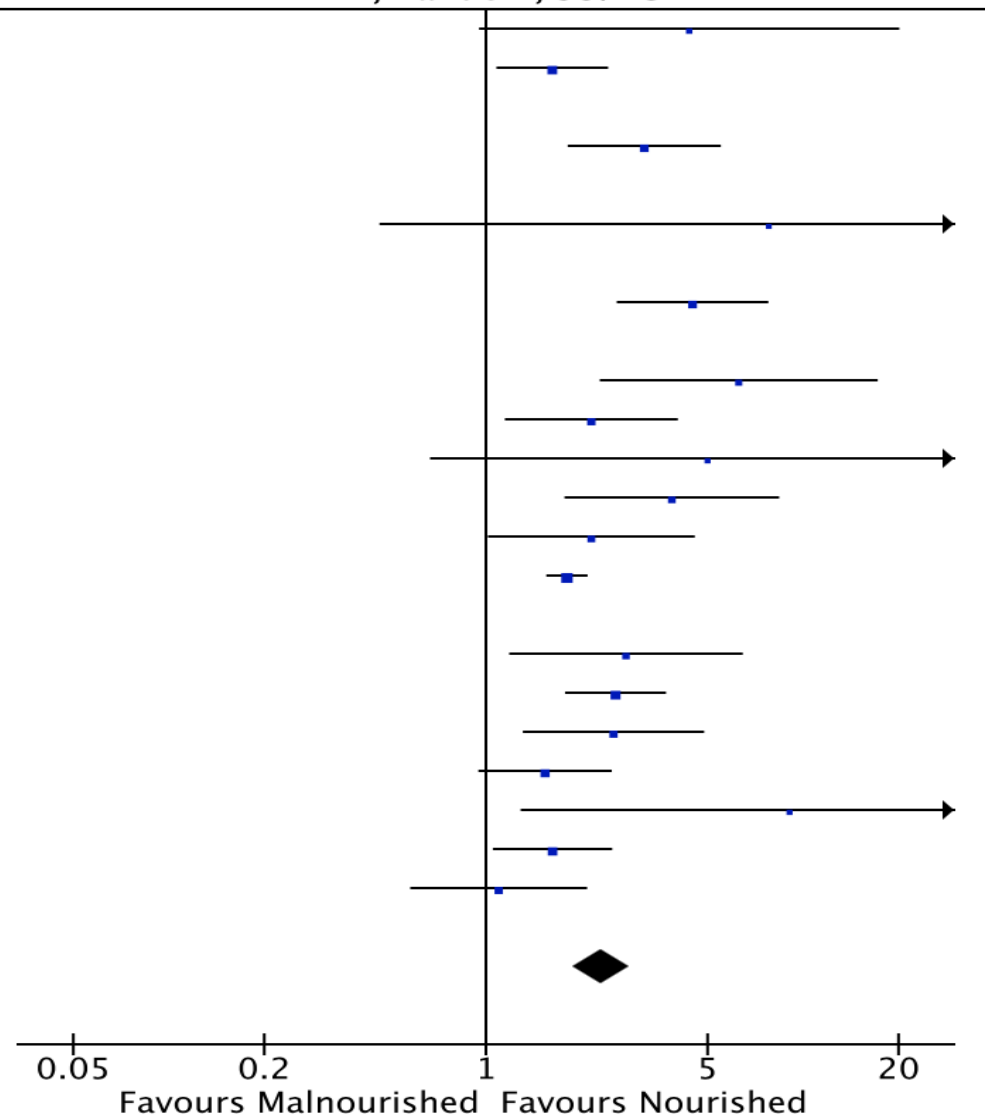
Cruz-Jentoft AJ, et al. Age Ageing 2010;39:412-423
Montano Loza AJ, et al. J Cachexia, Sarcopenia Muscle. 2016;7:126-135

Nutritional assessment tools predict pre-transplant mortality in a pooled analysis of 18 studies (N=3640 patients)

Study or Subgroup	Malnourished Events	Malnourished Total	Nourished Events	Nourished Total	Weight	Risk Ratio M-H, Random, 95% CI
Abad 1987	7	40	2	50	1.6%	4.38 [0.96, 19.91]
Abad-Iacruz 1993	34	55	21	55	9.0%	1.62 [1.09, 2.40]
Abad-Iacruz 1993	26	41	29	69	0.0%	1.51 [1.05, 2.17]
Alberino 2001	20	53	19	159	6.9%	3.16 [1.83, 5.45]
Alberino 2001	16	32	41	180	0.0%	2.20 [1.42, 3.40]
Alvares da silva 2005	6	29	0	17	0.5%	7.80 [0.47, 130.40]
Alvares da silva 2005	3	14	3	36		Not estimable
Caregaro 1996	20	29	14	91	6.9%	4.48 [2.61, 7.69]
Caregaro 1996	11	15	26	105		Not estimable
Gunsar 2006	35	127	4	91	3.2%	6.27 [2.31, 17.02]
Hanai 2015	42	89	9	41	6.0%	2.15 [1.16, 3.99]
Huisman 2011	10	56	1	28	1.0%	5.00 [0.67, 37.13]
Kim 2014	12	20	7	45	4.6%	3.86 [1.79, 8.32]
Lautz 1992	28	80	7	43	4.8%	2.15 [1.03, 4.51]
Merli 1996	165	277	254	768	12.8%	1.80 [1.57, 2.07]
Merli 1996	87	173	332	872		Not estimable
Montano Loza 2012	13	45	7	67	4.1%	2.77 [1.20, 6.39]
Montano-Loza 2016	111	292	31	209	9.6%	2.56 [1.79, 3.66]
Morgan 2006	30	66	9	50	5.7%	2.53 [1.32, 4.83]
Ruiz-Mangan 2015	37	133	21	116	7.8%	1.54 [0.96, 2.47]
Sasidharan 2012	19	44	1	21	1.0%	9.07 [1.30, 63.26]
Tandon 2012	28	58	25	84	8.6%	1.62 [1.06, 2.48]
Yadav 2015	10	47	32	165	5.9%	1.10 [0.58, 2.06]
Total (95% CI)		**1540**		**2100**	**100.0%**	**2.32 [1.90, 2.85]**
Total events	627		464			

Heterogeneity: $Tau^2 = 0.08$; $Chi^2 = 37.53$, df = 17 (P = 0.003); $I^2 = 55\%$

Test for overall effect: Z = 8.12 (P < 0.00001)



Malnutrition clinic

- High nutrition risk patients with cirrhosis (pre-transplant +) and IBD
- Combined assessment RD + MD
- Calorie / protein targets, nocturnal meals, diet quality, exercise
  - Recently updated nutrition guidelines
- F/U frequency based on nutrition assessment status

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- High nutrition risk patients with cirrhosis (pre-transplant +) and IBD
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Objective

- To identify if a personalized nutrition intervention in malnourished pre-transplant patients impacted clinical outcomes at 6-12 months following intervention

Methods

- Prospective cohort study
- Nutrition assessment data
  - SGA
  - HGS
  - MAC
- Clinical outcome data
  - Frequency of hospitalization
  - Infection
  - Hepatic encephalopathy
  - Mortality
  - Quality of Life

SGA and HGS predict mortality in patients with cirrhosis

	SGA		MUAC		HGS kg	
Mortality	**$\chi^2(2) = 6.6$, $p = 0.04$**		$\chi^2(1) = 1.15$, $p = 0.28$		**$\chi^2(1) = 13.8$, $p < 0.001$**	
	Yes	No	Yes	No	Yes	No
Well nourished	A: 2, 9.5%	16, 35.6%	4, 19.0%	16, 35.6%	5, 23.8%	34, 75.6%
Less nourished	B: 9, 42.9% C: 10, 47.6%	19, 42.2% 10, 22.2%	17, 81%	29, 64.4%	16, 76.2%	11, 24.4%

Nutrition assessment and clinical outcome variables over time

Characteristic (n=43)	Baseline (mean ± SD)	6-12 month F/U (mean ± SD)	P-value
Dry BMI	22.7 ± 3.9	23.5 ± 3.9	<0.01
MAC (cm)	26.5 ± 4.0	26.9 ± 3.6	<0.01
HGS (Kg)	23.6 ± 8.1	24.2 ± 9.0	<0.01
MELD-Na	15.1 ± 5.2	14.4 ± 4.9	<0.01

- Significantly improved SGA status at follow-up
- Worsening SGA at follow-up vs. baseline was associated:
  - Increased infections ($X^2(1)=7.93$, $p<0.01$
  - HE ($X^2(1)=5.82$, $p<0.05$)
  - Increased hospital length of stay (23 vs. 10 days)

Length of stay (bed days) by nutritional status

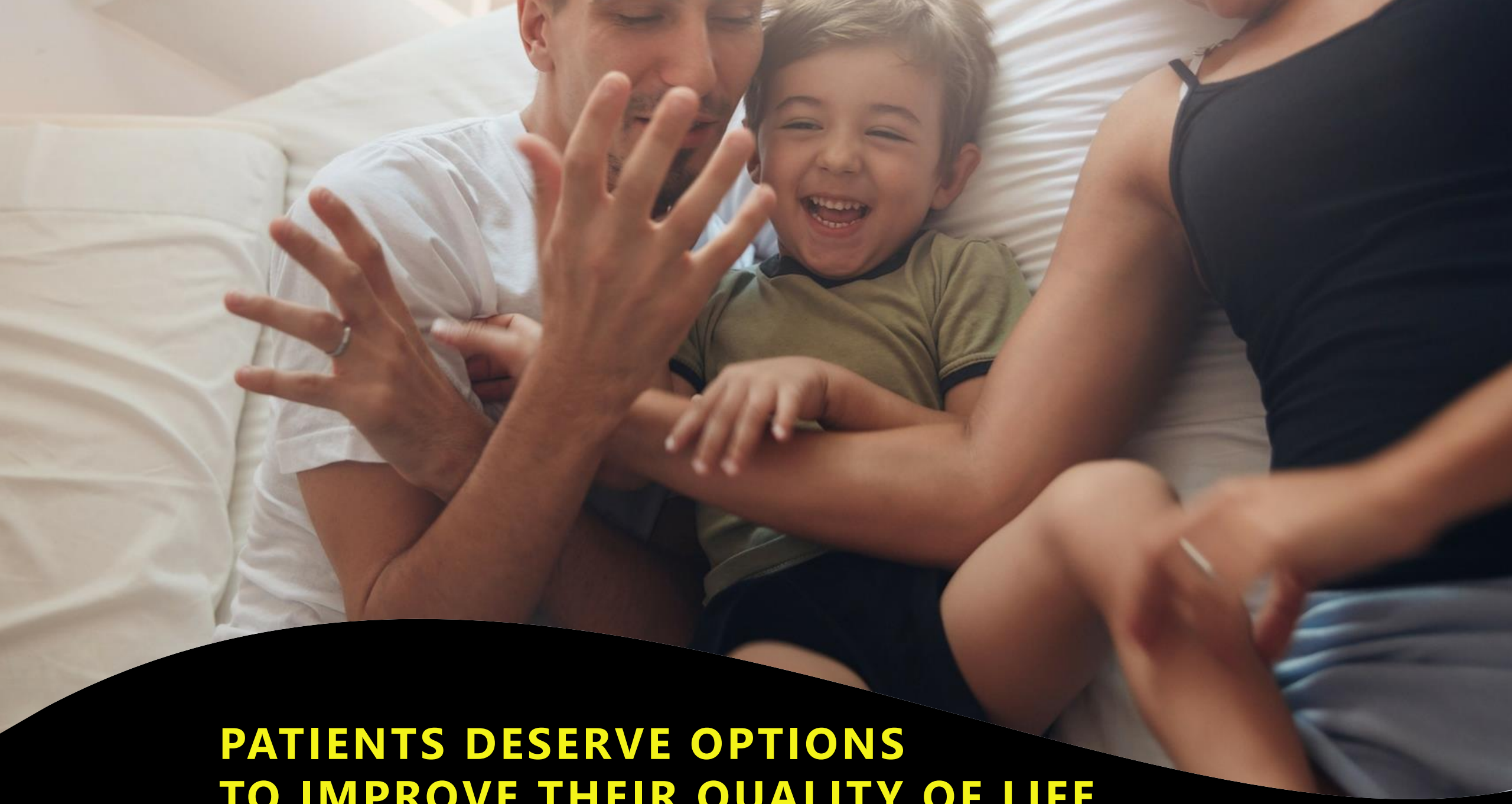
	Nourished	Moderately Malnourished	Severely Malnourished
Total N=958	8.43 [0.65]	11.66 [1.17]*	11.70 [0.96]*
Medical N=632	8.20 [0.95]	12.05 [1.32]*	12.05 [1.33]*
Surgical N=301	6.98 [0.65]	9.62 [1.39]*	8.75 [1.11]*

Costs by nutritional status

	Nourished	Moderately Malnourished	Severely Malnourished
Total N=958	$5074 [512]	$7931 [766]*	$7989 [976]*
Medical N=632	$4839 [593]	$7825 [849]*	$7823 [1042]*
Surgical N=301	$4303 [681]	$7154 [1660]*	$6744 [1435]*

Associations between SF-36 subscales and NATs and MELD-Na

SF-36 Subscale	SGA	HGS	MAC	MELD-Na
Physical Function	✓	✓	✗	✗
Role Physical	✓	✗	✗	✗
Vitality	✓	✗	✗	✗
Social Function	✓	✗	✗	✗
Bodily Pain	✗	✗	✗	✗
General Health	✓	✗	✗	✗
Emotional Role	✓	✗	✗	✗
Mental Health	✗	✗	✗	✗



PATIENTS DESERVE OPTIONS
TO IMPROVE THEIR QUALITY OF LIFE

Appointment help

Symptom tracking

Support network

Grocery lists and orders

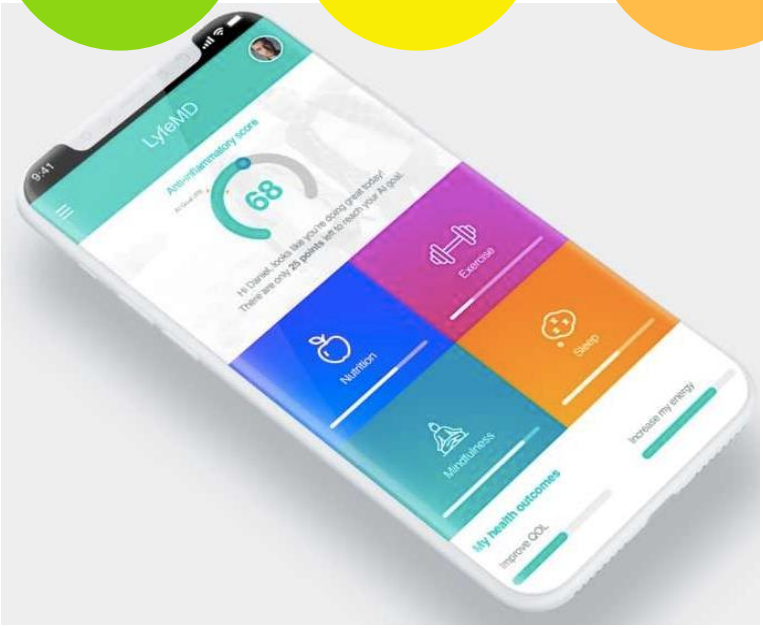
Nutrition tracking

Anti-inflammatory index

Stress management

Personalized meal plans

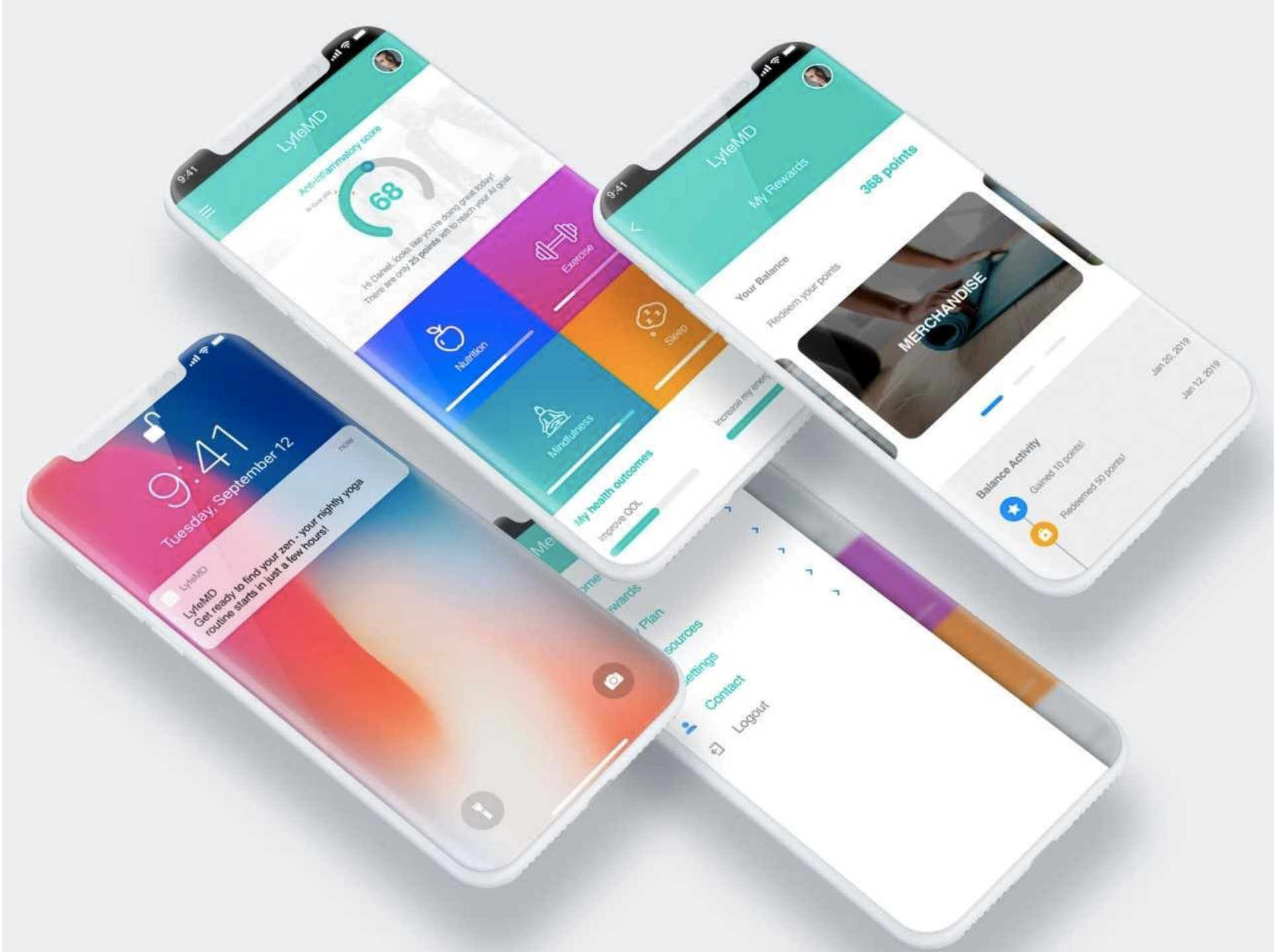
Nudges



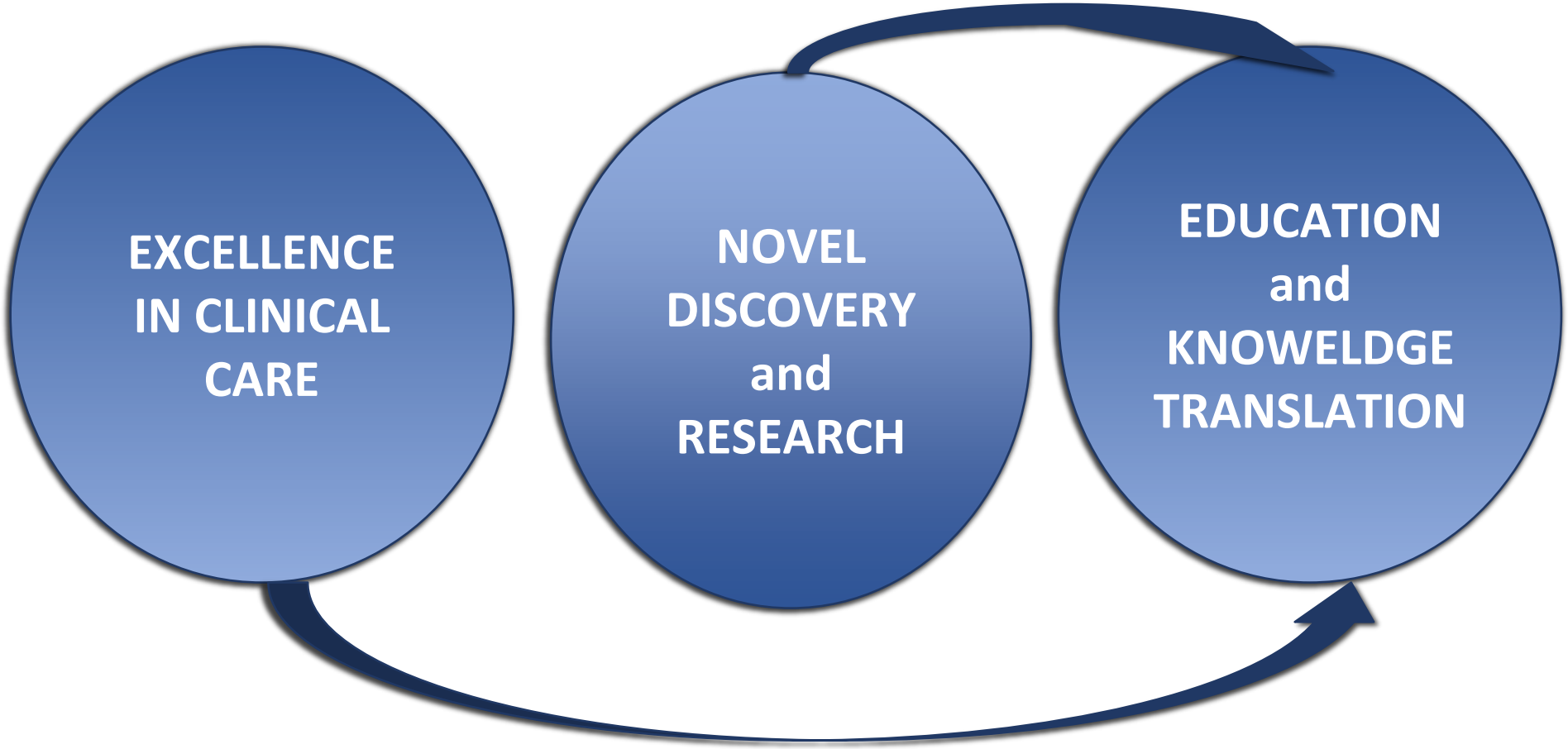
THE LyfeMD APP

EMPOWERING PATIENTS

MANAGE IBD


LyfeMD
9:41
Anti-inflammatory score
68
Exercise
Nutrition
Sleep
Mindfulness
My health outcomes
Improve QOL
Increase my energy
LyfeMD
My Rewards
368 points
Your Balance
Redeem your points
MERCHANDISE
Balance Activity
Gained 10 points!
Redeemed 50 points!
Jan 20, 2019
Jan 12, 2019
9:41
Tuesday, September 12
now
LyfeMD
Get ready to find your zen - your nightly yoga routine starts in just a few hours!
Contact
Logout

Ascend: Alberta's Collaboration of Excellence for Nutrition in Digestive Diseases



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Shommu N et al. Can J Gastroenterology. Accepted, 2018.

Ascend

Conclusions

- Malnutrition is common in cirrhosis and associated with increased clinical complications and poor QOL
- Nutrition therapy is of benefit in malnourished patients with cirrhosis
- Consider integrating both SGA in addition to a muscle measure (HGS/MAC/US) to assess muscle mass and quality
- Integrate physical activity to optimize muscle health

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