Appendix 1: Summary of reviewed literature examining TFA and health outcomes

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
All-Cause Mortality						
(Kiage et al., 2013) **Prospective**	**Total TFA** All-cause mortality & total dietary TFA	***Country:*** US REGARDS Cohort ***N***=18153, 56% F ***Age:*** mean 65 (≥ 45)y 7y FU 1572 deaths ***Intake TFA (% E):*** 2.97±1.117	***Dietary assessment:*** Self-administered Block 98 FFQ ***Outcome dx:*** Social security death index or national death index	Age, sex, smoking status, race, religion, alcohol use, education, WC, PAL, T2D. IHD, HTN, CKD, statin use, TEI, energy adj. SFA, PUFA, MUFA & PRO.	↓ to ↑ quintile TFA intake; mortality rates per 1000 person yrs FU: **After adj; HR (95% CI): 1st quintile 1.00, 2nd quintile 1.03 (0.86, 1.23), 3rd quintile 0.98 (0.82,1.17), 4th quintile 1.25 (1.05, 1.48) 5th quintile 1.24 (1.05, 1.48) Population attributable risk due to TFA intake was 7% (95% CI 5%, 8%)	**Intake: +ve assoc. TFA and all-cause mortality** Association only significant at higher intakes Data not yet available on all individual causes of death for this cohort
CHD						
(Chiuve et al., 2009) **Prospective**	**Total TFA (18:1 & 18:2)** Intake of TTFA, trans -18:1 and trans 18:2 & risk of SCD	***Country***: US NHS ***N***=86 762 **F** ***Age***: 60 y 26y FU 317 SCD events ***TFA intake (% E):*** Total TFA:1.54 18:1:1.26 18:2:1.09	***Dietary assessment:*** Self-administered FFQ every 4 y ***Outcome dx:*** Medical records	Age, TEI, CVD risk factors	No significant association: ↑ vs ↓ quintile of TFA intake RR, 95% CI: Total TFA: 1.28 (0.82, 2.00) Trans 18:1: 1.08 (0.64, 1.83) Trans 18:2; 1.19 (0.76, 1.88) In F:↑ vs ↓ quintile of intake ** Total TFA & SCD with CHD: RR 3.24 (1.42, 7.40)	**Intake: No assoc. TTFA or trans 18:1, 18:2 with SCD except for women with CHD.** **+ve assoc. b/t intake of TFA & SCD in women with CHD**
(Khaw, Friesen, Riboli, Luben, & Wareham, 2012) **Case-control**	**Total TFA** Plasma phospholipid FA (PFA) conc. & incident CHD	**Country:** UK EPIC-Norfolk Study ***N***=7354, 47% F Cases: 2424 (776 F) Control: 4930(2684 F) ***Age:*** 62.4 (40-79) y 12-16y FU	***Serum TFA:*** gas chromatography ***Outcome dx:*** Hospital admission or death from CHD	Age, sex, FA, BMI, PAL, smoking, alcohol, social class, education, plasma Vit. C, diabetes hx,	↑ vs ↓ quintile of intake Trans PFA: Fully adjusted model; OR 0.98 (0.91-1.05)p=0.5	**Serum: No assoc. TTFA conc. & CHD** Only measured 2 tFA: 16:1 n-9 trans & 18:1 n 9 trans.

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
		TFA conc. (% total) Cases: 0.1(0.1) Control:0.1 (0.1)		SBP, Chol.		
(Laake et al., 2012) **Prospective**	**PHVO, PHFO & rTFA** Intake of TFA from PHVO, PHFO, rTFA & risk of death from CVD, CHD, cerebrovascular diseases	***Country:*** Norway NCS **N**=71 464 (50%M) ***Age:*** 41 (20-49)y 19-33y FU Deaths during FU: 3870 CVD 2383 CHD 732 cerebrovascular ***Mean intake (% E)***: PHVO: 0.9 PHFO: 1.6 rTFA: 0.6	***Dietary assessment:*** 80 item SFFQ (special emphasis on fat sources) ***Outcome dx:*** death statistics for CVD, CHD, cerebrovascular diseases	Age, TEI, SBP, BMI, smoking, education, SFA, rTFA, TFA, PHVO, PRO, Chol, CHO	↑ vs ↓ quintile of intake: HR (95% CI) – significant assoc were: <u>TFA from PHVO</u> CHD : 1·23 (95 % CI 1·00, 1·50) Cerebrovascular diseases 0·65 (95 % CI 0·45, 0·94) <u>TFA from PHFO</u> CVD 1·14 (95 % CI 1·03, 1·26) Cerebrovascular diseases 1·32 (95 % CI 1·04, 1·69) <u>rTFA intake</u> CVD 1·30 (95% CI 1·05, 1·61) CHD 1·50 (95% CI 1·11, 2·03) Sudden death 2·73 (95% CI 1·19, 6·25) in women. These associations with rTFA intake were not significant in men	**Intake: +ve, -ve and neutral associations found** b/t TFA intake from PHVO, PHFO or rTFA and CVD or CHD.
(Mashal, Oudeh, Al-Ismail, Abu-Hammour, & Al-Domi, 2012) **Case-control**	**Total TFA** TFA intake & CHD	***Country:*** Jordan ***N***=191, 53% m Cases=100 Control=91 ***Age*****:** 41.9y	***Dietary assessment:*** 85 item SFFQ adapted to ↑ sensitivity to fat intake.	Age	Daily TFA intake & CHD risk compared to controls: *RR 5.2 (1.0-26.9) RR CHD for TFA	**Intake: +ve assoc. TFA intake and CHD** Estimates of intake dubious given the oil stocks are likely to be

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
		TFA intake/day %E: Total: 0.70±0.03	Database provided by US Dept. Ag ***Outcome dx:*** Medical records		↑ vs ↓ quintile of intake *4.9 (1.3,17.4)	very different in Jordan vs the US (US database used)
(Yaemsiri et al., 2012) **Prospective**	**Total TFA** TFA intake and ischaemic stroke	***Country***: US WHI-OS ***N***=87025 F ***Age:*** 63.5±7.3 (50-79y) 663 041 person-y FU with 1049 cases ***TFA intake by quintile (median g/day):*** Q1: 2.2 Q2: 2.3 Q3: 2.6 Q4: 3.4 Q5: 6.1 Mean of medians: 3.32	***Dietary assessment:*** Repeated & validated dietary assessments 122 item self-administered FFQ ***Outcome dx:*** Medical charts, brain imaging or death cert reviewed by neurologists.	Age, race, education, family income, smoking status, HRT, total metabolic eq task hrs per week, alcohol, CHD hx, AF hx, T2D hx, aspirin use, antihypertensive medications, statins, BMI, SBP, TEI	↑ vs ↓ quintile of intake *HR (1.39; 95% CI 1.08-1.79) Assoc. modified by aspirin use: *HR 1.66 (95% CI, 1.21-2.36) non aspirin users *HR 0.95 (0.60-1.48) among aspirin users	**Intake: +ve assoc. TFA intake & stroke, moderated by aspirin use** Women in the highest quintile of intake had a 39% increased incidence of ischaemic stroke than those in the lowest quintile Non aspirin users-66% increase incidence; Aspirin may attenuate adverse effects of TFA on ischaemic stroke
Cancer						
(Laake et al., 2013) **Prospective**	**Ruminant & Industrial separate analyses** Intake PHVO-TFA, PHFO-TFA, rTFA and cancer risk	***Country:*** Norway NCS ***N***=77 568, 50.4% m **Age:** 41.2y 24.8y mean FU 12004 cases dx ***TFA intake* (mean %E, median %E, range %E):** PHVO: 0.9, 0.7 (0.00-0.62) PHFO: 6, 1.3 (0.00-	***Dietary assessment:*** 80 item SFFQ ***Outcome dx:*** Cancer registry of Norway	Gender, TEI, PAL, smoking, BMI, education level	HR ↑ vs ↓ intake categories (5 groups, not quintiles) (95% CI); p for trend: <u>PHVO-TFA:</u> *Significant -ve trends:* ** all cancers 0.97(0.91, 1.04) p for trend=0.006 **pancreatic cancer in men 0.52 (0.31, 0.87) p for trend=0.007 *CMM men	**Intake: +ve, -ve and neutral assoc. TFA intake** PHFO-TFA & rTFA showed more unfavourable results than PHVO-TFA. Diff assoc. b/n cancer risk and TFA from these sources may be due to diff chemical structures of TFA & potentially different site specific carcinogenic effect.

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
		11.7) rTFA: 0.6,0.5 (0-2.0) Total TFA mean % E: 2.5			0.83(0.53, 1.30) p for trend =0.03 *non melanoma skin cancer 0.85 (0.55, 1.34) p for trend=0.03 ** cancer of CNS women 0.58 (0.32, 1.04) p for trend=0.005 *NHL 0.70 (0.50,0.98) p for trend=0.04 <u>PHFO-TFA:</u> *Significant +ve trends:* *stomach cancer 1.34 (0.97, 1.85) p for trend=0.01 **multiple myeloma 2.02 (1.24, 3.28) p for trend = 0.003 *lung cancer in men when analysis restricted to never smokers. *Significant -ve trends:* ** lung cancer women 0.55 (0.40, 0.77) p for trend= 0.0003 **prostate cancer 0.82 (0.69, 0.96) p for trend=0.002 <u>rTFA:</u> *Significant -ve trends:* *CMM women 0.57 (0.32, 1.02) p for trend =0.04	

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
					** multiple myeloma 0.45 (0.24, 0.84) p for trend=0.01 *Significant +ve trends:* ** all cancers 1.09 (1.02,1.16) p for trend=0.002 **mouth & pharynx 1.09 (1.02, 1.16) p for trend=0.006 **NHL 1.47 (1.06, 2.04) p for trend=0.01 *PM breast cancer 1.17 (0.91,1.49) p=0.03	
Breast						
(Aro et al., 2000) **Case-control**	**CLA, vaccenic acid** CLA, vaccenic acid intake & BC	***Country:*** Finland ***N=***433 F Case=225 Control =208 **Age** 52.6 (25-75y) ***TFA intake: g/day*** C18:1 trans: 1.17 ±0.54 Vaccenic acid: 0.28 ±0.14 CLA: 0.13± 0.06 Total: 0.52	***Dietary assessment:*** 110 item validated FFQ completed at home, checked by nurse at interview. Finnish food comp database **Serum FA**: gas liquid chromatography ***Outcome Dx.:*** Finnish Cancer registry	Age, area, energy. Age at menarche, age at 1st baby, OC, Oestrogen, FHx, BBD, education, alcohol, smoking, PAL, WHR, BMI	↑ vs ↓ quintile of intake Dietary CLA: PM women OR 0.3 (0.1, 0.7) Dietary trans-vaccenic acid: no signif assoc ↑ vs ↓ quintile of serum FA: In PM women Trans-vaccenic acid: OR 0.2 (95% CI 0.1,0.6) CLA: OR 0.2 (95% CI 0.1,0.6)	**Serum & Intake: Inv assoc with BC.** 70% reduction with higher intake of CLA 80% reduction in risk seen with higher serum CLA and 80% reduction with higher serum of trans-vaccenic acid. It is possible to ↑ CLA & trans-vaccenic acid in foods by modifying feeding of ruminants
(Byrne, Rockett, &	**Total TFA**	**Country**: US	***Dietary***	Age, Ht., age at	↑ vs ↓ quintile of	**Intake: No assoc. TFA &**

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
Holmes, 2002) **Prospective**	TFA intake & BC	NHS ***N=***44697 F **Age:** 56.8 ± 5.5 (35-55y) 14 y FU 1071 cases ***TFA intake (mean %E):*** 1.4±0.5	***assessment:*** FFQ 1980 (61 item) FFQ '84, '86, '90 (131 item) ***Outcome dx:*** Medical records for all reported dx of BC	menarche, age at menopause, HRT, parity, BMI, Wt change since 18y, FHx. BC, Vit A.	intake: Total TFA: RR 0.91 (0.73-1.13) p=0.33 No indication that ↑ intake of TFA was assoc. with ↑BC risk. A 1% change in percentage of energy from TFA was associated with a RR of 0.94 (95% CI 0.84-1.06)	**BC** Increase in dietary fat incl. TFA was not associated with higher risk of BC among PM women without BBD.
(Chajes et al., 2008) **Case-control**	**Total TFA, elaidic acid, trans-linoleic acid** TFA intake, serum & BC.	***Country***: France E3N-EPIC cohort ***N=***19 934 F ***Age:*** 56.8 (40-65y) 7y FU 363 BC dx, matched with controls within the study ***Serum TFA Conc (% Total FA)*** Elaidic acid: Controls: 0.21 Case:0.22 Trans-linoleic Controls: 0.07 Cases: 0.07 Palmitoleic acid: Controls: 0.16 Cases: 0.17	***Serum FA****:* gas chromatography ***Outcome dx:*** Examination of medical records by physician on report of BC dx	BMI, alcohol, ht, menopausal hormone use, education level, parity, family Hx of BC	↑ risk BC assoc. with: **↑ serum levels trans-palmitoleic acid (OR=2.24, 95% CI: 1.30, 3.86) Non-significant trends: trans elaidic acid (OR=1.45, 95% CI:0.90, 2.33) p=0.12 Trans-linoleic acid (OR=1.55, 95% CI :0.91, 2.63) p=0.10	**Serum: +ve assoc. serum trans palmitoleic acid & BC** **No assoc. elaidic acid & BC** Women with ↑serum levels of trans palmitoleic and elaidic acid had a risk of BC increase by 50% to 2 fold in comparison to those with low serum levels. Limitations: estimating TFA intake via dietary questionnaires is imprecise
(Chajès et al., 1999) **Case-Control**	**Elaidic acid** Elaidic acid intake & BC	***Country:*** Sweden VIP,MONICA & MSP ***N=***584 F Cases: 196	***Dietary assessment:*** Individual FA measured as % of	Age at menarche, age at 1st full term pregnancy,	↑ vs ↓ quartile of FA serum samples: 18:1 n-9 t (elaidic acid)	**Serum: no assoc. with BC**

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
		Controls: 388 Age: 55 y ***Serum TFA Conc (% total FA)*** Elaidic Acid: Case: 0.31 Control: 0.29	TFA capillary gas chromatography ***Outcome dx***: Linkage with regional & national cancer registries.	number of children, HRT, ht, wt.	Adj RR 0.55 (0.2-1.51) p=0.339	
(Holmes et al., 1999) **Prospective**	**Total TFA** intakes of FA & BC	***Country***: US NHS ***N***=88 795 F ***Age:*** 30-55y 14y FU 2956 BC dx ***TFA intake:*** not given	***Dietary assessment:*** 61 item SFFQ 1980, 131 item SFFQ '84, '86, 90 ***Outcome dx:*** Medical records, National Death Index	Energy, age, Vit A intake, alcohol, time period, Ht, parity, age 1st birth, Wt change since 18y, BMI, age at menopause, HRT, FHx, BBD, age at menarche	Data from 1980-94: MV RR for a 1% ↑ in TFA: 0.92 (0.86-0.98) Data from 1984 (expanded FFQ): MV RR TFA 0.87 (0.79-0.95)	**Intake: -ve assoc for TFA intake and BC risk** Long term averaged diet may not be the best way to express the r'ship b/t diet & BC- latency period
(Kohlmeier et al., 1997) **Case-control**	**Total TFA** Serum TFA & PM BC	**Country:** Switzerland, Spain, Ireland, Germany, Netherlands EURAMIC ***N=***616 F Cases:209 Controls:407 Age: 62 (50-74)y ***TFA mean serum levels (%FA ±SD):*** 1.11±0.64	***Adipose tissue:*** Concentrations of TFA in gluteal fat biopsies ***Outcome dx:*** Cases of BC from participating hospitals 1990-'92	Age, BMI, Centre, smoking, alcohol use, hormone use, SES	↑ vs ↓ quartile *OR 1.40 (95% CI, 1.02,1.93)	**Adipose tissue concentration: +ve assoc** Wt. change could compromise the validity with which adipose tissue reflects long term intake.
(McCann et al., 2004) **Case-control**	**Total CLA & 9c,11t-18:2 CLA** CLAs intake	***Country:*** US WEB study ***N=***3158 F Case=1122 control= 2036	***Dietary assessment:*** Self-administered 104 item FFQ. Food composition	Age, education, age at menarche, parity, age at 1st birth, BBD, FHx	No association with intake of total CLA or 9,11 CLA intakes and either pre or PM BC.	**Intake: No assoc** Results do not support association of CLA intake with overall risk of pre or PM

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
	& BC	***Age:*** 53.8 **(**35-79)y ***CLA intake (mean mg/day):*** 109±9	data compiled by Washington State University ***Outcome dx:*** Cases-histologically confirmed BC	BC, residual fat adjusted for TEI	↑ vs ↓ quartile of intake: Premenopausal- slight inverse r'ship of having and ER –ve tumour Adj OR, (0.40. 95% CI 0.16-1.01)	BCCLA intake may have been underestimated Levels of intake may have been too low to see a benefit. Dietary hx taken on intake 12-24 months before diagnosis. Adolescent diet may be more relevant in aetiology of BC
(Rissanen, Knekt, Jarvinen, Salminen, & Hakulinen, 2003) **Case-control**	**Total TFA:** FA of serum total lipids & BC	***Country***: Finland Mobile Clinic Health Evaluation Survey ***N=***369 F Case 127 Control 242 ***Age:*** 19-89 y ***FA conc (% of serum):*** Vaccenic: Cases: 0.41 Controls: 0.41 Trans MUFA Cases:1.14 Controls:1.10	***Serum FA*** ***Outcome Dx:*** Finnish Cancer Registry	BMI, chol, smoking, alcohol, parity, PAL, education.	↑ vs ↓ quartile serum FA: Trans 11-18:1 assoc. ↑ BC risk OR=3.69, CI =1.35-10.06 p=0.17 (trans-vaccenic) After adj for BMI, Chol, alcohol, education, exercise & parity: 4.23 (CI=1.36-13.2) Assoc. b/n total trans MUFA & BC non-significant	**No assoc. total serum trans MUFA & BC** Long follow up source of bias as distribution of FA intake changed during FU. Serum FA compositions may have degraded during long storage time
(Saadatian-Elahi et al., 2002) **Case-control**	**Elaidic acid** 18:1 n-9t Serum elaidic acid & BC in pre & post MP women	***Country:*** US NYUWHS ***N***=394 F Case=197 Control=197 ***Age:*** 51 (34-65)y **Elaidic acid (% serum phospholipids):**	***Serum FA:*** gas chromatography ***Outcome dx:*** Clinically identified BC subjects	Age at full term birth, FHx BC, BBD, Chol,	↑ vs ↓ quintile serum FA: Premenopausal OR 1.02 (0.36,2.88) p for trend =0.8 Postmenopausal OR 0.36 (0.13, 1.03) p for trend =0.13 Total: 0.66 (0.33,1.31)	**Serum: No assoc.** b/t elaidic acid and pre or post-menopausal BC risk.

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
		0.4±0.58			p for trend = 0.25	
(Sczaniecka, Brasky, Lampe, Patterson, & White, 2012) **Prospective**	**Total TFA** Intake TFA & BC	***Country:*** USA VITAL Cohort ***N=*** 30 252 F ***Age***: 50-76 y 6y FU 772 BC dx ***TFA intake (reported as % of subjects per category of g/day):*** Cases: <1.64g/day:19% 1.64≤2.36:19% 2.36≤3.22:21% 3.22≤4.58:21% ≥4.58:19% Non cases: <1.64g/day:20% 1.64≤2.36:20% 2.36≤3.22:20% 3.22≤4.58:20% ≥4.58:20%	***Dietary assessment:*** Self-reported 120 item SFFQ ***Outcome dx:*** Population based cancer registry	Age, race, education, ht, BMI, age at menarche, age at 1st birth, age at menopause, hysterectomy, HRT, Oestrogen, FHx BC, Hx BBB, non-steroidal anti-inflammatory drugs, exercise, alcohol, vegetable intake, fruit intake, TEI	HR & CI for assoc. FA intake and BC risk: (↑ vs ↓ quintile), p for trend. <u>TTFA:</u> HR= 1.27 (95% CI: 0.92, 1.78) p for trend= 0.08 <u>*TFA 18:2</u> HR =1.53 (95% CI: 1.07, 2.19) p for trend=0.02 <u>TFA 18:1</u> HR= 1.30 (95% CI: 0.94, 1.80) p for trend= 0.07	**Intake: total TFA no assoc.** **+ve assoc linolelaidic acid and BC risk.** Possibility that other constituents of foods ↑ in FA of interest could be responsible for ↑ risk
(Voorrips et al., 2002) **Prospective**	**Total TFA, CLA, vaccenic** Total TFA , CLA, vaccenic intake & BC	***Country:*** Netherlands NLCS ***N***=2539 F Sub cohort: 1598 ***Age***: 55-69y 6.3 y FU 941 BC dx ***TFA intake (g/day):*** Cases: 2.5±0.9	***Dietary assessment:*** Validated 150 item FFQ- linked to database with data on specific FA in European foods (TRANSFAIR)	Age, Hx BBD, FHx. BC, age at menarche and menopause, oral contraceptive use, parity, age at childbirth, education, alcohol use, smoking, TEI.	↑ vs ↓ quintile of intake: p for trend <u>TTFA:</u> *RR 1.30 (95% CI 0.93, 1.80) P for trend =0.01 <u>CLA:</u> *RR 1.24 (95% CI 0.91, 1.69) p for trend=0.02	**Intake: +ve assoc total TTFA , CLA & vaccenic.** CLA & vaccenic acid highly correlated (Pearson's r =0.95).

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
		Sub cohort: 2.5±0.9	***Outcome Dx:*** Regional cancer registries & Dutch national database of pathology	Fat intake adjusted for energy	<u>Vaccenic acid:</u> **RR 1.34 (95%CI 0.98, 1.82) P for trend=0.006	
Colorectal						
(McKelvey et al., 1999) **Case-control**	**Total TFA** TTFA &CAP	***Country***: US **N**=1067, 65% M Cases=516 Controls=551 ***Age*****:** 61 (50-74)y ***TFA intake (reported as number of subjects per category of g/day):*** Cases <2 g/day: 141 2-<4:211 4-<6: 103 6+:61 Controls: <2 g/day: 191 2-<4:251 4-<6: 73 6+:36	***Dietary assessment:*** 112 item self - administered SFFQ. Foods containing PHVO were categorised into 4 groups (sweetened baked goods, candy bars, oils & condiments, French fries and chips) ***Outcome dx:*** Sigmoidoscopy screening clinics	Age, sex, smoking, BMI, PA, TEI, red meat, vegetables, sweetened baked goods	Association with TFA not signif after adjustment for sweetened baked goods and other covariates. Sweetened baked goods ↑ vs ↓ category OR 2.1 (95% CI 1.3–3.5) after adjustment for other covariates No signif assoc with other PHVO food groups	**Intake: No assoc. TFA & risk of CAP after adjustment for sweetened baked goods** Results are consistent with hypothesis that foods ↑ in fat and sugar and ↓ in fibre and correlated micronutrients increase risk of adenomas
(Limburg et al., 2008) **Prospective**	**Total TFA** TFA intake & CRC	***Country***: US IWHS ***N***=35 216 F ***Age***: 62 (55-69)y 18y FU 1229 CRC dx ***TFA intake (g/day):*** 2.90 ± 1.59	***Dietary assessment:*** 126 item SFFQ Harvard food composition database ***Outcome dx***: CRC cases Identified through linkage	Age, TEI, BMI, PAL, oestrogen use, T2D, smoking, TFI, red meat, fruit & vegetable intake, calcium, Vit.E, folate, alcohol	↑ vs ↓ quartile of intake TFA not associated with CRC risk (RR=1.12; 95% CI 0.96-1.32) C18:1 (RR 1.05, 95% 0.87,1.26) C18:2 (RR 1.02, 95% 0.85,1.23)	**Intake: No assoc. TFA & CRC**

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
			with Iowa Cancer Registry & National Death Index			
(Lin, Zhang, Cook, Lee, & Buring, 2004) **Prospective**	**Total TFA, t16:1, t18:1, t18:2** TFA & CRC– a randomised trial of aspirin use	***Country***: US WHS ***N***=37547 F ***Age***: 54 (≥45)y 8.7y FU 202 CRC dx ***TFA intake by quintile (median % energy):*** 1=0.6, 2=0.9, 3=1.1, 4=1.4, 5=1.9	***Dietary assessment:*** 131 item FFQ ***Outcome dx:*** medical records and pathology	Age, random treatment assignment aspirin, BMI, FhX CRC, PAL, smoking, alcohol, HRT, TEI	↑ vs ↓ quintile of TFA intake, p for trend: TTFA Adj. RR 1.59 (0.94-2.67) p for trend =0.06 Trans 16:1 RR 0.80 (0.51, 1.25)p for trend =0.22 Trans 18:1 RR 1.33 (0.87, 2.05)p for trend =0.2 Trans 18:2 RR 1.29 (0.84, 1.98) p for trend =0.24	**Intake: no association TFA and CRC risk.** A +ve association was seen between intake of fried foods away from home & CRC. TFA from PHVO may contribute to this Limited statistical power due to small number of cases
(Slattery, Benson, Ma, Schaffer, & Potter, 2001) **Case-control**	**Total TFA** TFA & CRC	**Country:** US **N**=4403, 54.3% M **Age:**30-79y 2179 <67y 2224>67y ***TFA intake: g/1000kcal*** 2.53±1.03	***Dietary assessment:*** Adaptation of CARDIA diet hx q'airre. Data collected via trained interviewers; participants asked to recall previous 2 y from diagnosis. Nutrition Coordinating Centre food database ***Outcome Dx:*** primary colon	Age, BMI, PAL, TEI, fibre, calcium, oestrogen status	↑ vs ↓ quintile intake TTFA Fully adjusted model only significant in women *OR 1.5 (1.1,2.0)	**Intake: +ve assoc. TFA intake & CRC in women only** After adjustment women in highest quintile of intake 50% ↑ risk CRC compared to lowest. Results suggest↑ TFA consumption may alter risk of CRC. Data suggests that those who do not use aspirin, NSAID's or HRT may be more affected by TFA

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
			cancer-medical records			
(Theodoratou et al., 2007) **Case-Control**	**Total TFA** TFA intake &CRC	***Country:*** Scotland SOCCS ***N***=2910, 64.3% M Cases 1455 Matched 1455 ***Age:*** 64.3 (16-79 y) ***TFA intake (g/day)*** 3.55	***Dietary assessment:*** SFFQ 150 items validated in younger people FA data from UK food comp tables and FOODBASE database. ***Outcome dx:*** CRC presented to surgical unit in Scotland	Family hx CRC, TEI, TFI, alcohol, non-steroidal antiinflammatory drugs, smoking, BMI, PAL, total FA intake.	↑ vs ↓ quartile of TFA intake and risk of CRC Trans MUFA: *OR 1.38 (1.09, 1.74) Significant results only in females: *OR 1.57 (1.05,2.36) CRC risk 57% higher in women in 4th vs 1st quintile of intake.	**Intake: +ve assoc. TFA intake & CRC in women only** **Not signif in men**
(Vinikoor et al., 2009) **Case-Control**	**Total TFA** Investigate assoc. TFA & CRC race differences	***Country:*** US NCCCS-1 ***N=***1643, 50.7% M ***Age:*** 64.7 (40-80)y Cases: 623 Controls: 1020 ***TFA intake (mean g/day, SD)*** 5.47 ±2.65	***Dietary assessment:*** Modified version of 100 item SFFQ block food frequency- 29 local foods added Interviews by trained nurses. ***Outcome Dx:*** North Caroline Central Cancer Registry	Age, sex, calcium intake, meat consumption, alcohol, BMI, family Hx CRC	Energy adj TFA consumption was not associated with CRC. ↑ vs ↓ quintile of intake: Whites: Adj. OR 1.01 (95% CI 0.69, 1.49) AA: Adj. OR 0.99 (0.61, 1.62)	**Intake: No assoc. TFA & CRC** No assoc. found between ↑ consumption TFA & specific tumour location (proximal or distal colon)
Pancreatic						
(Heinen, Verhage,	Total TFA	***Country***: Netherlands	***Dietary***	gender, age, TEI,	No assoc. intake of	**Intake: No assoc. TFA**

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
Goldbohm, & van den Brandt, 2009) **Prospective**	Pancreatic cancer risk & fat intake	NLCS ***N***=120 852, 48% M ***Age****:* 61.7 (55-69)y 13y FU 350 incident cases **TFA intake: (g/day)** 2.91±1.241	***assessment:*** Self-administered validated 150 item FFQ Database TRANSFAIR study **Outcome dx:** Netherlands Cancer Registry & Netherlands Pathology Registry	smoking, alcohol, T2D, HTN, BMI, Vegetables, Fruit	TFA & pancreatic cancer in the total population in age and gender adjusted & multivariable adjusted. ↑ vs ↓ quintiles of intake: RR 1.14 (0.79-1.64)	**and pancreatic cancer risk**
(Michaud, Giovannucci, Willett, Colditz, & Fuchs, 2003) **Prospective**	Total TFA Pancreatic cancer & diet	***Country*****:** US NHS ***N***=88 802 F ***Age***: 46.8 (30-55)y 18y FU 178 dx ***TFA intake: median g/day):*** Q1=2.5, Q2=3.3, Q3=3.9, Q4=4.6, Q5=5.7	***Dietary assessment:*** 61 item SFFQ 1980, 131 item '84,'86,'90 ***Outcome dx:*** Self-reported via q'airre. Medical records obtained for confirmation	Smoking, BMI, Hx T2D, TEI, Ht. PAL, menopausal status, glycaemic load intake.	↑ vs ↓ quintile of TFA intake: RR 0.91 (95%CI 0.58, 1.43) p=0.44	**Intake: No assoc**. **TTFA and pancreatic cancer risk**
(Thiébaut et al., 2009) **Prospective**	Total TFA Pancreatic cancer & fat intake	**Country:** US National Institutes of Health- AARP Diet and Health Study US ***N*****=**525473, 58.7% m *Age:* 62 (50-71y) 6.3 y FU **TFA intake***: not reported*	***Dietary assessment:*** 124 item FFQ grid based version of NCI diet history q'airre. 1995-'96 USDA Continuing survey of food intake by individuals database.	Sex, TEI, smoking, BMI, T2D,	↑ vs ↓ quintile intake: <u>Trans 16:1:</u> **HR 1.38 (95%CI 1.17,1.64). <u>Trans 18:1:</u> HR 1.01 (95%CI 0.85, 1.20) p=0.98 <u>Trans 18:2:</u> HR 1.00 (95%CI 0.84, 1.19) p=0.69 <u>Total TFA:</u>	**Intake: No association TTFA & pancreatic cancer risk** **+ve assoc. trans 16:1** (palmitelaidic) Report some internal inconsistencies with results. Measurement error in reported dietary intakes

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
			Outcome dx: Cancer dx or death		HR 0.99 (95%CI 0.83, 1.17) p=>.99	
Prostate						
(Chavarro et al., 2008) **Prospective**	**Total TFA, elaidic acid, 18:2t** Elaidic acid, 18:2t, total TFA & prostate cancer	***Country:*** US PHS ***N=***14916, m ***Age***:58 (40-84y) 13y FU 476 dx ***TTFA % of total FA*** 1.82	***Serum TFA:*** gas liquid chromatography. ***Outcome dx:*** Hospital and pathology records	Age, smoking status, length of FU	*Prostate Cancer* ↑ vs ↓ quintile of TFA levels: No significant associations *Non aggressive prostate tumours:* <u>Elaidic acid</u>: RR 2.16 (1.12-4.17 p trend=0.11) <u>18:2t:</u> RR*1.97 (1.03-3.75 p trend = 0.01) <u>Total TTFA:</u> RR 2.21 (95%CI 1.14-4.29 p trend =0.06)	**Serum: No significant assoc. for serum TFA and prostate cancer** **Elaidic acid assoc.↑ risk non aggressive tumours**
(King, Kristal, Schaffer, Thornquist, & Goodman, 2005) **Case-Control**	**Total TFA- and individual FA** Serum phospholipid TFA & prostate cancer	***Country***: US B-Carotene & Retinol efficacy trial ***N***=698, M Cases=272 Controls=426 ***Age:*** <*55*-≥65y ***TFA Serum (mean % of FA):*** Cases: 0.23 Controls:0.22	***Serum TFA:*** gas chromatography ***Outcome dx:*** Cancer end point reported- medical & pathology reports obtained from hospital	Exposure population, period of enrolment, enrolment centre, age group, year of randomisation, ethnicity, baseline smoking status, age at blood draw, BMI, alcohol use	↑ Vs ↓ quartile phospholipid conc. *11t 18:1 trans Vaccenic acid: OR 1.69 (1.03-2.77) *9c,12t 18:2: OR 1.79 (1.02-3.15) Elaidic 1.39 (0.87-2.23) p=0.1	**Serum: +ve assoc. C18 TFA but not C16 TFA with prostate cancer** Consistent trends for ↑ risk across all C18 FA but not C16 TFA but only 2 mentioned reached statistical significance. Non-significant +ve assoc elaidic acid
(Schuurman, van den Brandt, Dorant,	**Total TFA** Energy and	***Country:*** Netherlands	***Dietary assessment:***	Age, family hx prostate	↑ vs ↓ quintile No assoc. TTFA intake	**Intake: No assoc.**

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
Brants, & Alexandra Goldbohm, 1999) **Prospective**	fat intake with prostate carcinoma risk.	NLCS ***N***=3640, M ***Age*** 62.65 (55-69)y 6.3y FU 642 dx **TFA intake (mean g/day):** 3.3	Self-administered SFFQ 150 items Intake on specific FA based on food composition database from TRANSFAIR study. ***Outcome dx:*** Netherlands cancer registries	carcinoma, education, SES, TEI, total energy adjusted fat intake	and prostate carcinoma: RR 0.99 (0.70-1.40 p 0.72) fully adjusted model.	This study found no associations between prostate carcinoma and intake of energy, total fat, TSFA, or TFA. Authors conclude that certain FA may be involved in PC occurrence.
Type 2 Diabetes						
(Mozaffarian et al., 2013) **Prospective**	**Trans-palmitoleate** Trans-palmitoleate & T2D	***Country:*** US MESA ***N=***2617, 46.7% M ***Age:*** 61.7 (45-84)y 5y FU 205 dx ***Trans-palmitoleic acid (% of FA):*** 0.058	***Serum FA*** ***Outcome dx***: Assessed at study clinic biannually. Dx on new fasting glucose of ≥126mg/dL or new use of insulin or oral hypoglycaemic medications	Age, sex, race, education, centre, smoking, diabetes, alcohol, PAL, BMI, WC, whole fat dairy, low fat dairy, red meat, TEI	MV adjustment: ↑ vs ↓quintile of serum TFA *HR: 0.52 (95% CI 0.32,0.85)	**Serum: -ve assoc** T2D & Intake:
(Papantoniou, Fito, Covas, Munoz, & Schroder, 2010) **Cross-sectional**	**Total TFA** T2D risk &TFA consumption	***Country:*** Spain ***N***=8195, 45%M ***Age:*** 54.2 (35-74)y ***Intake TFA (g/day):*** 1.5 women; 1.8 men.	***Dietary assessment:*** 165 item validated FFQ ***Outcome dx:*** Fasting BG & T2D Hx recorded. ADA criteria used for diagnosis of T2D	Age, PA, educational status smoking, alcohol, fibre	No sig. association between TFA intake and risk of type 2 diabetes in men and women Men: p=0.909 Women: p=0.990	**Intake: No association b/t TFA intake & T2D risk.** ↑TFA intake was assoc. less healthy lifestyle and dietary habits
(Salmerón et al.,	**Total TFA**	***Country:*** US	***Dietary***	Age, BMI, time	↑ vs ↓quintile of TFA	**Intake: +ve association**

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
2001) **Prospective**	Dietary fat intake & T2D .	NHS ***N*=**84 204 F ***Age***:46.3 (34-59)y 14y FU 2507 cases T2D ***Intake TFA (%E):*** 2	***assessment:*** 1980 61 item SFFQ 1984 expanded 116 items '86 &'90 ***Outcome Dx:*** WHO criteria 1985 used. 98% of medical records reviewed	period, smoking, parental T2D, alcohol, PAL, % energy protein, TEI	intake: MV RR 1.15 (1.01, 1.32) p for trend = 0.09 Additionally adjusted for other fats: *RR 1.31 (1.10, 1.56) p for trend = 0.02 **2% ↑ in energy from TFA; RR 1.39 (1.15, 1.67)	**TFA & T2D** +ve assoc. TFA observed primarily in obese and less physically active women
(van Dam, Willett, Rimm, Stamper, & Hu, 2002) **Prospective**	**Total TFA** Dietary fat, meat intake & T2D	***Country:*** US HPFUS ***N:*** 42 504 M ***Age:*** 53.7 (40-75)y 12y FU 1321 dx ***TFA intake (median E%)*** 1.3	***Dietary assessment:*** 131 item validated SFFQ at baseline, 1990 & '94 ***Outcome dx.:*** T2D confirmed based on WHO criteria, verified with medical records in sub sample of 71 participants.	Age, TEI, time period, PAL, alcohol, hypercholesterolemia, HTN, FHx T2D, Fibre, Magnesium, BMI	↑ vs ↓quintile of intake: Age & energy adjusted RR (95% CI) **1.39 (1.16, 1.67) Fully adjusted MV model: 0.90 (0.74-1.10) p=0.33	**Intake: TFA not assoc with T2D**
Other Conditions						
(Cho et al., 2001) **Prospective**	**Total TFA** Fat intake and AMD	***Country*:** US NHS & HPFUS ***N***=72489, 41% M ***Age***: 56.2y 12y FU 567 dx ***TFA intake (median % E)***	***Dietary assessment:*** 130 item SFFQ; women 1984, '86, '90 & men 1986, '90 ***Outcome dx:*** Incident AMD	Age, pack years of smoking, energy, lutein and zeaxanthin intake, BMI, PM hormone use, vigorous exercise, alcohol intake,	↑ vs ↓ quintile of intake: Pooled RR (95% CI): *1.35 (1.02, 1.80) After adjustment for quintiles of all fats simultaneously risk was attenuated. 1.26 (0.89,1.79)	**Intake: no assoc. TTFA intake and AMD** (after adjustment for other fats)

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
		Women: Q1; 1.2. Q2; 1.6, Q3; 1.9, Q4; 2.2, Q5 2.7 Men: Q1; 0.7, Q2; 1.0, Q3; 1.2, Q4; 1.5, Q5; 1.9	with visual loss of 20/30 or more. Medical records reviewed	profession	p=0.22	
(Chong et al., 2009) **Prospective**	**Total TFA** Dietary fat intake and AMD	***Country***: Australia MCCS ***N***=6734, 64% F ***Age***: 64.1 (58-69y) 16y FU ***TFA intake (g/day):*** 0.08	***Dietary assessment:*** 121 Item FFQ ***Outcome dx:*** At nonstereoscopic retinal photographs of disc and macular of each eye taken. Reviewed by AMD physicians	Age, sex, smoking, energy, VitC, VitE, β carotene, zinc, lutein, zeaxanthin, supplements (VitC, VitE, cod liver oil, fish oil	↑ vs ↓ quartile of intake: OR (95% CI): Late AMD: 1.76 (0.92-3.37) Early AMD[a] :0.92 (0.78, 1.09) Early AMD[b]: 0.98 (0.80,1.20)	**Intake: no assoc. TFA intake and early or late AMD**
(Cohen, Rifas-Shiman, Rimm, Oken, & Gillman, 2011) **Prospective**	**Total TFA** Maternal TFA intake during pregnancy and foetal growth	***Country***: USA Project Viva ***N***=1369 mother-child pairs ***Age***: 32.4y FU 1st & 2nd trimester ***TFA intake (g/day):*** 2.35 ± 1.07	***Dietary assessment:*** Self-administered validated SFFQ during 1st & 2nd trimesters. ***Outcome dx:*** Data on infant birth wt from medical records. Length of gestation by subtracting date of last menstrual period from day of delivery. BW/GA z value	TEI, race, income, parity, education, smoking status, age pre-pregnancy BMI, PA, television viewing, fish consumption	Total TFA intake & Foetal Growth: 1st trimester no assoc. β=0.02; (95% CI -0.20,0.25) 2nd trimester +ve assoc. *β=0.29; (95% CI 0.07,0.51)	**Foetal growth: + assoc in 2nd trimester**

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
			(foetal growth) using US ref data			
(Dirix, Kester, & Hornstra, 2009) **Prospective**	**18-1*t isomer (elaidic acid)*** Associations b/t neonatal birth dimensions and maternal plasma fatty acid contents	***Country:*** Netherlands MEFAB ***N*=**782 mother-infant pairs ***Age***: 29y ***Serum TFA*:** (% w/w) as median (25^{th}-75^{th} percentile) maternal plasma PL: 16 w: 0.45 (0.33-0.59) 22 w: 0.44 (0.32-0.58) 32w: 0.42 (0.31-0.54) Delivery: 0.37 (0.27-0.49)	***Serum TFA:*** Maternal serum samples collected at 16, 22, 32 weeks & delivery. ***Outcome dx:*** Local hospital staff members recorded BW, BL & HC on standardised data sheets	Maternal age, Ht, BMI, parity, smoking & drinking during pregnancy, socioeconomic status, GA, infant sex	None of the assoc. b/t relative maternal 18:1t contents and BW, BL or HC reached statistical significance or showed a trend. Backward regression analysis demonstrated that for none of the 12 birth outcome FA combinations 18:1t was neither a predictor or confounder. Results not published	**Serum: No assoc between neonatal birth dimensions and maternal plasma fatty acid contents** Considerable number of 18:1t values missing from database,
(Engelhart et al., 2002) **Prospective**	**Total TFA** TFA intake & dementia	***Country*:** The Netherlands The Rotterdam Study ***N*=** 5395, 41%M ***Age*:** 67.7 **(**≥55)y 16y FU 197 dx ***TFA intake (g/day):*** 2.7 ± 1.0	Validated SFFQ Food composition database derived from the TRANSFAIR Study and Dutch Food Composition Table	Age, sex, education, total energy intake, intake of vitamin E	Rate ratios of dementia per standard deviation increase in TFA intake: 0.90 (95% CI 0.77 to 1.06),	**Intake: no assoc between TTFA and dementia risk**
(Enke et al., 2011) **Cross-sectional**	**Total TFA** Distribution of TFA in foetal cord blood related to maternal lipids	***Country*:** Germany ***N*=** 55, mother-child pairs ***Age*:** mothers 29.2y	***TFA in erythrocytes and plasma:*** t9t12, c9t12, t9c12, C18:2; t3,c9,c11 & c8,t10,t12 C18:3 were summarised as TTFA		Fatty acids in maternal and foetal plasma (% of total FAME, m ± SD) **TTFA maternal 0.59 ± 0.12; foetal: 0.52 ± 0.17 **r=0.36 **C9,t11 CLA maternal 0.20 ± 0.07; foetal: 0.14 ± 0.04	**Serum: +ve assoc TTFA in maternal plasma correlated with TTFA in foetal plasma but not adjusted for any confounders**

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
			Collected at birth		r=0.84 Fatty acids in maternal and foetal erythrocytes (% of total FAME, m ± SD) **TTFA maternal 0.82 ± 0.15; foetal: 0.64 ± 0.45 **r=0.07 **C9,t11 CLA maternal 0.12 ± 0.04; foetal: 0.08 ± 0.04 **r=0.32	
(Iuliano et al., 2013) **Case-control**	**Individual TFA** Individual FTA & mild Alzheimer's disease	***Country*:** Germany ***N*=** 60, 28%M ***Age*:** 70y Cases: 30 Controls:30 ***Serum TFA (% total FA):*** C18:1 (n-7) vaccenic Controls: 1.96±0.3 Cases: 2.26±0.4 C18:1 (n-9)t elaidic Controls: 0.04±0.02 Cases: 0.04±0.03 C18:2 (n-9)t linoleadic Controls: 0.04±0.02 Cases: 0.04±0.01	***Serum TFA:*** gas chromatography	Comparison among groups done for gender, age, educational level and global cognitive level	**Pts with Alzheimer's disease had significantly higher intakes C18:1 (n-7) vaccenic compared with controls P=0.0029	**Serum: +ve assoc vaccenic acid and Alzheimer's disease**
(Kim et al., 2005) **Cross-sectional**	**No TFA data** **Margarine consumption** Asthma and	***Country*:** Sweden ***N*=**1014, 51% F ***Age*:** Median 9 (5-14) y 114 subjects reported allergy intolerance	***Dietary assessment:*** TFA not assessed. 7 question dietary questionnaire	Age, gender, 12 dietary variables (meat, fish, fruits, veg, fresh milk, fermented	*R'ship b/t consumption of margarine, respiratory symptoms and asthma* *OR (95% CI):*	**Intake: +ve assoc.** in those consuming margarine b/t: respiratory symptoms, asthma and allergens.

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
	allergy in relation to diet	TFA intake not measured ***Margarine intake:*** Consumption yes/no No=19% Yes=81	administered. Measured consumption of meat, fish, fruits, veg, fresh milk, fermented milk and fast food. Q'airre contained yes/no questions on 5 types of fat. ***Outcome dx:*** Current asthma assessed as current medication or attack in past 12 months. Additional questions on cat allergy, dog allergy, pollen allergy.	milk, fast food, butter, margarine, olive oil, rapeseed oil, PUFA)	Wheeze: 0.68 (0.38-1.23) Daytime breathlessness: 1.23 (0.51-2.96) Current asthma: 0.79 (0.37-1.68) Atopic sensitisation: 0.86 (0.52-1.42) *With regards to allergens:* Among those consuming margarine, there were significant positive associations (P<0.05) between wheeze and dog and horse allergen levels, daytime attacks of breathlessness and cat, dog and horse allergen levels, current asthma and dog and horse allergen levels. No significant associations among children not consuming margarine	
(Nagel & Linseisen, 2005) **Case-control**	**No TFA date: Margarine intake** Assoc b/t margarine & asthma	***Country*:** Germany Multicentre EPIC Cohort ***N:*** 525, 35% M ***Age***: <50-≥60 y Case: 105 Control: 420	***Dietary assessment:*** Self-administered FFQ- didn't look at TFA specifically. Food intake data	Age, fat energy intake, non-fat energy intake, BMI, smoking status, gender, educational level.	Margarine intake was significantly higher in cases than controls: p= 0.029 ↑ vs ↓ tertile of intake:	**Intake: borderline assoc b/t margarine intake and asthma.** (p for trend of 0.05)

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
		TFA intake not measured ***Margarine intake:*** (Median g/day, 33-66 percentiles): Cases: 1.0 (0-4.1) Controls: 0.3 (0-1.8)	calculated from German food composition tables. ***Outcome dx:*** Physician diagnosed asthma based on clinical examination, skin prick tests, lung function tests.		OR (95% CI): 1.73 (1.05-2.87), P for trend=0.05	
(Sausenthaler et al., 2006) **Prospective**	**No TFA data: Margarine intake** Intake of margarine with eczema and allergic sensitization in 2 y olds.	***Country*:** Germany LISA ***N*=**2582, 51 % M FU till babies were 2 y 188 (7.2%) predominantly consumed margarine. **TFA intake:** Not measured	***Dietary assessment:*** SFFQ. Parents were asked how often they used margarine in past 6 months ***Outcome dx:*** Symptomatic eczema- itchy rash recurrent or persisting over 14 days. Doctor dx of eczema. Allergic sensitisation: measured specific IgE to common food allergens	Study area, gender, maternal age at delivery, maternal smoking during 2nd or 3rd trimester, education level, breastfeeding exclusively for 4 months, parental hx of atopic diseases, fresh fruit intake, salad and raw veg intake, dog, cat.	Adjusted OR (95% CI) b/t exposure category & margarine: <u>Eczema symptoms:</u> 2 Yr: Margarine: 1.30 (0.67-2.55) Lifetime prevalence: *Margarine: 1.71 (1.12-2.61) Doctor dx eczema: 2 Yr: Margarine: 1.70 (0.84-3.41) Lifetime prevalence: *Margarine: 2.10 (1.36-3.25) <u>Food or inhalant allergens:</u> Margarine: 1.52 (0.89-2.58) Food allergens: Margarine: 1.58 (0.87-2.86)	**Intake: margarine +ve assoc.** lifetime prevalence of symptomatic eczema, Dr dx eczema and allergic sensitization against inhalants. All response variables risk was higher in infants with predominant margarine intake than the mixed group but only statistically sig in these 3 groups. No associations were found for butter intake.

Reference & Study type	Overview	Study Population	TFA Assessment	Confounders	Results	Conclusions & Notes
					Inhalant allergens: *Margarine: 2.10 (1.01-4.41)	
(van Eijsden, Hornstra, van der Wal, Vrijkotte, & Bonsel, 2008) **Prospective**	**18-1*t isomer* (elaidic acid)** Elaidic acid & foetal growth	***Country*:** Holland ABCD study ***N*=**3704, F ***Age*:** ≤24-≥ 35 y ***Serum TFA (% of FA):*** Elaidic acid 0.23 ± 0.10	***Dietary assessment:*** gas chromatography ***Outcome dx:*** BW (g) SGA (yes/no) defined as below 10th percentile for GA	Maternal BMI, smoking, alcohol, psychosocial stress, cohabitant status, education, ethnicity	↑ vs ↓ quintile: Values are β ± SE: BW: -14.2 ± 20.9 ↑ vs ↓ quintile: Values are OR (95% CI) SGA: 1.01 (0.74, 1.39)	**Serum: No assoc. BW or SGA & elaidic acid** The observed negative association between the maternal elaidic acid conc and foetal growth disappeared after adjustment**.**
(Wieland, von Mutios, Husing, & Asher, 1999) **Ecological**	**Total TFA** Intake of TFA& prevalence of childhood asthma and allergies	***Country*:** Multicountry - Europe ISAAC ***N*=** 55 study centres in 10 European countries ***Age*:** 13-14 y ***Intake TFA (% E):*** Range 0.5-1.4	***Dietary assessment:*** Country estimates using representative market baskets per country ***Outcome dx:*** 12-month prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and atopic eczema assessed via written and video questionnaires	Gross national product of the country	Positive association between TFA and prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and atopic eczema**,** all p<0·001 The associations tended to be stronger when the analyses were restricted to estimates of TFA intake from sources that contain predominantly PHVO, such as oils, biscuits, cakes, and chips	**Intake: +ve assoc TFA and asthma and allergies** Ecological study - observed association between populations does not necessarily exist between individuals.

ABCD study; Amsterdam Born Children and their Development, BCDDP; Breast Cancer Detection Demonstration Project. EPIC; European Prospective Investigation into Cancer & Nutrition, EURAMIC; European Community Multicentre Study on Antioxidants, HPFUS; Health Professionals Follow Up Study, ISAAC; International Study of Asthma and Allergies in Childhood, IWHS; Iowa Women's Health Study, LISA; MCCS; Melbourne Collaborative Cohort Study, MEFAB;

Maastricht Essential Fatty Acid Birth Cohort, MONICA, Monitoring of trends and cardiovascular disease study, MSP; Mammary Screening Project, MESA; Multiethnic Study of Atherosclerosis. NCCCS-1. North Carolina Colon Cancer Study-1;NCS; Norwegian Counties Study NLCS, Netherlands Cohort Study; NHS; Nurses' Health Study, NYUWHS; New York University Women's' Health Study, PHS; Physicians Health Study, REGARDS; Reasons for Geographical & Racial Differences in Stroke, SOCCS; Study of Colorectal Cancer in Scotland. VIP; Vasterbotten Intervention Project, WEB; Western New York Exposures and Breast Cancer Study; WHI-OS; Women's' Health Initiative-Observational Study. WHS; Women's Health Study

Abbreviations

** Significant (P < 0.01)
* Significant (P < 0.05)
+ve=positive
-ve=negative
ADA=American Diabetes Association
AMD= Age-related macular degeneration
AMD[a]= drusen 63µm or larger
AMD[b]= 123 µm or larger
Assoc.= Associated
BC= breast cancer
BBD= benign breast disease
b/t = between
BW = birth weight
BL = birth length
CAD=coronary artery disease
CAP= colorectal adenomatous polyps
CRC=colorectal cancer
CRP=c reactive protein
CI= confidence interval
CIn= cerebral Infarction
Dx= diagnosis
E = energy
↑ = Highest/increase
↓ = Lowest/ decrease
FAME=fatty acid methyl esters
f=female
FFQ=food frequency questionnaire
FU= follow up
GA= gestational age
HDL-C= HDL cholesterol
HR= hazard Ratio
Hrs. = hours
Ht. = height
HTN=hypertension
HVO=hydrogenated vegetable oil
Hx = history
IHD= ischaemic heart disease
Inv.= inverse
IS= ischaemic stroke
LDL-C=
m=male
MI= myocardial Infarction
MUFA=monounsaturated fatty acids
MV= multivariate model
N=number
OR= odds ratio
PA= physical activity
PHFO= partially hydrogenated fish oil
PHVO= partially hydrogenated vegetable oil
Pt.=patient
PVD= peripheral vascular disease
RR= risk ratio
rTFA= ruminant TFA
SCD= sudden cardiac death
SF= saturated fat
SFA= saturated fatty acids
SFFQ= Semi-quantitative food frequer questionnaire
SGA= small for gestational age
TEI= Total energy intake
T2D = Type 2 Diabetes
TFA=Trans fatty acids
TTFA= Total trans fatty acids
Vs.= versus
WHR= waist to hip ratio
w/o = without
wks. = weeks
y=years

Units

mmol/L = Millimoles per litre

Aro, A., Mannisto, S., Salminen, I., Ovaskainen, M. L., Kataja, V., & Uusitupa, M. (2000). Inverse association between dietary and serum conjugated linoleic acid and risk of breast cancer in postmenopausal women. *Nutr Cancer, 38*(2), 151-157. doi: 10.1207/s15327914nc382_2

Byrne, Celia, Rockett, H., & Holmes, M. D. (2002). Dietary fat, fat subtypes, and breast cancer risk: Lack of an association among postmenopausal women with no history of benign breast disease. *Cancer Epidemiol, Biomarkers Prev, 11*(3), 261-265.

Chajès, Véronique, Hultén, Kerstin, Van Kappel, Anne-Linda, Winkvist, Anna, Kaaks, Rudolf, Hallmans, Göran, . . . Riboli, Elio. (1999). Fatty-acid composition in serum phospholipids and risk of breast cancer: An incident case-control study in Sweden. *Int J Cancer, 83*(5), 585-590. doi: 10.1002/(SICI)1097-0215(19991126)83:5<585::AID-IJC2>3.0.CO;2-Z

Chajes, Veronique, Thiebaut, Anne C. M., Rotival, Maxime, Gauthier, Estelle, Maillard, Virginie, Boutron-Ruault, Marie-Christine, . . . Clavel-Chapelon, Francoise. (2008). Association between serum trans-monounsaturated fatty acids and breast cancer risk in the E3N-EPIC Study. *Am J Epi, 167*(11), 1312-1320.

Chavarro, Jorge E., Stampfer, Meir J., Campos, Hannia, Kurth, Tobias, Willett, Walter C., & Ma, Jing. (2008). A prospective study of trans-fatty acid levels in blood and risk of prostate cancer. *Cancer Epidemiol Biomarkers Prev, 17*(1), 95-101. doi: 10.1158/1055-9965.epi-07-0673

Chiuve, S. E., Rimm, E. B., Manson, J. E., Whang, W., Mozaffarian, D., Stampfer, M. J., . . . Albert, C. M. (2009). Intake of total trans, trans-18:1, and trans-18:2 fatty acids and risk of sudden cardiac death in women. *American heart journal, 158*(5), 761-767. doi: 10.1016/j.ahj.2009.08.015

Cho, E., Hung, S., Willett, W.C., Spiegelman, D., Rimm, E.B., Seddon, J.M., . . . Hankinson, S.E. (2001). Prospective study of dietary fat and the risk of age-related macular degeneration. *American Journal of Clinical Nutrition, 73*, 209-218.

Chong, E.W., Robman, L.D., Simpson, J.A., Hodge, A.M., Aung, K.Z., Dolphin, T.K., . . . Guymer, R.H. (2009). Fat consumption and its association with age-related macular degeneration. *Archives of Ophthalmology, 127*(5), 674-680.

Cohen, Juliana FW, Rifas-Shiman, Sheryl L, Rimm, Eric B, Oken, Emily, & Gillman, Matthew W. (2011). Maternal trans fatty acid intake and fetal growth. *American Journal of Clinical Nutrition, 94*(5), 1241-1247. doi: 10.3945/ajcn.111.014530

Dirix, Chantal EH, Kester, Arnold D, & Hornstra, Gerard. (2009). Associations between neonatal birth dimensions and maternal essential and trans fatty acid contents during pregnancy and at delivery. *British Journal of Nutrition, 101*(03), 399-407.

Engelhart, M. J., Geerlings, M. I., Ruitenberg, A., van Swieten, J. C., Hofman, A., Witteman, J. C.M., & Breteler, M. M.B. (2002). Diet and risk of dementia: Does fat matter?: The Rotterdam Study. *Neurology, 59*(12), 1915-1921. doi: 10.1212/01.wnl.0000038345.77753.46

Enke, Uta, Jaudszus, Anke, Schleussner, Ekkehard, Seyfarth, Lydia, Jahreis, Gerhard, & Kuhnt, Katrin. (2011). Fatty acid distribution of cord and maternal blood in human pregnancy: special focus on individual trans fatty acids and conjugated linoleic acids. *Lipids Health Dis, 10*(1), 247.

Heinen, M. M., Verhage, B. A., Goldbohm, R. A., & van den Brandt, P. A. (2009). Meat and fat intake and pancreatic cancer risk in the Netherlands Cohort Study. *Int J Cancer, 125*(5), 1118-1126. doi: 10.1002/ijc.24387

Holmes, M. D., Hunter, D. J., Colditz, G. A., Stampfer, M. J., Hankinson, S. E., Speizer, F. E., . . . Willett, W. C. (1999). Association of dietary intake of fat and fatty acids with risk of breast cancer. *J Am Med Assoc, 281*(10), 914-920.

Iuliano, Luigi, Pacelli, Antonio, Ciacciarelli, Marco, Zerbinati, Chiara, Fagioli, Sabrina, Piras, Fabrizio, . . . Spalletta, Gianfranco. (2013). Plasma fatty acid lipidomics in amnestic mild cognitive impairment and Alzheimer's disease. *J Alzheimer's Dis, 36*(3), 545-553. doi: 10.3233/JAD-122224

Khaw, Kay-Tee, Friesen, Marlin D., Riboli, Elio, Luben, Robert, & Wareham, Nicholas. (2012). Plasma Phospholipid Fatty Acid Concentration and Incident Coronary Heart Disease in Men and Women: The EPIC-Norfolk Prospective Study. *PLoS Med, 9*(7), e1001255. doi: 10.1371/journal.pmed.1001255

Kiage, James N, Merrill, Peter D, Robinson, Cody J, Cao, Yue, Malik, Talha A, Hundley, Barrett C, . . . Kabagambe, Edmond K. (2013). Intake of trans fat and all-cause mortality in the Reasons for Geographical and Racial Differences in Stroke (REGARDS) cohort. *The American journal of clinical nutrition, 97*, 1121-1128.

Kim, J. L., Elfman, L., Mi, Y., Johansson, M., Smedje, G., & Norbäck, D. (2005). Current asthma and respiratory symptoms among pupils in relation to dietary factors and allergens in the school environment. *Indoor Air, 15*(3), 170-182. doi: 10.1111/j.1600-0668.2005.00334.x

King, Irena B., Kristal, Alan R., Schaffer, Steve, Thornquist, Mark, & Goodman, Gary E. (2005). Serum trans-fatty acids are associated with risk of prostate cancer in β-carotene and retinol efficacy trial. *Cancer Epidemiol Biomarkers Prev, 14*(4), 988-992. doi: 10.1158/1055-9965.epi-04-0517

Kohlmeier, L, Simonsen, N, van 't Veer, P, Strain, J J, Martin-Moreno, J M, Margolin, B, . . . Kok, F J. (1997). Adipose tissue trans fatty acids and breast cancer in the European Community Multicenter Study on antioxidants, myocardial infarction, and breast cancer. *Cancer Epidemiol Biomarkers Prev, 6*(9), 705-710.

Laake, Ida, Carlsen, Monica H., Pedersen, Jan I., Weiderpass, Elisabete, Selmer, Randi, Kirkhus, Bente, . . . Veierod, Marit B. (2013). Intake of trans fatty acids from partially hydrogenated vegetable and fish oils and ruminant fat in relation to cancer risk. *J Cancer, 132*(6), 1389–1403.

Laake, Ida, Pedersen, Jan I., Selmer, Randi, Kirkhus, Bente, Lindman, Anja S., Tverdal, Aage, & Veierød, Marit B. (2012). A prospective study of intake of trans-fatty acids from ruminant fat, partially hydrogenated vegetable oils, and marine oils and mortality from CVD. *Br J Nutr, 108*(4), 743-754.

Limburg, Paul J., Liu-Mares, Wen, Vierkant, Robert A., Wang, Alice H., Harnack, Lisa, Flood, Andrew P., . . . Cerhan, James R. (2008). Prospective evaluation of trans-fatty acid intake and colorectal cancer risk in the Iowa Women's Health Study. *Int J Cancer, 123*(11), 2717-2719. doi: 10.1002/ijc.23820

Lin, J., Zhang, S. M., Cook, N. R., Lee, I. M., & Buring, J. E. (2004). Dietary fat and fatty acids and risk of colorectal cancer in women. *American journal of epidemiology, 160*(10), 1011-1022. doi: 10.1093/aje/kwh319

Mashal, Rima H., Oudeh, Ayman, Al-Ismail, Khalid M., Abu-Hammour, Khaled A., & Al-Domi, Hayder A. (2012). Association of dietary intake of trans fatty acids and coronary heart disease risk in Jordanian subjects. *Pakistan J Nutr, 11*(5), 423-433.

McCann, S. E., Ip, C., Ip, M. M., McGuire, M. K., Muti, P., Edge, S. B., . . . Freudenheim, J. L. (2004). Dietary intake of conjugated linoleic acids and risk of premenopausal and postmenopausal breast cancer, Western New York Exposures and Breast Cancer Study (WEB Study). *Cancer Epidemiol Biomarkers Prev, 13*(9), 1480-1484.

McKelvey, W., Greenland, S., Chen, M. J., Longnecker, M. P., Frankl, H. D., Lee, E. R., & Haile, R. W. (1999). A case-control study of colorectal adenomatous polyps and consumption of foods containing partially hydrogenated oils. *Cancer Epidemiol Biomarkers Prev, 8*(6), 519-524.

Michaud, Dominique S., Giovannucci, Edward, Willett, Walter C., Colditz, Graham A., & Fuchs, Charles S. (2003). Dietary meat, dairy products, fat, and cholesterol and pancreatic cancer risk in a prospective study. *Am J Epi, 157*(12), 1115-1125. doi: 10.1093/aje/kwg098

Mozaffarian, D., de Oliveira Otto, M. C., Lemaitre, R. N., Fretts, A. M., Hotamisligil, G., Tsai, M. Y., . . . Nettleton, J. A. (2013). trans-Palmitoleic acid, other dairy fat biomarkers, and incident diabetes: the Multi-Ethnic Study of Atherosclerosis (MESA). *The American journal of clinical nutrition, 97*(4), 854-861. doi: 10.3945/ajcn.112.045468

Nagel, G., & Linseisen, J. (2005). Dietary intake of fatty acids, antioxidants and selected food groups and asthma in adults. *European Journal of Clinical Nutrition, 59*, 8-15.

Papantoniou, Kyriaki, Fito, Montserrat, Covas, Maria-Isabel, Munoz, Daniel, & Schroder, Helmut. (2010). trans Fatty acid consumption, lifestyle and type 2 diabetes prevalence in a Spanish population.

Rissanen, H., Knekt, P., Jarvinen, R., Salminen, I., & Hakulinen, T. (2003). Serum fatty acids and breast cancer incidence. *Nutr Cancer, 45*(2), 168-175. doi: 10.1207/s15327914nc4502_05

Saadatian-Elahi, Mitra, Toniolo, Paolo, Ferrari, Pietro, Goudable, Joëlle, Akhmedkhanov, Arslan, Zeleniuch-Jacquotte, Anne, & Riboli, Elio. (2002). Serum fatty acids and risk of breast cancer in a nested case-control study of the New York University Women's Health Study. *Cancer Epidemiol Biomarkers Prev, 11*(11), 1353-1360.

Salmerón, Jorge, Hu, Frank B, Manson, JoAnn E, Stampfer, Meir J, Colditz, Graham A, Rimm, Eric B, & Willett, Walter C. (2001). Dietary fat intake and risk of type 2 diabetes in women. *The American journal of clinical nutrition, 73*(6), 1019-1026.

Sausenthaler, Stefanie, Kompauer, Iris, Borte, Michael, Herbarth, Olf, Schaaf, Beate, von Berg, Andrea, . . . the, Lisa Study Group. (2006). Margarine and butter consumption, eczema and allergic sensitization in children. The LISA birth cohort study. *Pediatric Allergy and Immunology, 17*(2), 85-93. doi: 10.1111/j.1399-3038.2005.00366.x

Schuurman, Agnes G., van den Brandt, Piet A., Dorant, Elisabeth, Brants, Henny A. M., & Alexandra Goldbohm, R. (1999). Association of energy and fat intake with prostate carcinoma risk. *Cancer, 86*(6), 1019-1027.

Sczaniecka, Anna K., Brasky, Theodore M., Lampe, Johanna W., Patterson, Ruth E., & White, Emily. (2012). Dietary intake of specific fatty acids and breast cancer risk among postmenopausal women in the VITAL cohort. *Nutr Cancer, 64*(8), 1131-1142.

Slattery, Martha L., Benson, Joan, Ma, Khe-Ni, Schaffer, Donna, & Potter, John D. (2001). Trans-fatty acids and colon cancer. *Nutr Cancer, 39*(2), 170-175. doi: 10.1207/S15327914nc392_2

Theodoratou, Evropi, McNeill, Geraldine, Cetnarskyj, Roseanne, Farrington, Susan M., Tenesa, Albert, Barnetson, Rebecca, . . . Campbell, Harry. (2007). Dietary fatty acids and colorectal cancer: A case-control study. *Am J Epi, 166*(2), 181-195. doi: 10.1093/aje/kwm063

Thiébaut, Anne C. M., Jiao, Li, Silverman, Debra T., Cross, Amanda J., Thompson, Frances E., Subar, Amy F., . . . Stolzenberg-Solomon, Rachael Z. (2009). Dietary fatty acids and pancreatic cancer in the NIH-AARP Diet and Health Study. *J Natl Cancer Inst, 101*(14), 1001-1011. doi: 10.1093/jnci/djp168

van Dam, Rob M., Willett, Walter C., Rimm, Eric B., Stamper, Meir J., & Hu, Frank B. (2002). Dietary fat and meat intake in relation to risk of type 2 diabetes in men. *Diabetes Care, 25*(3), 417-424.

van Eijsden, Manon, Hornstra, Gerard, van der Wal, Marcel F, Vrijkotte, Tanja GM, & Bonsel, Gouke J. (2008). Maternal n− 3, n− 6, and trans fatty acid profile early in pregnancy and term birth weight: a prospective cohort study. *The American journal of clinical nutrition, 87*(4), 887-895.

Vinikoor, Lisa C., Satia, Jessie A., Schroeder, Jane C., Millikan, Robert C., Martin, Christopher F., Ibrahim, Joseph G., & Sandler, Robert S. (2009). Associations between trans fatty acid consumption and colon cancer among whites and African Americans in the North Carolina Colon Cancer Study I. *Nutr Cancer, 61*(4), 427-436. doi: 10.1080/01635580802710725

Voorrips, Laura E, Brants, Henny AM, Kardinaal, Alwine FM, Hiddink, Gerrit J, van den Brandt, Piet A, & Goldbohm, R Alexandra. (2002). Intake of conjugated linoleic acid, fat, and other fatty acids in relation to postmenopausal breast cancer: the Netherlands Cohort Study on Diet and Cancer. *The American journal of clinical nutrition, 76*(4), 873-882.

Wieland, S.K., von Mutios, E., Husing, A., & Asher, M. Innes. (1999). Intake of trans fatty acids and prevalence of childhood asthma and allergies in Europe. *Lancet, 353*, 2040-2041.

Yaemsiri, Sirin, Sen, Souvik, Tinker, Lesley, Rosamond, Wayne, Wassertheil-Smoller, Sylvia, & He, Ka. (2012). Trans fat, aspirin, and ischemic stroke in postmenopausal women. *Ann Neurol, 72*(5), 704-715. doi: 10.1002/ana.23555