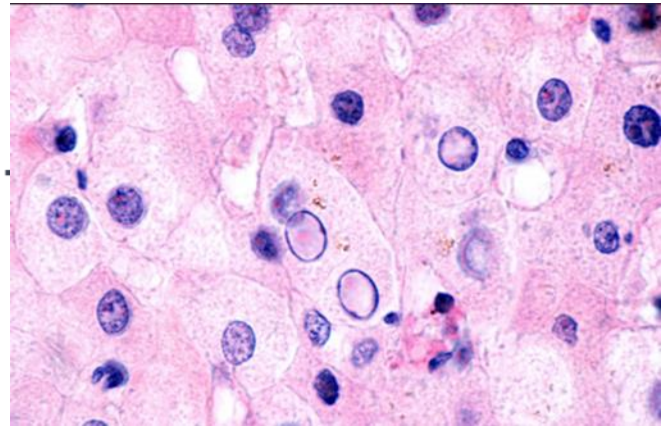
THEME II: Modern trends, new science

Hosted by Kamran Abbasi, The BMJ



Non-alcoholic fatty liver disease

Metabolic-associated steatotic liver disease

Prof. Dr. Manuel Romero-Gómez

UCM Digestive Diseases. Ciberehd.

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President AEEH

Conflict of interest

DISCLOSURES

- Consulting for: Alpha-sigma, Allergan, BMS, Boehringer-Ingelheim, Intercept, Innventia, Julius Clinical; Kaleido, MSD, Pfizer, Prosciento, Rubió, Shionogi, Siemens, Sobi, Thera, Zydus.
- Research Grants: Gilead, Intercept, Siemens, Theratechnologies, Echosens; NovoNordisk
- European funding programs: FP7 (FLIP), IMI2 (LITMUS), IHI3 (Grip-on-NASH)

Opinions expressed here are solely based on my own personal academic view and are intended to stimulate intelectual debate and not in any direct or indirect way drug prescription, clinical trial enrollment or any investment action.

- 37 years-old woman attended the first time in 2014 in our hepatology clinic due to altered liver function test
- No alcohol consumption. Smokes 6-7 cigarettes/day. Working on as office assistant.
- Blood test: normal blood count, liver biochemistry: AST 70 U/L, ALT: 112 UI/L; GGT: 26 U/L; AP: 87 U/L
- Any causes other than MASLD were ruled out.

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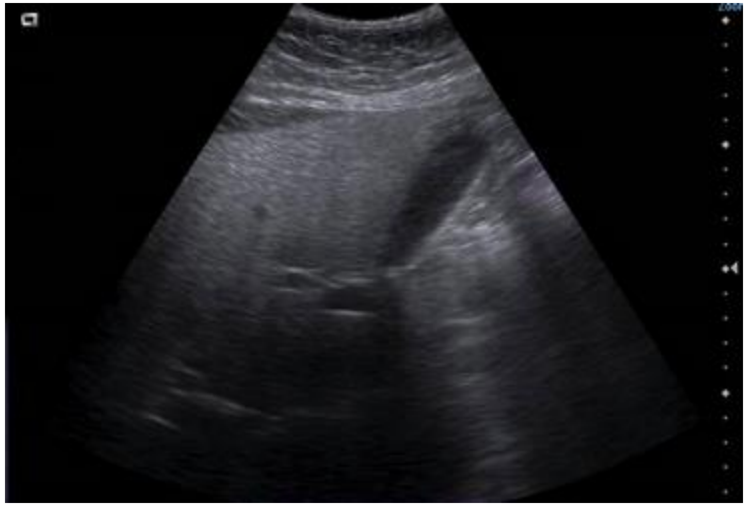

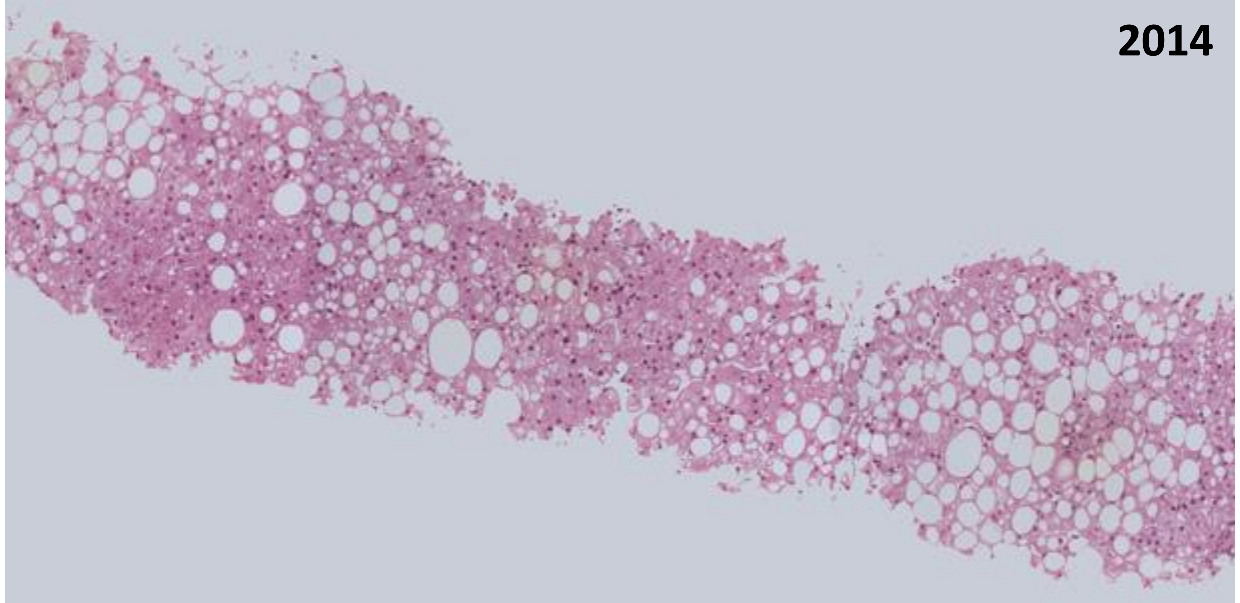

Macro-micro steatosis in 70% of hepatocytes: **S3A0F0**
No inflammation no ballooning no fibrosis.
Bland steatosis No steatohepatitis

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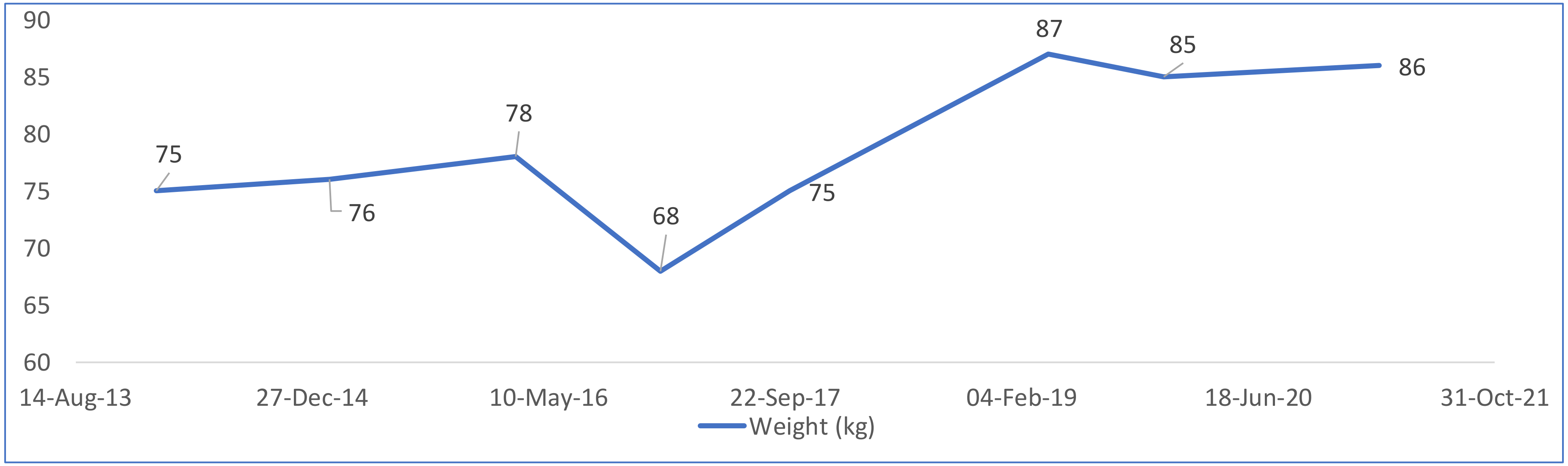
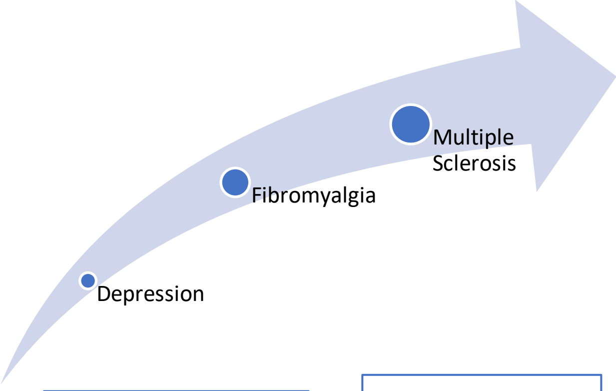
Disease progression: AST, ALT, stiffness & body weight

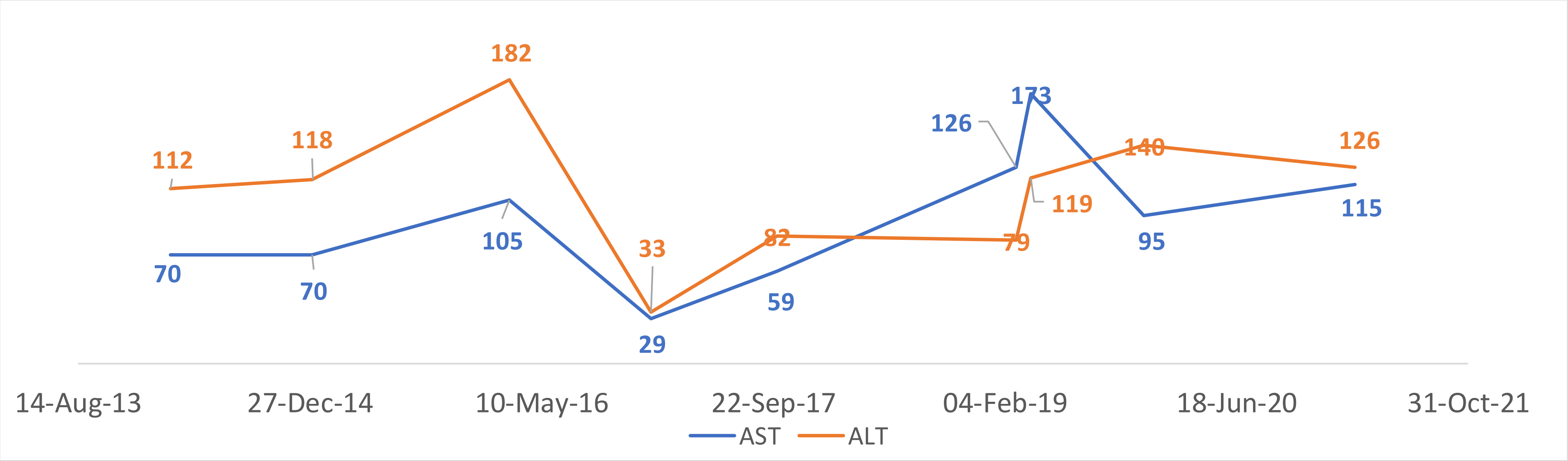
Transient elastography (kPa):	**5.8 kPa**	**9,7 kPa**	**17.4kPa**
CAP	**NA**	**363 dB7m**	**334 dB7m**





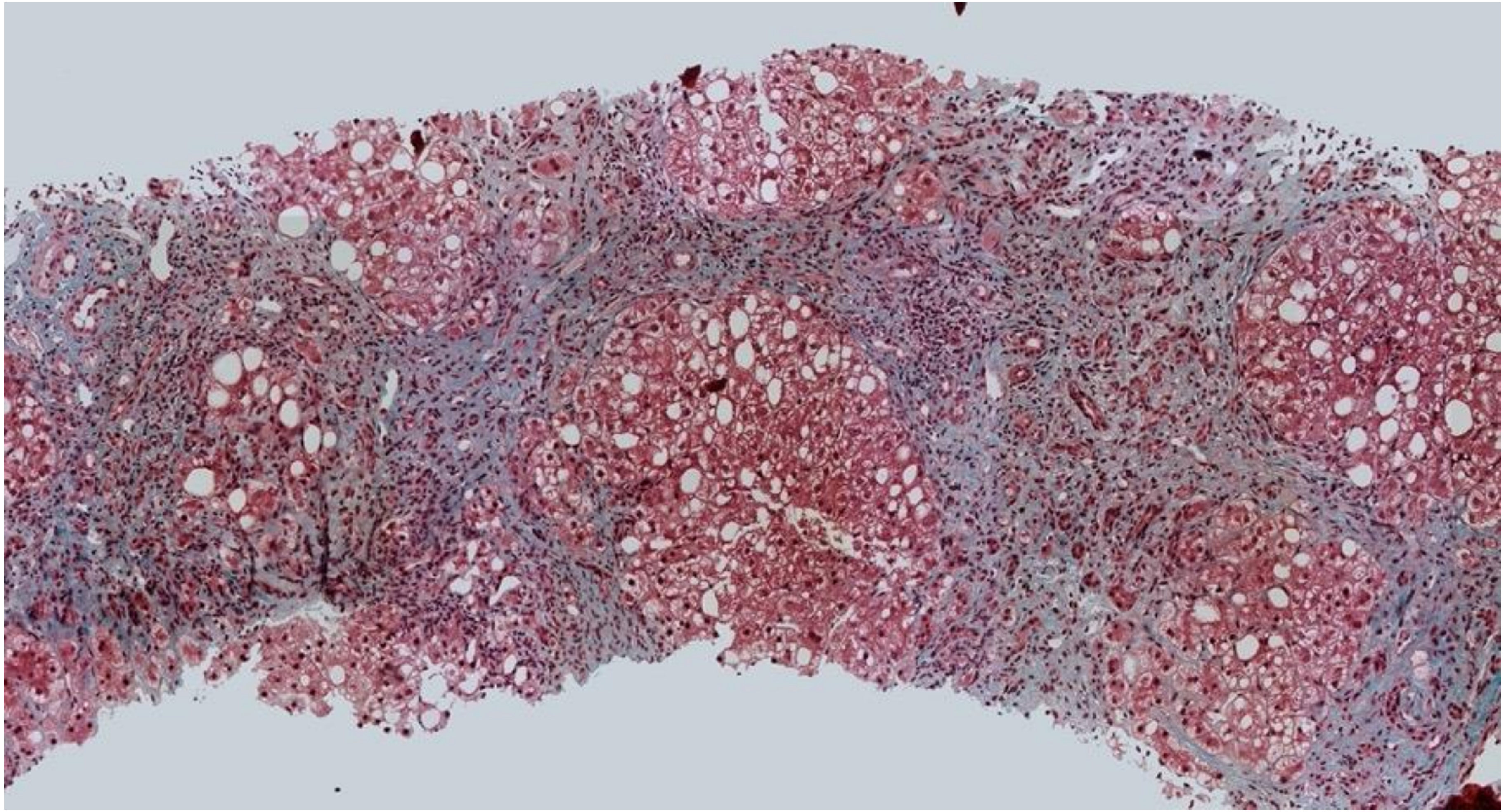
No physical exercise

Need to eat fatty food DMF



Worsening of MASH.

Second liver biopsy in May 2021



Liver biopsy: Macrovesicular steatosis (75%) with ballooning and lobular inflammation with bridging portal-sinusoidal fibrosis. No iron deposits.

Precirrhotic disease:

S3A2F3

Nutrition and diet could be the solution and the cause of MASLD

MASLD progression

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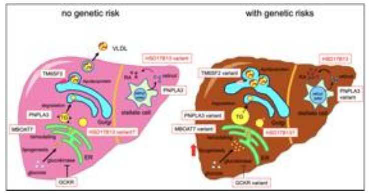
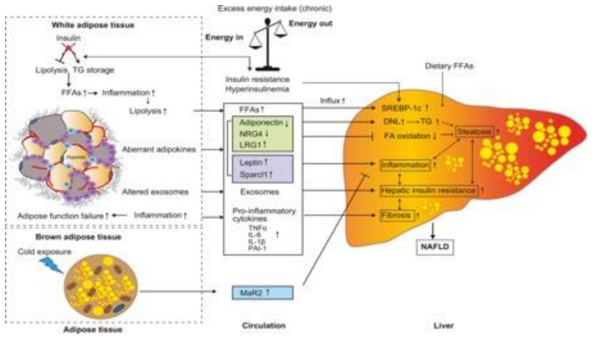
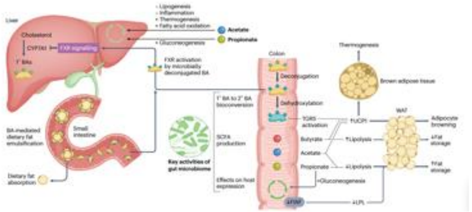
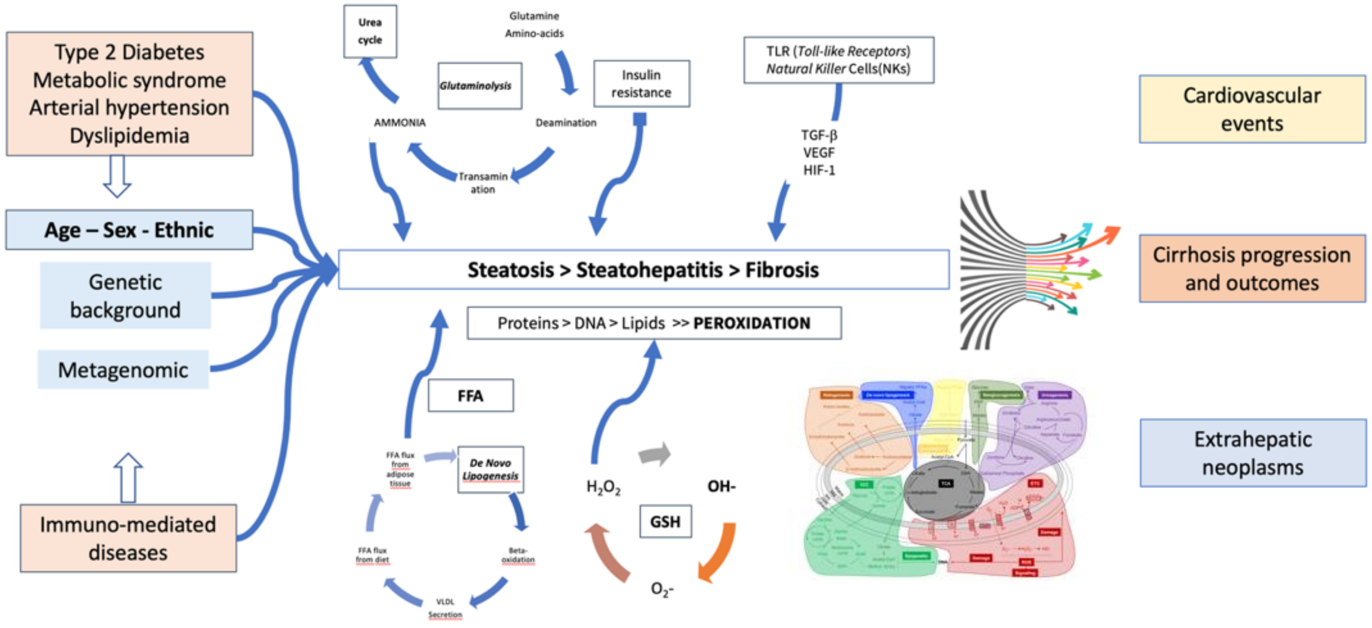


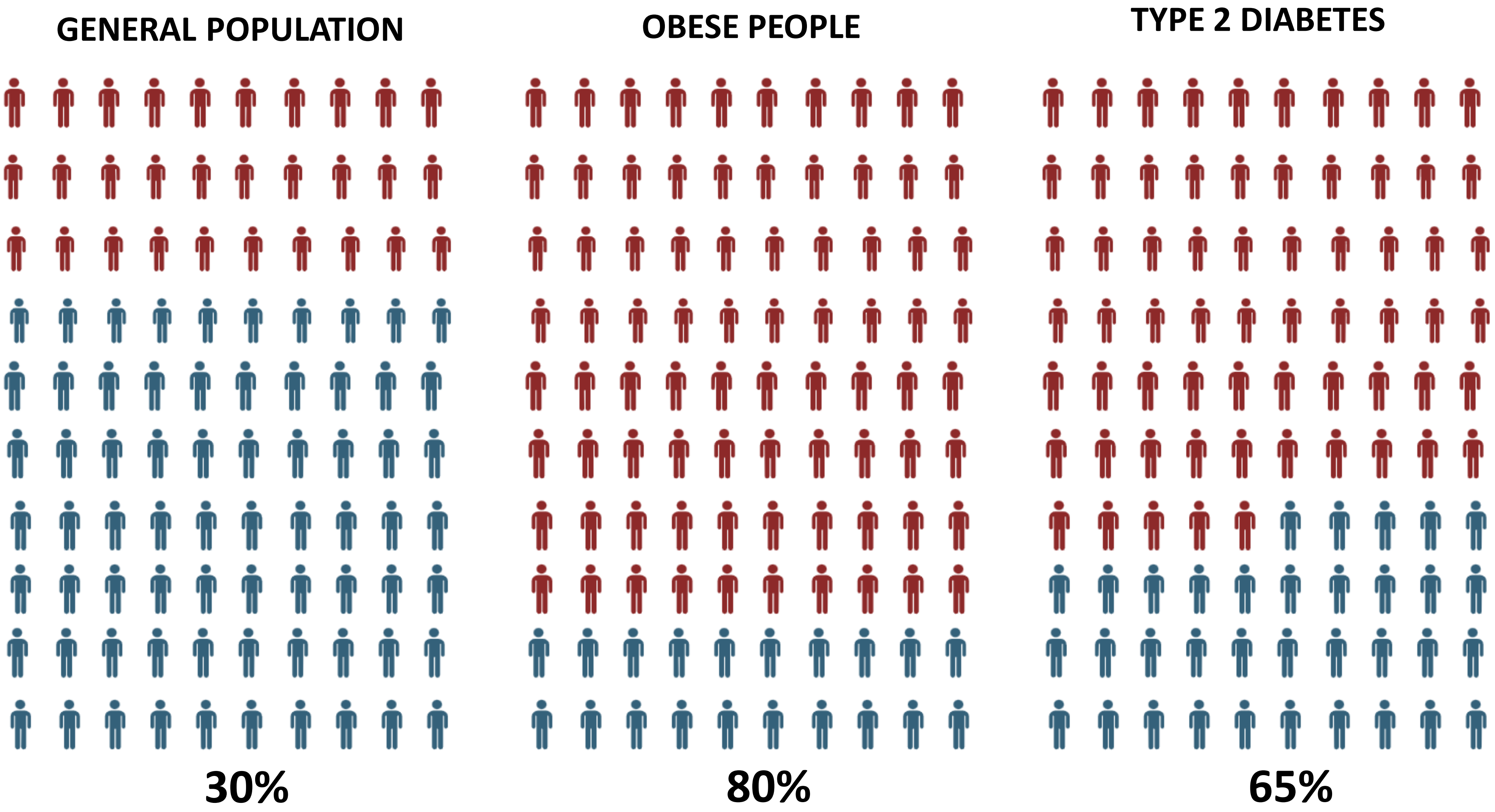






Romero-Gómez M. Med Clin 2022; Aron-Wisnewsky J et al. NRGH 2020; 17:219; Carmody RN et al. Nat Rev Microbiol 2023; Tilg et al. Nat Metab 2021; 3:1596 Lee et al. J Hepatol 2023; Morio B et al. Cell Calcium 2021;94: 102336

Prevalence of MASLD in general population, obese people and type 2 diabetes



by 3.5 times

Li et al. Obes Rev 2016

MASLD continues to be neglected

- Lack of awareness and education about preventing the disease, among the public as well as physicians
  - Under-diagnosis and under-reporting by physicians in Europe, USA and Australia
- NAFLD is barely mentioned in international and national guidelines on obesity and type 2 diabetes and is missing from the World Health Organization webpage on obesity complications (https://www.who.int/health-topics/obesity#tab=tab_2)
- No globally accepted, evidence based practical dietary recommendations for the prevention of NAFLD.

Lazarus et al. Nat Rev Gastroenterol Hepatol 2021;18:717-29
Alexander et al. BMC Med 2018;16:130
Patel et al. Intern Med J 2018;48:144-51

Modification of dietary habits

Dietary Recommendations

To reduce:

- calories intake
- Ultra processed food
- Saturated fats and trans fat
- High fructose – Sugar sweetened beverages

Overconsumption & weight gain

Less expensive

- Children
- Low socio-economic groups

Chips

Mass produced bread

Breakfast cereals

Biscuits

Lower nutritional quality

Higher energy density

Higher levels of Saturated fats & Salt

- ✓ **Soft drink consumption associated to NAFLD.**
- ✓ **Restriction of sugar and fructose associated to NAFLD improvement.**
- ✓ **Dietary share of UPF strongly related to NAFLD risk.**

Zhao et al. JAMA 2023;330:537-46; Zhang et al. Am J Clin Nutr 2021;113:1265-74; Schwimmer et al. JAMA 2019; 321:256-65; Zhang et al. Int J Epidemiol 2022;51:237-49; Hall et al. Cell Metab 2019;30:226-236; Golovaty et al. J Nutr 2020;150:91-98

Gastroenterology 2015;149:367–378

CLINICAL—LIVER

Weight Loss Through Lifestyle Modification Significantly Reduces Features of Nonalcoholic Steatohepatitis

Eduardo Vilar-Gomez,[1,2] Yadina Martinez-Perez,[1] Luis Calzadilla-Bertot,[1] Ana Torres-Gonzalez,[1] Bienvenido Gra-Oramas,[1] Licet Gonzalez-Fabian,[1] Scott L. Friedman,[4] Moises Diago,[5] and Manuel Romero-Gomez[2]

Weight loss is the ultimate and sufficient treatment for NASH (and fibrosis)

N=293

Diet Intervention
- Low-fat, average-protein diet (22% fat, 14% protein, and 64% carbohydrate).
- Saturated fat <8%, dietary fiber >20 g/d, and cholesterol <150 mg/1000 kcal.
- 3-day dietary food records completed at baseline and at 8, 16, 24, 32, 40, and 52 weeks.

Physical Activity
- ≥200 minutes per week, gradual increase from 90 minutes to 200 minutes of moderate intensity exercise per week during the first 6 months.
- Baecke physical activity questionnaire (16 items) at 8, 16, 24, 32, 40, and 52 weeks.

Behavioral Sessions
- Baseline: reccomendations from research dietitians.
- Follow-up: 2 hours individual meeting every 8 weeks during the first 6 months, 2-hour group sessions every 8 weeks for 6 additional months.
- Education program emphasizing diet compliance and exercise was implemented

% Weight loss (WL)		5%		7%		10%	
NASH-resolution	10%		26%		64%		90%
FIBROSIS-regression	45%		38%		50%		81%
STEATOSIS improvement	35%		65%		76%		100%
% Patients achieving WL	70%		12%		9%		10%

Table 2. Improvement of Histologic Outcomes Across Different Categories of Weight Loss at the End of Treatment

Variables	Overall (n = 293)	WL <5 (n = 205)	WL = 5–6.99 (n = 34)	WL = 7–9.99 (n = 25)	WL ≥10 (n = 29)	*P* value
Weight loss, %	3.8 ± 2.7	1.78 ± 0.16	5.86 ± 0.09	8.16 ± 0.22	13.04 ± 6.6	—
Resolution of steatohepatitis[a]	72 (25)	21 (10)	9 (26)	16 (64)	26 (90)	<.01

Romero-Gómez M, Zelber-Sagi S, Trenell M. J Hepatol 2017

Vilar-Gomez,…,Romero-Gomez, Gastroenterology 2015; 149:367-378

Impact of diet and nutrition on natural history of the disease

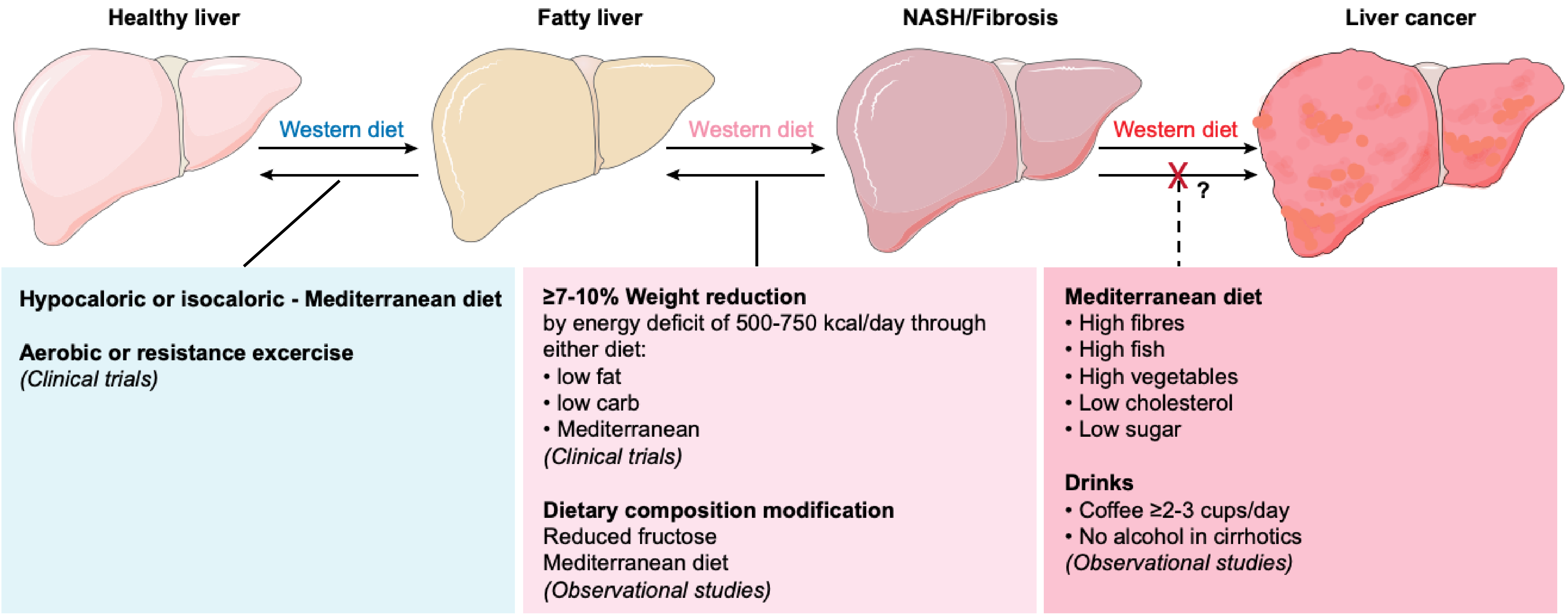


Fig. 1. A summary of the nutritional treatment options (based on clinical trials or observational studies) through the course of NAFLD. Remission of steatosis can occur with weight reduction achieved by several types of diet or with isocaloric Mediterranean diet (which induces metabolic and anti-inflammatory benefits), as indicated by clinical trials. For remission of NASH or fibrosis, there is no evidence from clinical trials for a benefit of merely improving dietary composition, while there is evidence that at least 7% weight reduction is needed. For prevention of progression to liver cancer, the evidence regarding certain foods and nutrients is derived only from large observational studies and needs further confirmation.

Romero-Gómez et al. J Hepatol 2017;

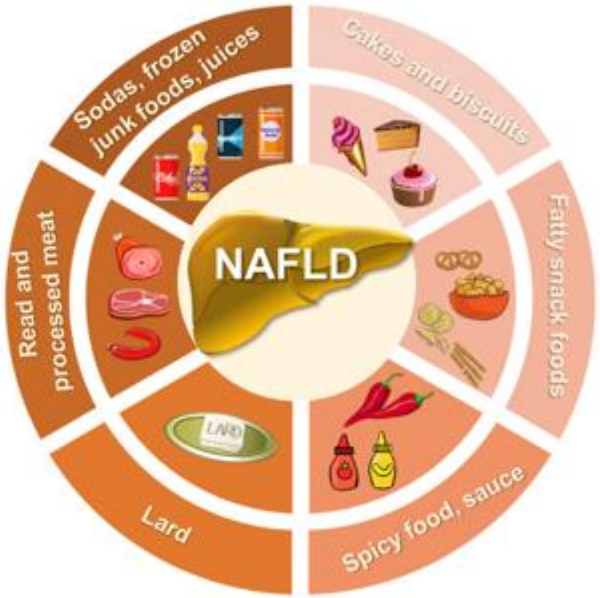
Received: 25 December 2019 | Accepted: 26 December 2019
DOI: 10.1111/liv.14360

REVIEW ARTICLE

Liver INTERNATIONAL WILEY

The role of nutrition in non-alcoholic fatty liver disease: Pathophysiology and management

Genoveva Berná[1] | Manuel Romero-Gomez[2]

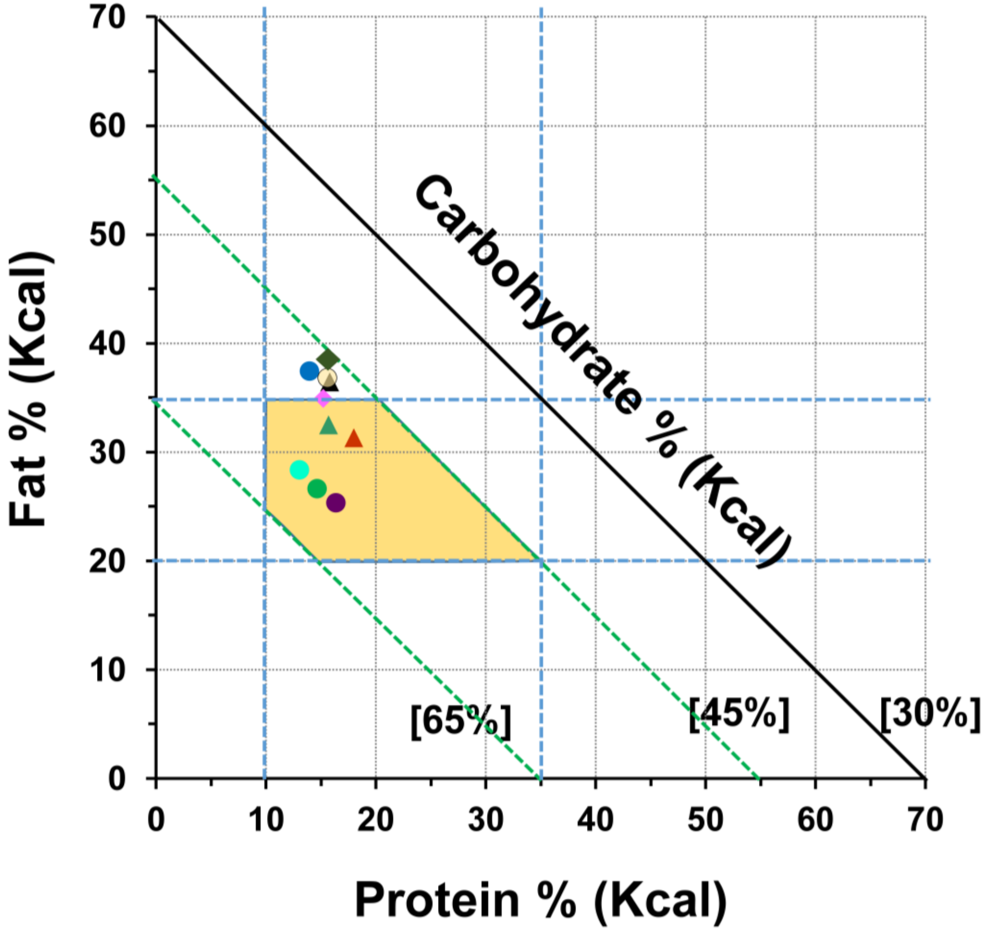


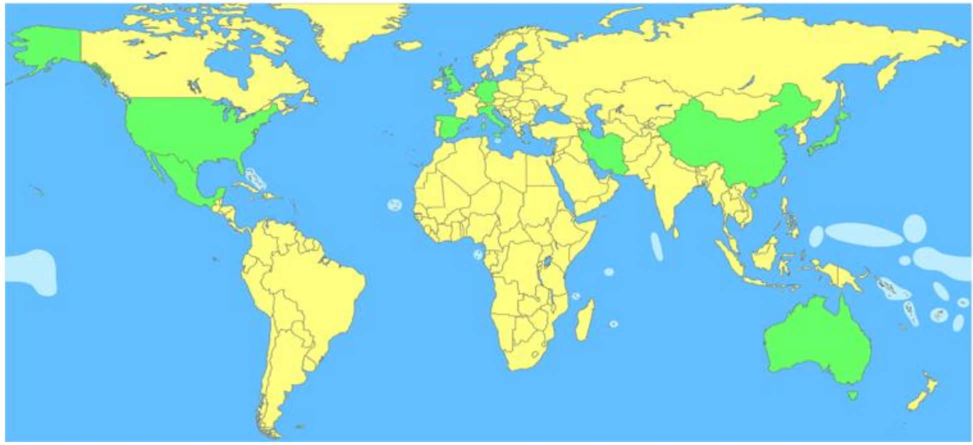
Nutrients that promote NAFLD: UPF, SFAs: saturated fatty acids; Trans FAs: trans fatty acids.

	NAFLD	Healthy
Dietary patterns	**Western dietary**	**Mediterranean Diet (MD)**
Foods intake	❖ *Processed foods* ❖ *Red meats* ❖ *Processed meats* ❖ *Sugary beverages* ❖ *Snacks* ❖ *cakes and biscuits* ❖ *eggs* ❖ *butter*	❖ *Extra virgin olive oil* ❖ *Vegetables and Fruits* ❖ *Cereals, legumes, nuts* ❖ *Moderate intakes of fish and other meat, dairy products and red wine* ❖ *Low intakes of eggs and sweets.*
Nutrients	↑**Energy intake** ↑SFA ↓PUFA ↑protein animal ↑sugar, fructose ↑cholesterol ↑Salt ↓fiber	↓SFA ↑**MUFA** ↑**PUFA** ↑protein vegetables ↓sugar fructose ↓cholesterol ↑**fiber** ↑**polyphenols,** ↑**carotenoids**

Berna & Romero-Gómez Liver Intern 2020

Micronutrients > macronutrients > food > meals > patterns

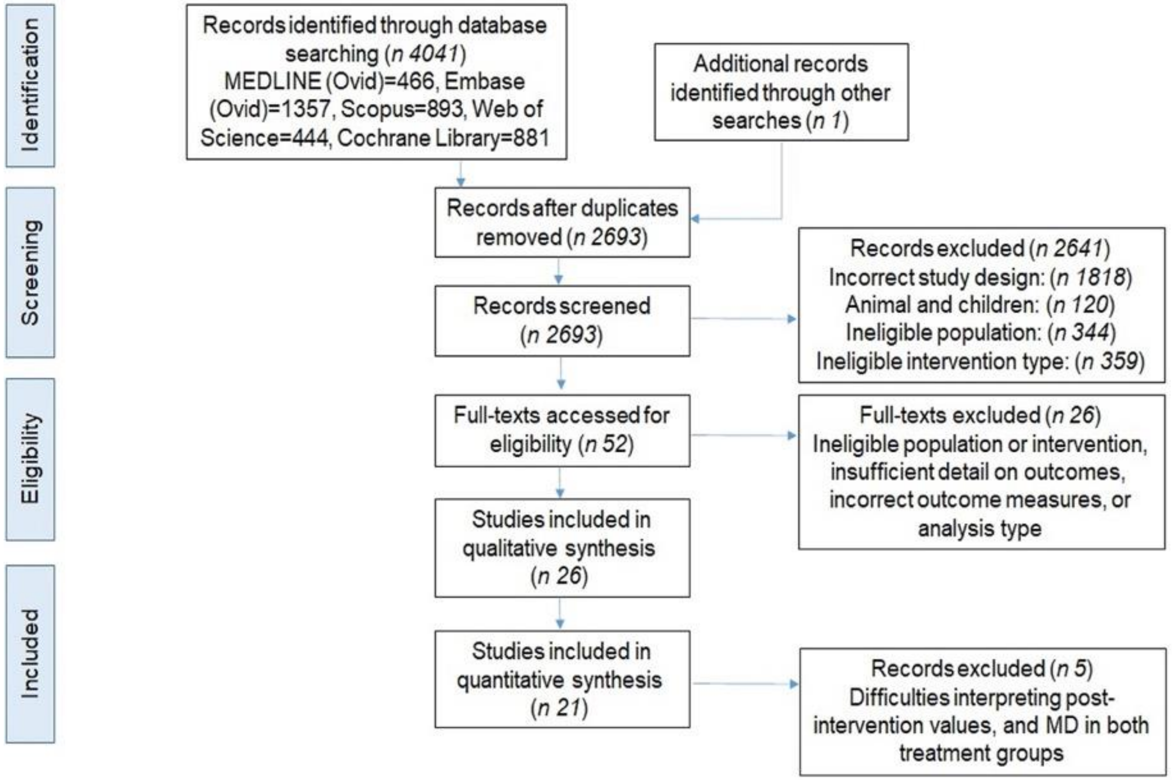




- Spain (ANIBE study)
- China (Fifth National Nutrition Survey)
- Japan (National Health and Nutrition Survey)
- Italy (Third National Food Consumption Survey)
- USA (NHANES 2017–2018)
- Australia (Australian Health Survey)
- UK (NDNS)
- German (NEMONIT)
- Mexico (Mexican National Health and Nutrition Survey)
- Iran (Isfahan Cohort Study)

Romero Gómez M, Aller R, Martín-Bermudo F. Semin Liver Dis 2022

The effectiveness and acceptability of Mediterranean diet and calorie restriction in non-alcoholic fatty liver disease (NAFLD): A systematic review and meta-analysis



Study ID	D1	D2	D3	D4	D5	Overall
Properzi 2018, Australia	+	-	+	+	+	-
Katsagoni 2018, Greece	!	!	+	+	+	!
Misciagna 2017, Italy	!	!	+	+	+	!
Abenavoli 2017, Italy	!	+	+	+	+	!
Marin-Alejandre 2019, Spain	!	+	-	+	!	-
Ristic-Medic 2021, Serbia	!	+	-	+	+	-
Nourian 2020, Iran	!	+	-	+	+	-
Abbate 2021, Spain	!	!	+	+	!	!
Yaskolka Meir 2021, Israel*	!	!	+	+	+	!
Willmann 2019, Germany*	!	+	-	+	+	-
Dorosti 2020, Iran	!	+	-	+	+	-
Shidfar 2018, Iran	!	+	-	+	+	-
Rezaei 2019, Iran	!	+	+	+	!	!
Wong 2013, Hong Kong	+	+	+	+	+	+
Dong 2016, China	!	+	+	+	+	!
Promrat 2010, USA	!	-	+	+	+	-
Cheng 2017, China	!	+	+	+	!	!
Johari 2019, Malaysia	!	+	+	+	+	!
Shojasaadat 2019, Iran	!	-	+	+	+	-
Ghetti 2019, Brazil	!	-	+	+	+	-
Holmer 2021, Sweden*	+	+	+	+	+	+

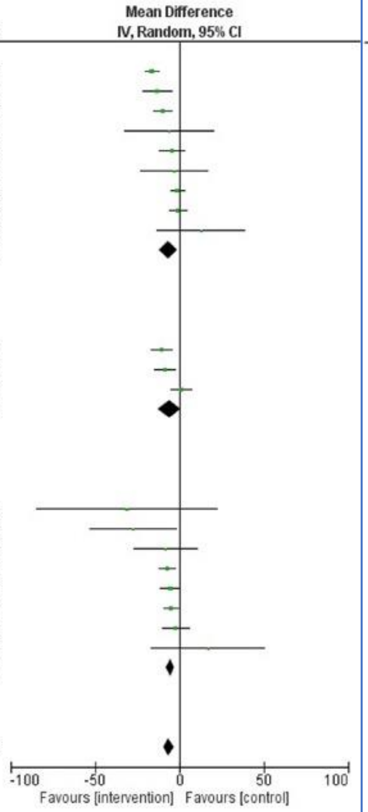
\+ Low risk
! Some concerns
\- High risk

D1 Randomisation process
D2 Deviations from the intended interventions
D3 Missing outcome data
D4 Measurement of the outcome
D5 Selection of the reported result

Haigh L et al. Clin Nutr 2022;41:1913-1931

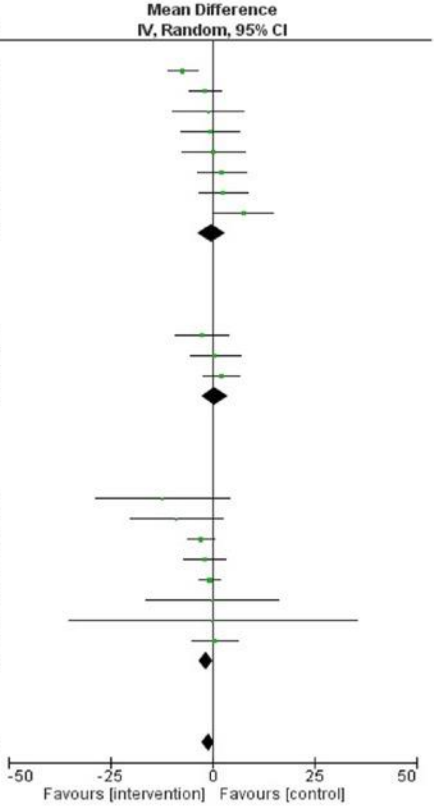
Effects of dietary interventions on ALT (n=1295)

Study or Subgroup	Dietary intervention Mean	SD	Total	Comparator (control) Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
1.2.1 MD interventions								
Abenavoli, L., et al., 2017	24.8	3.7	20	41	5.8	10	8.3%	-16.20 [-20.14, -12.26]
Nourian, M., et al., 2020	30.26	14.28	36	43.46	20.8528	33	5.4%	-13.20 [-21.71, -4.69]
Katsagoni, C.N., et al., 2018	34.5	6.4	21	44.5	7.5	11	7.5%	-10.00 [-15.21, -4.79]
Biolato, M., et al., 2019	52.2	32.3	18	58.3	38.7	12	1.1%	-6.10 [-32.60, 20.40]
Ristic-Medic, D., et al., 2021	27.33	6.46	12	31.92	11.89	12	5.9%	-4.59 [-12.25, 3.07]
Ryan, M.C., et al., 2013	42	12	12	45	33	12	1.8%	-3.00 [-22.87, 16.87]
Marin-Alejandre, B.A., et al., 2019	21.7	9.2	39	22.9	8.5	37	8.3%	-1.20 [-5.18, 2.78]
Abbate, M., et al., 2021	26	13.1	43	26.7	10.5	42	7.6%	-0.70 [-5.74, 4.34]
Properzi, C., et al., 2018	69	47	24	56	45	24	1.1%	13.00 [-13.03, 39.03]
Subtotal (95% CI)			**225**			**193**	**46.8%**	**-6.54 [-12.02, -1.05]**
Heterogeneity: Tau² = 44.83; Chi² = 41.05, df = 8 (P < 0.00001); I² = 81%								
Test for overall effect: Z = 2.34 (P = 0.02)								
1.2.2 MD components								
Shidfar, F., et al., 2018	35.7	11.3	25	46.2	10.3	25	6.9%	-10.50 [-16.49, -4.51]
Dorosti, M., et al., 2020	24.1	12.2	47	32.5	18.2	47	6.7%	-8.40 [-14.66, -2.14]
Rezaei, S., et al., 2019	24.3	14.1	32	23.3	11.3	34	6.8%	1.00 [-5.19, 7.19]
Subtotal (95% CI)			**104**			**106**	**20.5%**	**-5.99 [-12.93, 0.95]**
Heterogeneity: Tau² = 27.76; Chi² = 7.64, df = 2 (P = 0.02); I² = 74%								
Test for overall effect: Z = 1.69 (P = 0.09)								
1.2.3 CRI								
Johari, M.I., et al., 2019	59.2	89.4468	30	90.2	65.3078	9	0.3%	-31.00 [-84.34, 22.34]
Promrat, K., et al., 2010	41.7	20.8	20	69	38.5	10	1.2%	-27.30 [-52.84, -1.76]
Ghetti, F.F., et al., 2019	44.4	34.4354	20	52.4	25.9384	20	1.9%	-8.00 [-26.89, 10.89]
Wong, V.W., et al., 2013	26	13	77	33	17	77	7.7%	-7.00 [-11.78, -2.22]
Cheng, S., et al., 2017	18.2	10.8315	28	23.5	11.8303	29	7.0%	-5.30 [-11.19, 0.59]
Dong, F., et al., 2016	24	12.5	130	28.8	20.9	130	8.1%	-4.80 [-8.99, -0.61]
Shojasaadat, F., et al., 2019	29.1	17.3	35	31.1	15.5	34	5.8%	-2.00 [-9.75, 5.75]
Browning, J.D., et al., 2011	98	25	9	81	45	9	0.7%	17.00 [-16.63, 50.63]
Subtotal (95% CI)			**349**			**318**	**32.8%**	**-5.44 [-8.01, -2.88]**
Heterogeneity: Tau² = 0.00; Chi² = 6.73, df = 7 (P = 0.46); I² = 0%								
Test for overall effect: Z = 4.16 (P < 0.0001)								
Total (95% CI)			**678**			**617**	**100.0%**	**-6.28 [-9.21, -3.34]**
Heterogeneity: Tau² = 22.97; Chi² = 56.86, df = 19 (P < 0.0001); I² = 67%								
Test for overall effect: Z = 4.19 (P < 0.0001)								
Test for subgroup differences: Chi² = 0.13, df = 2 (P = 0.93), I² = 0%								



Effects of dietary interventions on body weight (n=1226)

Study or Subgroup	Dietary intervention Mean	SD	Total	Comparator (control) Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
1.1.1 MD interventions								
Abenavoli, L., et al., 2017	77.8	1.4	20	85	5.8	10	9.6%	-7.20 [-10.85, -3.55]
Katsagoni, C.N., et al., 2018	84.8	6.6	21	86.6	4.8	11	8.7%	-1.80 [-5.80, 2.20]
Ryan, M.C., et al., 2013	87.3	10.3	12	88.3	11.4	12	2.9%	-1.00 [-9.69, 7.69]
Ristic-Medic, D., et al., 2021	91.88	9.48	12	92.41	8.14	12	4.1%	-0.53 [-7.60, 6.54]
Biolato, M., et al., 2019	86	12.4	18	85.7	9.4	12	3.5%	0.30 [-7.52, 8.12]
Marin-Alejandre, B.A., et al., 2019	86.6	13.2	39	84.2	13.1	37	5.4%	2.40 [-3.51, 8.31]
Abbate, M., et al., 2021	89.3	14.3	43	86.7	13.8	42	5.3%	2.60 [-3.37, 8.57]
Properzi, C., et al., 2018	87.3	12.5	24	79.6	13.5	24	3.9%	7.70 [0.34, 15.06]
Subtotal (95% CI)			**189**			**160**	**43.3%**	**-0.17 [-3.61, 3.28]**
Heterogeneity: Tau² = 14.72; Chi² = 19.18, df = 7 (P = 0.008); I² = 63%								
Test for overall effect: Z = 0.09 (P = 0.93)								
1.1.2 MD components								
Shidfar, F., et al., 2018	76.2	10.1	25	78.7	12.9	25	4.8%	-2.50 [-8.92, 3.92]
Rezaei, S., et al., 2019	79.1	13.3	32	78.4	12.2	34	5.0%	0.70 [-5.47, 6.87]
Dorosti, M., et al., 2020	84.2	11.8	47	82	10.6	47	7.6%	2.20 [-2.33, 6.73]
Subtotal (95% CI)			**104**			**106**	**17.4%**	**0.65 [-2.52, 3.83]**
Heterogeneity: Tau² = 0.00; Chi² = 1.37, df = 2 (P = 0.50); I² = 0%								
Test for overall effect: Z = 0.40 (P = 0.69)								
1.1.3 CRI								
Promrat, K., et al., 2010	90.2	25.9	20	102.4	19.2	10	0.9%	-12.20 [-28.65, 4.25]
Ghetti, F.F., et al., 2019	79.2	9.8387	20	87.9	24.1495	20	1.8%	-8.70 [-20.13, 2.73]
Wong, V.W., et al., 2013	65	11	77	67.8	9.9	77	10.5%	-2.80 [-6.11, 0.51]
Cheng, S., et al., 2017	67.9	10.0578	28	69.7	9.7271	29	6.5%	-1.80 [-6.94, 3.34]
Dong, F., et al., 2016	75.3	9.9	130	76	11	130	12.7%	-0.70 [-3.24, 1.84]
Browning, J.D., et al., 2011	92	15	9	92	20	9	0.9%	0.00 [-16.33, 16.33]
Johari, M.I., et al., 2019	78.8	90.2503	30	78.6	22.1162	9	0.2%	0.20 [-35.18, 35.58]
Shojasaadat, F., et al., 2019	84.4	12.5	35	83.7	11.3	34	5.8%	0.70 [-4.92, 6.32]
Subtotal (95% CI)			**349**			**318**	**39.3%**	**-1.57 [-3.31, 0.16]**
Heterogeneity: Tau² = 0.00; Chi² = 4.76, df = 7 (P = 0.69); I² = 0%								
Test for overall effect: Z = 1.78 (P = 0.08)								
Total (95% CI)			**642**			**584**	**100.0%**	**-0.97 [-2.60, 0.66]**
Heterogeneity: Tau² = 3.73; Chi² = 26.88, df = 18 (P = 0.08); I² = 33%								
Test for overall effect: Z = 1.17 (P = 0.24)								
Test for subgroup differences: Chi² = 1.67, df = 2 (P = 0.43), I² = 0%								

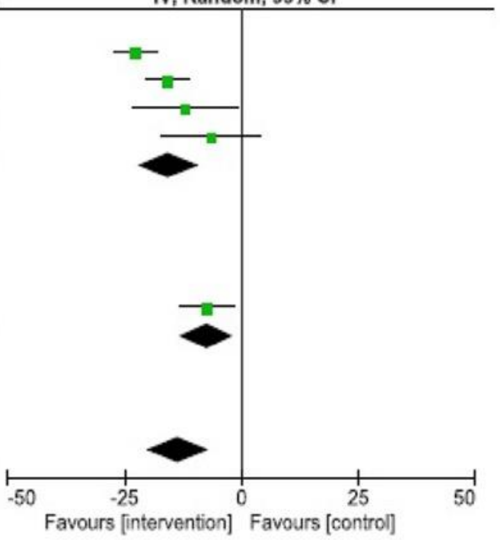


SD, standard deviation; IV, inverse variance; CI, confidence interval; MD, Mediterranean diet; CRI, calorie restricted interventions.

Haigh L et al. Clin Nutr 2022;41:1913-1931

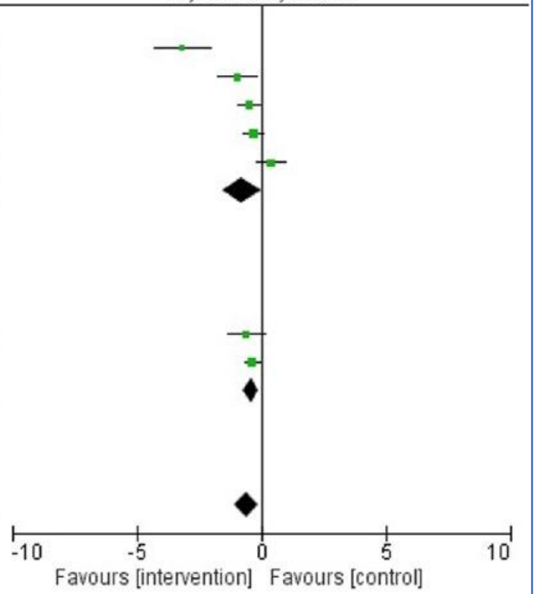
Effects of dietary interventions on Fatty Liver Index (n=488)

Study or Subgroup	Dietary intervention Mean	SD	Total	Comparator (control) Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
1.6.1 MD interventions								
Abenavoli, L., et al., 2017	49.5	8.68	20	72.25	4.37	10	23.6%	-22.75 [-27.42, -18.08]
Misciagna, G., et al., 2017	53.98	13.21	50	69.73	9.91	48	23.7%	-15.75 [-20.36, -11.14]
Ristic-Medic, D., et al., 2021	43.17	7.99	12	55.08	18.22	12	14.9%	-11.91 [-23.17, -0.65]
Marin-Alejandre, B.A., et al., 2019	47.9	24.1	39	54.4	23.7	37	15.5%	-6.50 [-17.25, 4.25]
Subtotal (95% CI)			**121**			**107**	**77.8%**	**-15.60 [-22.01, -9.18]**
Heterogeneity: Tau² = 27.89; Chi² = 10.37, df = 3 (P = 0.02); I² = 71%								
Test for overall effect: Z = 4.77 (P < 0.00001)								
1.6.3 CRI								
Dong, F., et al., 2016	44.72	23.08	130	52.06	24.38	130	22.2%	-7.34 [-13.11, -1.57]
Subtotal (95% CI)			**130**			**130**	**22.2%**	**-7.34 [-13.11, -1.57]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 2.49 (P = 0.01)								
Total (95% CI)			**251**			**237**	**100.0%**	**-13.52 [-20.05, -7.00]**
Heterogeneity: Tau² = 41.30; Chi² = 20.03, df = 4 (P = 0.0005); I² = 80%								
Test for overall effect: Z = 4.06 (P < 0.0001)								
Test for subgroup differences: Chi² = 3.52, df = 1 (P = 0.06), I² = 71.6%								



Effects of dietary interventions on Transient Elastography (LSM) (n=464)

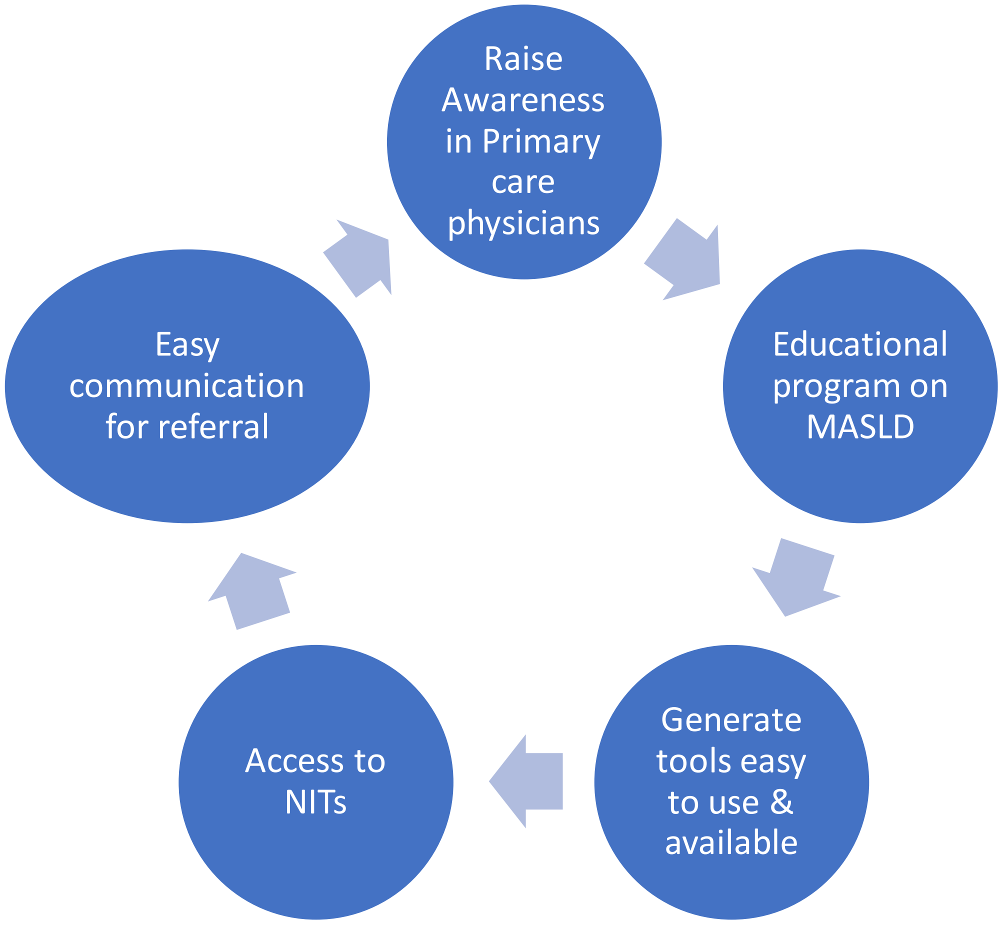
Study or Subgroup	Dietary intervention Mean	SD	Total	Comparator (control) Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
1.7.1 MD interventions								
Abenavoli, L., et al., 2017	6	0.6	20	8.3	0.9	10	9.2%	-3.15 [-4.29, -2.01]
Katsagoni, C.N., et al., 2018	6.9	1.4	21	8.3	1.5	11	12.8%	-0.95 [-1.72, -0.18]
Marin-Alejandre, B.A., et al., 2019	1.7	0.6	39	2	0.7	37	16.2%	-0.46 [-0.91, -0.00]
Abbate, M., et al., 2021	4.8	1.6	43	5.3	1.7	42	16.5%	-0.30 [-0.73, 0.13]
Properzi, C., et al., 2018	11.7	15.3	24	7	6	24	15.0%	0.40 [-0.17, 0.97]
Subtotal (95% CI)			**147**			**124**	**69.6%**	**-0.75 [-1.51, 0.00]**
Heterogeneity: Tau² = 0.63; Chi² = 31.91, df = 4 (P < 0.00001); I² = 87%								
Test for overall effect: Z = 1.95 (P = 0.05)								
1.7.3 CRI								
Johari, M.I., et al., 2019	5	2.678	30	6.5	1.8343	9	12.9%	-0.58 [-1.34, 0.17]
Wong, V.W., et al., 2013	4.6	1.4	77	5.2	1.9	77	17.5%	-0.36 [-0.68, -0.04]
Subtotal (95% CI)			**107**			**86**	**30.4%**	**-0.39 [-0.69, -0.10]**
Heterogeneity: Tau² = 0.00; Chi² = 0.29, df = 1 (P = 0.59); I² = 0%								
Test for overall effect: Z = 2.61 (P = 0.009)								
Total (95% CI)			**254**			**210**	**100.0%**	**-0.61 [-1.09, -0.13]**
Heterogeneity: Tau² = 0.32; Chi² = 32.22, df = 6 (P < 0.0001); I² = 81%								
Test for overall effect: Z = 2.49 (P = 0.01)								
Test for subgroup differences: Chi² = 0.76, df = 1 (P = 0.38), I² = 0%								

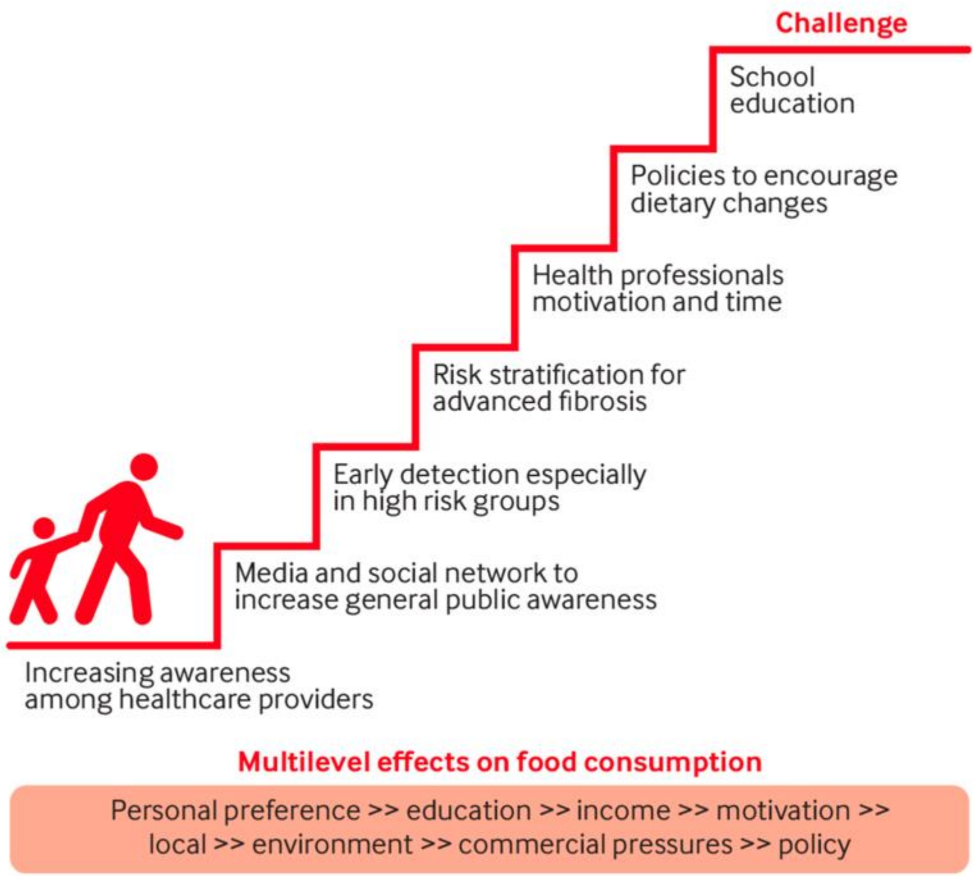


Haigh L et al. Clin Nutr 2022;41:1913-1931

A societal approach to preventing NAFLD

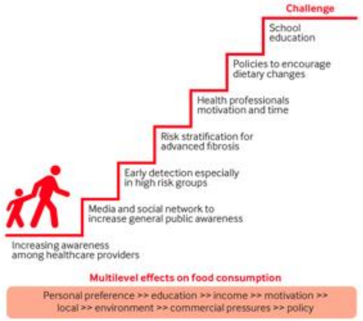
i. Prevention, early detection and referral





Maya-Miles et al. Liver Intern 2022

A societal approach to preventing NAFLD



ii. Patient centered multidisciplinary care for NAFLD:
   a. Educational programs
   b. Public health campaigns:
      i. Interventions in families and primary schools
      ii. Social media & internet

Routine care:
Overweight or obese people with NAFLD

→

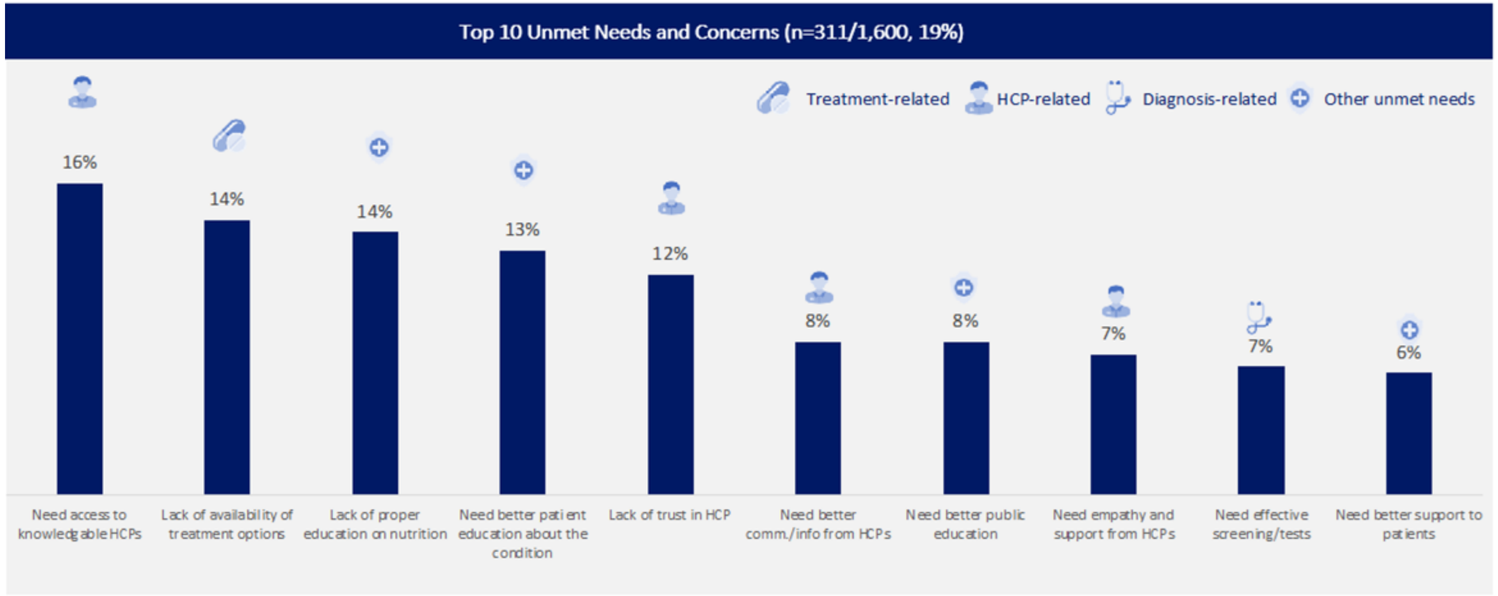
Recommendations diet & physical activity
50%

→

Weight reduction (>5%) (39 months)
32%

→

Weight regain
21.2%



By listening to the voices of people living with NAFLD, the community of practice can grow and develop more effective ways to help them manage their condition

Lazarus et al. AASL2023
Malespin et al. Clin Gastroenterol Hepatol 2021;

A societal approach to preventing NAFLD: Reformulation of unhealthy foods

ii. Patient centered multidisciplinary care for NAFLD:
- i. Regulate advertising and marketing:
  - i. Front of package labelling system
  - ii. Limiting promotion of sugar and fat.
  - iii. To reduce children exposure
  - iv. Taxation on unhealthy foods

Most policy evaluations are observational in nature

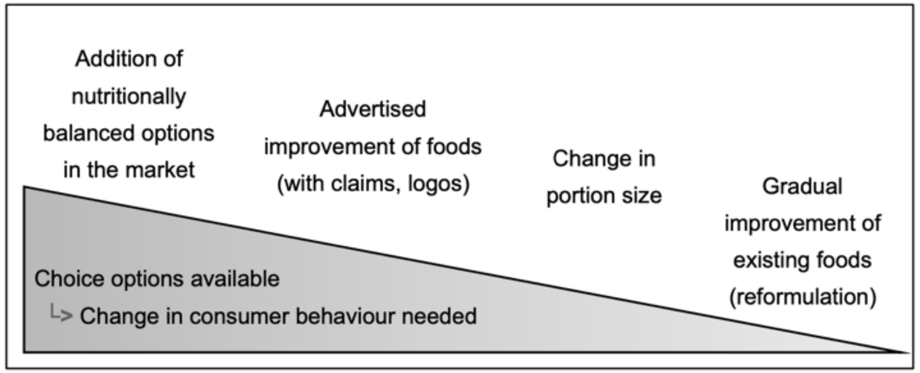


Figure 1. Classifications of strategies changing the characteristics of food available for a population along a gradient of change in consumer behaviour needed to get a benefit from the new food products.

UK parliament
British liver Trust
Liver Cancer UK

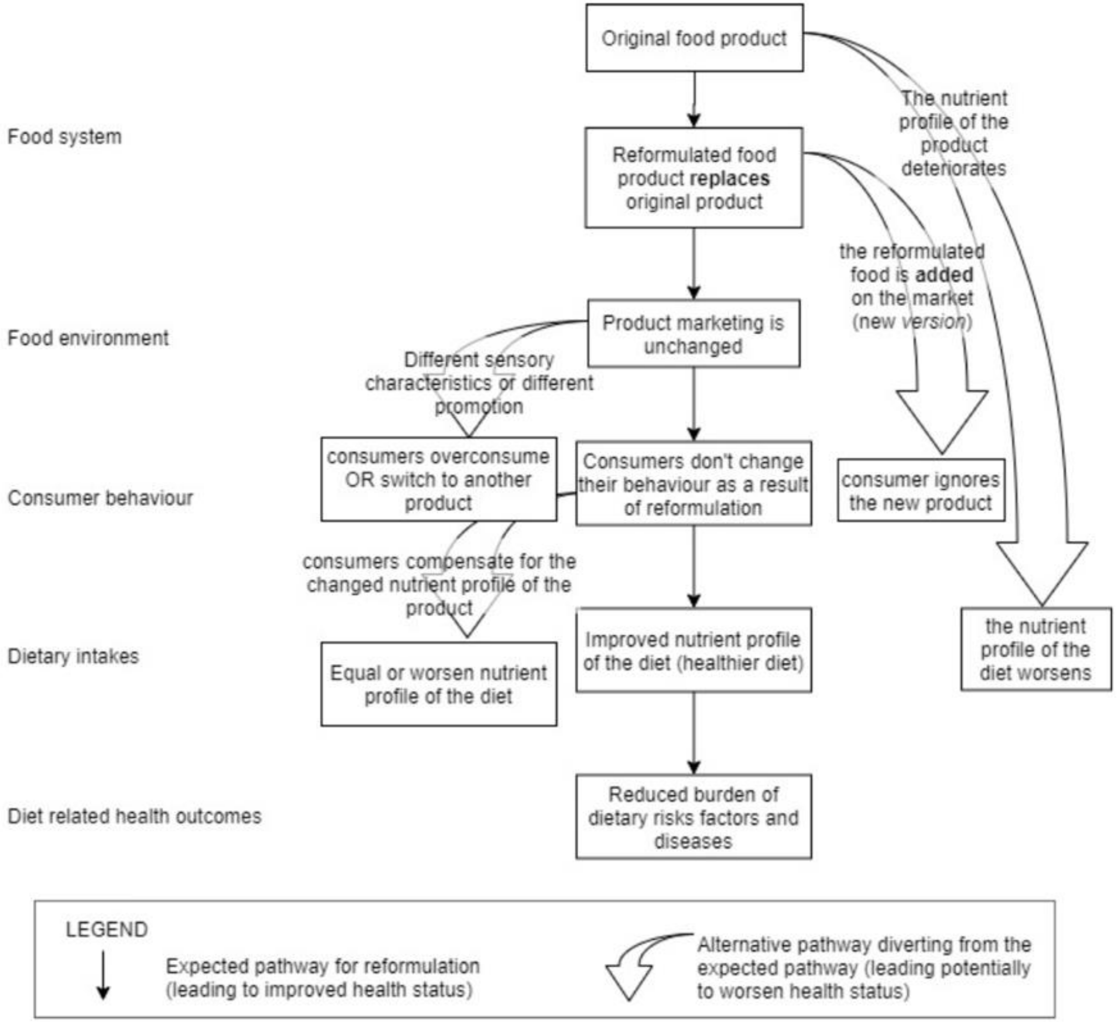


Figure 2. Logic model of the effect of reformulating existing food products, and sources of diversion from the expected health benefits.

Gressier et al. Nutrients 2020;12. 1992

A societal approach to preventing NAFLD

iii. Nutrition and dietary guidelines for NAFLD prevention

a. To reach general population
b. To reach health professionals
c. To promote multidisciplinary teams
d. Integration of NAFLD management in Diabetes and obesity guidelines.

No direct evidence linking food taxation to NAFLD risk

Taxation of sugar added foods & sugar sweetened drinks reduced SSB consumption but increased unhealthy food untaxed.
Specific taxes alone did not work and should be added to other taxes and subsidy for fruits and vegetables.

Tackling NAFLD necessitates a multifaceted approach requiring collaboration across governments, healthcare institutions, communities, families, and individuals.
Policy interventions when paired with individual efforts to adopt a healthy lifestyle, can help to prevent and control NAFLD.

Batis et al. JAMA Net Open 2023;6:e2325191
Blakely et al. Lancet Public Health 2020;5:e404-413

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