

Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
Pharmacotherapy									
Rasmussen 699	Randomized: unclear Blinded Patients: yes Providers: yes Outcome: yes Mean age: 37 Mean weight: 95.7 Female/Total: 51/60	BMI: 27-39	Diet: low-calorie, high-fiber Exercise: none Behavioral: none	1. Placebo 2. Cimetidine 200 mg TID Duration: 8 weeks	5 5	(29) -5.9 (26) -5.7 <u>2vs1</u> 0.20 (-1.09, 1.48)	<u>SBP</u> 1. (30) 123 (117, 129) 2. (30) 127 (118, 135) <u>DBP</u> 1. (30) 79 (74.9, 83.1) 2. (30) 81 (76.5, 85.5)	<u>SBP</u> 1. (29) 120 (114, 125) 2. (26) 120 (112, 127) <u>2vs1</u> -4 (-41, 32) <u>DBP</u> 1. (29) 73 (69.2, 76.8) 2. (26) 74 (69.2, 78.8) <u>2vs1</u> -1 (-5.5, 3.5)	Nausea/abdominal pain more frequent with cimetidine (no statistic done).
Mathus-Vliegen 390	Randomized: unclear Blinded Patients: yes Providers: yes Outcome: yes Subgroup of INDEX trial Mean age: 35.9 Mean weight: 110.7 Female/Total: 64/75	>135% IBW	Diet: low-calorie (1000 kcal less) Exercise: none Behavioral: none	1. Placebo 2. Dexfenfluramine 15 mg BID	3 (8%) 7 (19%)	(36) -8.0 (36) -10.7 <u>2vs1</u> p=ns	<u>SBP</u> 1. 1.(39) 154.2 (148.2, 160.2) 2. 2.(36) 151.9 (143.9, 159.9) <u>DBP</u> 1. (39) 103.1 (98.9, 107.3) 2. (36) 103.8 (98.2, 109.4)	<u>SBP 6 mos</u> <u>2vs1</u> -3.70 (-11.19, 3.79) <u>SBP</u> 1. (36) 126.9 (119.9, 133.9) 2. (29) 124.1 (116.9, 131.3) <u>2vs1</u> -0.50 (-8.02, 7.02) <u>DBP</u> 1. (36) 88.3 (83.8, 92.8) 2. (29) 86.4 (81.5, 91.3) <u>2vs1</u> -2.60 (-7.64, 2.44) <u>DBP 6 mos change</u> <u>2vs1</u> -1.00 (-6.14, 4.14)	Dutch eating behavior increased in placebo (need to restrain their eating more in order to achieve same weight loss).
Herwig 70037	Randomized: Yes Blinded Patients: Yes Providers: Yes Outcome: Yes Mean age: 42 Mean weight: Female/Total: 52/60	>120% IBW	Diet: LCD 1500 Exercise: No Behavioral: No	1. Placebo 2. Dexfenfluramine 15 mg BID	18/60	<u>Weight loss</u> (upper body obesity) 1. (8) -4.7 (-7.1, -2.3) 2. (12) -14.2 (-15.6, 12.8) <u>2vs1</u> -9.5 (-11.19, -7.81) <u>Weight loss</u> (lower body obesity) 1. (6) -2.6 (-5, -0.16) 2. (16) -11.1 (-12.7, -9.6) <u>2vs1</u> -8.5 (-10.14, -6.86)	<u>SBP</u> (upper body obesity) 1. (8) 153.8 (146, 161) 2. (12) 157.5 (151, 164) <u>SBP</u> (lower body obesity) 1. (6) 138 (128, 138) 2. (16) 136 (128, 144)	<u>SBP</u> (upper body obesity) 1. (8) 140 (133, 147) 2. (12) 133 (128, 138)	

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Connacher 696	Randomized: unclear Blinded Patients: yes Providers: yes Outcome: yes Mean age: 42.8 Mean weight: 100.5 Female/Total: 32/40	>120% IBW	Diet: 3.35 MJ/d Exercise: no Behavioral: no	1. Placebo 2. BRL 26830A (beta adrenoreceptor agonist) start at 200, then 400 mg	none	<u>Weight in kg</u> 1. (16) -10 (95%CI -13.1, -6.9) 2. (16) -15.4 (95%CI -18.9, -11.9)	<u>SBP</u> 1. (20) 127 (95%CI 118.6, 135.4) 2. (20) 129 (95%CI 123.4, 134.6) <u>DBP</u> 1. (20) 83 (95%CI 79.7, 86.3) 2. (20) 84 (95%CI 80.3, 87.7)	<u>SBP</u> 1. (16) 119 (95%CI 112.6, 125.4) 2. (16) 116 (95%CI 107.5, 124.5) <u>DBP</u> 1. (16) 79 (95%CI 74.7, 83.3) 2. (16) 78 (95%CI 73.7, 82.3)	
Bremer 386	Randomized: unclear Blinded Patients: yes Providers: yes Outcome: yes Mean age: 49.4 Mean weight: 83.3 Female/Total: 15/26 *dyslipidemic patients	poor outcome to weight loss programs	Diet: low-fat diet Exercise: none Behavioral: none	1. Placebo 2. Dexfenfluramine 15 mg BID	0 3 (20%)	(14) -2.5 (12) -4.2 <u>2vs1</u> -1.7 (-8.65, 5.25)	<u>SBP</u> 1. (14) 137.5 (130.6, 144.4) 2. (12) 146.7 (136.6, 156.8) <u>DBP</u> 1. (14) 87.5 (80.6, 94.4) 2. (12) 82.3 (77.0, 87.6)	<u>SBP</u> 1. (14) 132.4 (125.9, 138.9) 2. (12) 128.6 (120.2, 137.0) <u>2vs1</u> -13.00 (-20.85, -5.15) <u>DBP</u> 1. (14) 86.9 (81.3, 92.5) 2. (12) 78.2 (72.7, 83.7) <u>2vs1</u> -3.50(-9.39, 2.39)	40% in dF compared to 0% in placebo. Drowsiness, fatigue, sleepiness, memory loss, faintness, loss of sensation in arms and legs were reasons for withdrawal.
Mathus-Vliegen 391	Randomized: unclear Blinded Patients: yes Providers: yes Outcome: yes Mean age: 36.5 Mean weight: 109 Female/Total: 35/42	>120% IBW	Diet: 1000 kcal less Exercise: none Behavioral: none	1. Placebo 2. Dexfenfluramine 15 mg BID	1. (17%) 2. (24%)	(18) -8.63 (17) -12.84 <u>2vs1</u> -4.21 (-13.2, 4.79)	<u>SBP</u> 1. (18) 150.3 (144.1, 156.5) 2. (17) 152.1 (139.5, 164.7) <u>DBP</u> 1. (18) 103.3 (97.5, 109.1) 2. (17) 102.6 (93.8, 111.4)	<u>SBP</u> 1. (18) 137.2 (126.7, 147.7) 2. (17) 129.4 (119.4, 139.4) <u>2vs1</u> -9.6 (-20, 0.8) <u>DBP</u> 1. (18) 94.4 (87.3, 101.5) 2. (17) 91.5 (84.7, 98.3) <u>2vs1</u> -2.2 (-9.5, 5.2)	
O'Connor 392	Randomized: unclear Blinded Patients: yes Providers: yes	BMI: 30-40 (kg/m ²)	Diet: 1200 to 1500 Exercise: none	1. Placebo 2. Dexfenfluramine 15 mg BID	1. (14%) 2. (10%)	(24) -4.9 (27) - 9.7	<u>SBP</u> 1. (24) 118.9 (113.9, 123.9) 2. (27) 117.2 (111.2, 123.2)	<u>SBP</u> 1. (24) 119.9 (114.7, 125.1)	Diarrhea, ↓appetite, fatigue, headache more

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	Outcome: yes Mean age: 40.2 Mean weight: 96.4 Female/Total: 31/58		Behavioral: none kcal/d			EOT Weight kg <u>2vs1</u> -4.80(-6.87, -2.73)	DBP 1. (24) 77.6 (74.1, 81.1) 2. (27) 75.8 (71.3, 80.3)	2. (27) 117.4 (109.6, 125.2) <u>2vs1</u> -0.80(-7.27, 5.67) DBP 1. (24) 75.8 (71.7, 79.9) 2. (27) 73.6 (68.7, 78.5) <u>2vs1</u> -0.40 (-4.90, 4.10)	common in dF (NS), significantly more nausea, dry mouth, dizziness with dF.
Swinburn 70050	Randomized: unclear Blinded Patient: yes Providers: yes Outcome: yes Mean age: 45.7 Mean weight: 97 Female/Total: 57/84	BMI 30-40	Diet: Low fat Exercise: none Behavioral: none	1. Placebo 2. Dereflluamia 15 mg bid	13/97	Weight (kg) 1. (42) -0.3 (-0.4, -0.2) 2. (42) -42.2 (-4.3, 4.0) <u>2vs1</u> -3.9 (-6.79, -1.01)	SBP 1. (42) 132.9 (127, 138) 2. (42) 136.7 (131, 142) DBP 1. (42) 84 (80.9, 87.1) 2. (42) 83.4 (80.4, 86.4)	SBP 1. (42) 0.2 (-0.3, 0.7) 2. (42) 3.2 (2.6, 3.8) <u>2vs1</u> 3.0 (2.46, 3.54) DBP 1. (42) 0.2 (-0.2, 0.6) 2. (42) 0.4 (-0.01, 0.8) <u>2vs1</u> 0.2 (-0.2, 0.6)	
Astrup 695	Randomized: unclear Blinded Patients: yes Providers: yes Outcome: yes Mean age: 35.5 Mean weight: 94.8 Female/Total: 155/180	120-180% IBW	Diet: 1000 kcal Exercise: none Behavioral: none	1. Placebo 2. Caffeine 200 mg TID 3. Ephedrine 20 mg TID 4. Ephedrine 20 mg + Caffeine 200 mg TID	10 (22%) 10 (22%) 10 (22%) 10 (22%)	(35) -13.2 (35) -11.5 (35) -14.3 (35) -16.6 4vs1 p<0.02 3vs1 p>0.2 2vs1 p>0.2	SBP 1. (45) 127.6 (126.7, 128.5) 2. (44) 128.2 (127.3, 129.1) 3. (45) 122.6 (121.9, 123.3) 4. (45) 123.7 (123.0, 124.4) DBP 1. (45) 82.8 (82.3, 83.3) 2. (44) 80.8 (80.3, 81.3) 3. (45) 79.7 (79.2, 80.2) 4. (45) 79.3 (78.9, 79.7)	SBP 1. (35) -6.7 (-7.6, -5.8) 2. (35) -9.3 (-10.1, -8.5) 3. (35) -8.7 (-9.2, -8.2) 4. (35) -4.8 (-5.5, -4.1) 4vs3 3.90 (3.30, 4.50) 4vs1 1.90 (1.11, 2.69) 3vs1 -2.00 (-2.71, -1.29) DBP 1. (35) -5.2 (-5.8, -4.6) 2. (35) 8.9 (8.2, 9.6) 3. (35) -6.9 (-7.4, -6.4) 4. (35) -5 (-5.6, -4.4) 4vs3 1.90 (1.36, 2.44) 4vs1 0.20 (-0.39, 0.79) 3vs1 -1.70 (-2.24, -1.16)	Significantly more patients in the ephedrine/caffeine group than in placebo reported at least one symptom. Withdrawal symptom seemed more frequent in EC (headache, tiredness) and ephedrine.
Weintraub 395	Randomized: yes Blinded Patients: yes Providers: yes Outcome: yes	130-180% IBW	Diet: yes 1000-1800 kcal/d Exercise: yes	1. Placebo 2. Fenfluramine extended release 60 mg + Phentermine 15 mg	1. 8% 2. 6%	Weight in kg 1. (54) -4.6 (95% CI -6.2, -3.0) 2. (58) -14.3 (95% CI	SBP 1. (59) 128 (95% CI 124.0, 132.0) 2. (62) 130 (95% CI 126.0,	SBP 1. (54) 120 (95% CI 116.0, 124.0) 2. (58) 120 (95% CI 116.0,	

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	Mean age: 40 Mean weight: 33.4 mg/kg ² Female/Total: 90/121		>900 Cal/week Behavioral: yes group, 8 sessions			-16.1, -12.5) 2vs1 -9.70 (-11.39, -8.01)	134.0) DBP 1. (59) 80 (95%CI 78.0, 82.0) 2. (62) 83 (95%CI 81.0, 85.0)	124.0) 2vs1 -2.00 (-6.29, 2.29) DBP 1. (54) 77 (95%CI 75.0, 79.0) 2. (58) 76 (95%CI 74.0, 78.0) 2vs1 -4.00 (-6.14, -1.86)	
Schteingart 512	Randomized: unclear Blinded Patients: yes Providers: yes Outcome: yes Mean age: 37.8 Mean weight: 79.9 Female/Total: 85/101	115-145% overweight	Diet: 1200 kcal Exercise: none Behavioral: none	1. Placebo 2. Phenylpropanolamine 75 mg qd	23 (46%) 15 (29%)	(28) -1.07 (36) -2.59 2vs1 -1.52 (-3.52,0.48)		<u>SBP (Change from baseline)</u> 1. (28) -5.7 (n/a, n/a) 2. (36) 0.4 (n/a, n/a) <u>DBP (Change from baseline)</u> 1. (28) 0.3 (n/a, n/a) 2. (36) 0.9 (n/a, n/a) at end of treatment differences between groups for SBP and DBP were not significant	no details other than 2 drop-outs secondary to nausea.
Marin 698	Randomized: unclear Blinded Patients: no Providers: no Outcome: no Mean age: 50.8 Mean weight: 95.6 Female/Total: 0/23	BMI>25	Diet: ns Exercise: none Behavioral: none	1. Placebo 2. Testosterone decanoate 80 mg BID	1 (8%) 1 (9%)	(12) -0.2 (11) -1.4 2vs1 -1.2 (-8.03, 5.63)	<u>SBP</u> 1. (12) 144.2 (134.1, 154.3) 2. (11) 140.0 (133.8, 146.2) <u>DBP</u> 1. (12) 85.0 (79.5, 90.5) 2. (11) 88.2 (83.5, 92.9)	<u>SBP</u> 1. (12) 135.9 (126.0, 145.8) 2. (11) 130.9 (122.2, 139.6) 2vs1 -0.80 (-9.5, 7.9) <u>DBP</u> 1. (12) 83.6 (77.4, 89.8) 2. (11) 82.1 (79.6, 84.6) 2vs1 -4.70 (-9.61, 0.21)	Side effects: a statistically significant enlargement of the prostate was found in the testosterone group. PSA unchanged.
Pfohl 393	Randomized: unclear Blinded Patients: yes Providers: yes Outcome: yes Mean age: 38.5 Mean weight: 96.5	>120% IBW	Diet: yes 1200-1500 kcal Exercise: no Behavioral: no	1. Placebo 2. Dexfenfluramine 15 mg BID	not given	<u>Weight in kg</u> 1. (15) -9.6 (95%CI -13.2, -6.0) 2. (19) -10.9 (95%CI -14.7, -7.1) 2vs1 -1.3 (-5.2, 2.6) <u>Weight in kg 48 months</u>		<u>DBP change 6 months</u> 2vs1 1.20(-18.97, 21.37) <u>SBP change 6 months</u> 2vs1 1.30(-36.83, 39.43) <u>SBP 11 months</u>	

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	Female/Total: 38/48					1. (11) -2.1 (95% CI -4.8, 0.6) 2. (11) 1.5 (95% CI -1.4, 4.4) <u>2vs1</u> 3.6 (0.72, 6.48)		1. (11) 130.5 (95% CI 97.3, 163.7) 2. (11) 126.8 (95% CI 97.4, 156.2) <u>2vs1</u> 2.60 (-31.01, 36.21) <u>DBP 11 months</u> 1. (11) 85.9 (95% CI 61.2, 110.6) 2. (11) 80.9 (95% CI 63.1, 98.7) <u>2vs1</u> -0.60 (-20.38, 19.18) <u>SBP 48 months</u> 1. (11) 144.6 (95% CI 96.7, 192.5) 2. (11) 139.1 (95% CI 109.7, 168.5) <u>2vs1</u> 0.70 (-36.63, 38.03) <u>DBP 48 months</u> 1. (11) 89.1 (95% CI 64.4, 113.8) 2. (11) 87.3 (95% CI 67.7, 106.9) <u>2vs1</u> 2.60 (-17.58, 22.78)	
Exercise									
Ready 685	Randomized: unclear Self-selected: yes Included: postmenopausal women, included non-overweight Mean age: not given Mean weight: 79.7 Female/Total 40/40	postmenopausal women	Diet: no Exercise: yes 60 min 5x/wk Max HR: 60% Behavioral: no	1. Control (no exercise) 2. Exercise	1. 6/16 (37%) 2. 9/24 (37%)	<u>Weight in kg</u> 1. 0.6 (-7.9, 9.1) 2. -1.9 (-11.22, 7.42) <u>2vs1</u> -2.5 (-11.0, 6.0)	<u>SBP</u> 1. (10) 6.74 (6.3, 7.2) 2. (15) 6.64 (6.4, 6.9)	<u>SBP</u> 1. (10) 6.75 (6.4, 7.1) 2. (15) 6.34 (6.0, 6.7)	
Hellenius 365	Randomized: unclear Self-selected: no Included: non-overweight Mean age: 46.2 Mean weight: 25 kg/m ² Female/Total: none/158	not given	Diet: none for group 3 Exercise: yes 30-45 min 3x/wk Max HR: 60-80% Behavioral: no	1. No intervention 2. Low-fat diet 3. Exercise alone 4. Low-fat diet + exercise	1. 1/40 (2.5%) 2. 0/39 3. 0/39 4. 0/39	<u>Change in BMI</u> 1. 0.3 2. -0.3 3. -0.3 4. -0.6 <u>4vs3</u> -0.30 (-0.57, -0.03)	<u>SBP</u> 1. (39) 130 (126.0, 134.0) 2. (40) 130 (124.8, 135.2) 3. (39) 133 (127.2, 138.8) 4. (39) 129 (124.9, 133.1) <u>DBP</u> 1. (39) 82 (79.3, 84.7)	<u>SBP</u> 1. (39) -0.13 (-0.33, 0.07) 2. (40) -0.19 (-0.49, 0.11) 3. (39) -0.12 (-0.35, 0.11) 4. (39) -0.45 (-0.77, -0.13) <u>3vs1</u> 0.01 (-0.20, 0.22) <u>3vs2</u> 0.07 (-0.19, 0.33) <u>2vs1</u> -0.06 (-0.31, 0.19)	

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						<u>4vs2</u> -0.30 (-0.60, 0.00) <u>4vs1</u> -0.90 (-1.15, -0.65) <u>3vs1</u> -0.60 (-0.82, -0.38) <u>3vs2</u> 0.00 (-0.28, -0.28) <u>2vs1</u> -0.60 (-0.86, -0.34)	2. (40) 82 (79.5, 84.5) 3. (39) 82 (78.9, 85.1) 4. (39) 81 (78.5, 83.5)	<u>4vs3</u> -0.33 (-0.60, -0.06) <u>4vs2</u> -0.26 (-0.57, 0.05) <u>4vs1</u> -0.32 (-0.58, -0.06) <u>DBP</u> 1. (39) -1 (-3, 1) 2. (40) -6 (-8, -4) 3. (39) -4 (-7, -2) 4. (39) -2 (-4, 1)	
Gordon 70030	Randomized: unclear Self-selected: yes Included: hypertensive and moderately obese Mean age: 48 Mean weight: 98 Female/Total 38/55	Moderately obese	Diet: none for group 2 Exercise: yes 30-45 min, 3-5x/wk Max HR: 60-85% Behavioral: no	1. Exercise training 2. Diet 3. Exercise and diet	1. 0/14 2. 2/17 3. 5/24	<u>Weight</u> (kg) 1. (14) -1 (2.0, 0.4) 2. (15) -5.8 (-7.9, -3.6) 3. (19) -7.1 (-8.5, -5.7)	<u>SBP</u> 1. (14) 145 (138, 152) 2. (15) 141 (133, 149) 3. (19) 145 (139, 151) <u>DBP</u> 1. (14) 96 (91.3, 100.6) 2. (15) 93 (89.1, 96.9) 3. (19) 95 (91.6, 98.4)	<u>SBP</u> 1. (14) -9.9 (-13.6, -6.2) 2. (15) -11.3 (-18, -4.6) 3. (19) -12.5 (-15.5, -9.5) <u>DBP</u> 1. (14) -5.9 (-8.6, -3.2) 2. (15) -7.5 (-9.8, -5.1) 3. (19) -7.9 (-9.9, -5.8)	
Gillett 678	Randomized: yes Self-selected: unclear Included: not specified Mean age: 41.9 Mean weight: 165.8 Female/Total: 38/38	not given	Diet: no Behavioral: no	1. Aerobic dance not individualized 2. Intensity controlled individualized aerobic	3. 3/20 (15%) 4. 1/18 (6%)	1. -5.9 2. -5.5 <u>2vs1</u> 0.4 (-8.5, 9.3)	<u>SBP</u> 1. (17) 109.8 (105.6, 114.0) 2. (17) 115 (108.2, 121.8) <u>DBP</u> 1. (17) 70.6 (66.3, 74.9) 2. (17) 79.2 (72.9, 85.5)	<u>SBP</u> 1. (17) 103.5 (95% CI 100.5, 106.5) 2. (17) 110.8 (95% CI 105.0, 116.6) <u>DBP</u> 1. (17) 66.5 (95% CI 63.3, 69.7) 2. (17) 72.1 (95% CI 67.6, 76.6)	
Fortmann 363	Randomized: unclear Self-selected: yes Included: >120-150% IBW Mean age: 44.3 Mean weight: 93.6 Female/Total: 0/115	>120-150% of IBW	Diet: only for group 2 Exercise: yes 3x/wk Max HR: 70-85% Behavioral: no	1. Control (no intervention) 2. Low-calorie diet 3. Exercise only	not given	1. 0.5 2. -6.9 3. -4.6 <u>EOT Weight change</u> <u>2vs1</u> -7.40 (-8.73, -6.07) <u>3vs2</u> 2.30 (1.07, 3.53) <u>3vs1</u> -5.10 (-6.27, -3.93)	<u>SBP</u> 1. (35) 120 (116.9, 123.1) 2. (38) 118 (115.0, 121.0) 3. (42) 122 (117.9, 126.1) <u>DBP</u> 1. (35) 79 (76.3, 81.7) 2. (38) 80 (77.4, 82.6) 3. (42) 78 (75.5, 80.5)	<u>SBP</u> 1. (35) -4.1 (-6.8, -1.4) 2. (38) -5.7 (-8.3, -3.1) 3. (42) -6.6 (-9.2, -4.0) <u>3vs2</u> -0.90 (-3.46, 1.66) <u>3vs1</u> -2.50 (-5.10, 0.10) <u>2vs1</u> -1.60 (-4.20, 1.00) <u>DBP</u> 1. (35) -2.6 (-5.4, 0.2) 2. (38) -5.6 (-8.0, -3.2) 3. (42) -4.1 (-6.6, -1.6) <u>3vs2</u> 1.50 (-0.91, 3.91) <u>3vs1</u> -1.50 (-4.10, 1.10)	There were no convincing relations between changes in nutrient intake and changes in BP in any of the 3 groups

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								<u>2vs1</u> -3.00 (-5.55, -0.45) <u>SBP,a</u> 1. (35) 0.2 (-2.2, 2.6) 2. (38) -2.7 (-6.2, 0.8) 3. (42) -2.3 (-4.5, -0.1) <u>3vs2</u> 0.40 (-2.44, 3.24) <u>3vs1</u> -2.50 (-4.75, -0.25) <u>2vs1</u> -2.90 (-5.87, 0.07) <u>DBP,a</u> 1. (35) 1.5 (-0.4, 3.4) 2. (38) -1.4 (-4.0, 1.2) 3. (42) -2 (-3.8, -0.2) <u>3vs2</u> -0.60 (-2.78, 1.58) <u>3vs1</u> -3.50 (-5.32, -1.68) <u>2vs1</u> -2.90 (-5.15, -0.65)	
King 401	Randomized: yes Self-selected: no Included: non-overweight Mean age: not given Mean weight: 26.9 kg/m ² Female/Total: 160/357	not given	Diet: no Exercise: 30-50 min 3-5x/wk Max HR: 70-80% Behavioral: no	1. No intervention 2. Lower-intensity home-based exercise 3. Higher-intensity home-based exercise 4. Higher-intensity group-based exercise	not given	Men Women 1. 0.1 0 2. -0.9 -0.6 3. -0.2 0.1 4. 0.4 0.4 men: <u>2vs1</u> -1.0 (-1.9, -0.01) <u>3vs2</u> 0.7 (-0.3, 1.7) <u>4vs3</u> 0.6 (-0.81, 2.01) women: <u>2vs1</u> -0.6 (-2.3, 1.2) <u>3vs2</u> 0.7 (-1.2, 2.6) <u>4vs3</u> 0.3 (-1.5, 2.1)	<u>SBP, men</u> 1. (41) 119 (114.9, 123.1) 2. (45) 115 (111.7, 118.3) 3. (42) 117 (113.3, 120.7) 4. (40) 118 (113.8, 122.2) <u>SBP, women</u> 1. (34) 117 (112.1, 121.9) 2. (29) 117 (112.1, 121.9) 3. (35) 116 (111.2, 120.8) 4. (34) 119 (114.1, 123.9) <u>DBP, men</u> 1. (41) 76 (73.8, 78.2) 2. (45) 74 (71.6, 76.4) 3. (42) 75 (72.5, 77.5) 4. (40) 75 (72.4, 77.6) <u>DBP, women</u> 1. (34) 72 (69.2, 74.8) 2. (29) 73 (70.3, 75.7) 3. (35) 73 (70.3, 75.7) 4. (34) 75 (72.2, 77.8)	<u>SBP, men</u> 12 months 1. (41) -1 (-3.8, 1.8) 2. (45) -1 (-3.4, 1.4) 3. (42) -3 (-5.8, -0.2) 4. (40) -3 (-5.6, -0.4) <u>4vs1</u> -2.00 (-4.66, 0.66) <u>4vs2</u> -2.00 (-4.46, 0.46) <u>4vs3</u> 0.00 (-2.66, 2.66) <u>3vs1</u> -2.00 (-4.76, 0.76) <u>3vs2</u> -2.00 (-4.58, 0.56) <u>2vs1</u> 0.00 (-2.56, 2.56) <u>SBP, women</u> 12 months 1. (34) -3 (-6.1, 0.1) 2. (29) -6 (-9.4, -2.6) 3. (35) -3 (-5.4, -0.6) 4. (34) -5 (-7.8, -2.2) <u>4vs1</u> -2.00 (-4.90, 0.90) <u>4vs2</u> 1.00 (-2.03, 4.03) <u>4vs3</u> -2.00 (-4.56, 0.56) <u>3vs1</u> 0.00 (-2.72, 2.72) <u>3vs2</u> 3.00 (0.17, 5.83) <u>2vs1</u> -3.00 (-6.17, 0.17) <u>DBP, men</u> 12 months 1. (41) -2 (-3.6, -0.4) 2. (45) -2 (-3.8, -0.2) 3. (42) -2 (-3.9, -0.1)	

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Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
								4. (40) -1 (-2.6, 0.6) 4vs1 1.00 (-0.58, 2.58) 4vs2 1.00 (-0.68, 2.68) 4vs3 1.00 (-0.73, 2.73) 3vs1 0.00 (-1.73, 1.73) 3vs2 0.00 (-1.82, 1.82) 2vs1 0.00 (-1.68, 1.68) DBP, women 12 months 1. (34) -2 (-3.4, -0.6) 2. (29) -3 (-4.9, -1.1) 3. (35) -2 (-3.7, -0.3) 4. (34) -2 (-3.7, -0.3) 4vs2 1.00 (-0.76, 2.76) 4vs3 0.00 (-1.67, 1.67) 3vs1 0.00 (-1.53, 1.53) 3vs2 1.00 (-0.76, 2.76) 2vs1 -1.00 (-2.61, 0.61)	
Diet and Exercise									
Schuler 405	Randomized: yes Self-selected: no Included: non-overweight Mean age: 53.5 Mean weight: 26.5 Female/Total: 0/113	includes non-overweight	Diet: yes <20% fat Exercise: yes Max HR: 70% Behavioral: no	1. No intervention 2. Low-fat diet and exercise	1. 4/57 (7%) 2. 5/56 (9%)	1. (52) -0.2 mg/kg ² 2. (40) -1.6 mg/kg ² BMI Change 2vs1 -1.40 (-2.20, -0.60)	SBP 1. (52) 128 (122.2, 133.8) 2. (40) 128 (121.9, 134.1)	SBP 1. (52) 128 (123.0, 133.0) 2. (40) 129 (123.2, 134.8) 2vs1 1.00 (-5.04, 7.04)	
Page 684	Randomized: unclear Self-selected: unclear Included: non-overweight, subjects with impaired glucose tolerance Mean age: 39 Mean weight: not given Female/Total: ng/31	includes non-overweight	Diet: yes ADA with increased fiber to lose 0.5-1.0 kg/wk Behavioral: no	1. No intervention 2. Low-fat diet and exercise	1. 1/8 (12%) 2. 5/23 (22%)	1. (7) -1.0 mg/kg ² 2. (18) -1.0 mg/kg ² BMI 104 wks change 2vs1 0.00 (-2.38, 2.38)	SBP 1. (7) 138 (120.4, 155.6) 2. (18) 124 (116.5, 131.5) DBP 1. (7) 87 (78.7, 95.3) 2. (18) 77 (71.5, 82.5)	SBP 1. (7) 134 (118.3, 149.7) 2. (18) 118 (110.5, 125.5) 2vs1 -2.00 (-11.70, 7.70) DBP 1. (7) 92 (82.8, 101.2) 2. (18) 76 (71.5, 80.5) 2vs1 -6.00 (-11.82, -0.18) At 2 years SBP 104 weeks 1. (6) 129 (118.5, 139.5) 2. (17) 118 (112.3, 123.7) 2vs1 3.00 (-5.43, 11.43)	

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
								DBP 104 weeks 1. (6) 87 (76.5, 97.5) 2. (17) 74 (68.3, 79.7) 2vs1 -3.00 (-9.20, 3.20)	
Kanaley 681	Randomized: unclear Self-selected: unclear Included: BMI>29 Mean age: 36 Mean weight: 88.3 Female/Total: 24/24	BMI >29	Diet: 2.1 MJ less than BMR Exercise: 1. encouraged 2. 30 min x3/wk at Max HR 60-80% Behavioral: no	1. Diet with informal exercise 2. Diet with formal exercise	overall 5/24 (21%)	<u>Weight in kg, lower obesity</u> 1,2. (9) -7.7 (-13.4, -2.01) <u>Weight in kg, upper obesity</u> 1,2. (10) -9.2 (-15.3, -3.1)	<u>SBP, lower body obesity</u> 1,2. (9) 111 (104.1, 117.9) <u>DBP, lower body obesity</u> 1,2. (9) 74 (69.4, 78.6) <u>SBP, upper body obesity</u> 1,2. (10) 118 (109.0, 127.0) <u>DBP, upper body obesity</u> 1,2. (10) 80 (73.2, 86.8)	<u>SBP, lower body obesity</u> 1,2. (9) 105 (95.8, 114.2) <u>DBP, lower body obesity</u> 1,2. (9) 68 (63.4, 72.6) <u>SBP, upper body obesity</u> 1,2. (10) 115 (106.0, 124.0) <u>DBP, upper body obesity</u> 1,2. (10) 74 (67.2, 80.8)	Formal vs informal exercise did not influence the changes in BP in either group.
Hellenius 365	Randomized: unclear Self-selected: no Included: includes non-overweight Mean age: 46.2 Mean weight: 25.3 mg/kg ² Female/Total: 0/158	includes non-overweight	Diet: NCEP I Exercise: yes groups 3 and 4 30-45 min x3/wk Max HR: 60-80% Behavioral: no	1. Control(no intervention) 2. Diet alone 3. Exercise alone 4. Diet and exercise	1. 1/40 (2%) 2. 0/40 3. 0/39 4. 0/39	<u>BMI</u> 1. (39) 0.3 (0.1, 0.5) 2. (40) -0.3 (-0.6, 0.03) 3. (39) -0.3 (-0.5, -0.01) 4. (39) -0.6 (-0.9, -0.3) <u>EOT BMI change</u> <u>4vs3</u> -0.30 (-0.57, -0.03) <u>4vs2</u> -0.30 (-0.60, 0.00) <u>4vs1</u> -0.90 (-1.15, -0.65)	<u>SBP</u> 1. (39) 130 (126.0, 134.0) 2. (40) 130 (124.8, 135.2) 3. (39) 133 (127.2, 138.8) 4. (39) 129 (124.9, 133.1) <u>DBP</u> 1. (39) 82 (79.3, 84.7) 2. (40) 82 (79.5, 84.5) 3. (39) 82 (78.9, 85.1) 4. (39) 81 (78.5, 83.5)	<u>SBP</u> 1. (39) -0.13 (-0.33, 0.07) 2. (40) -0.19 (-0.49, 0.11) 3. (39) -0.12 (-0.35, 0.11) 4. (39) -0.45 (-0.77, -0.13) <u>3vs1</u> 0.01 (-0.20, 0.22) <u>3vs2</u> 0.07 (-0.19, 0.33) <u>2vs1</u> -0.06 (-0.31, 0.19) <u>4vs3</u> -0.33 (-0.60, -0.06) <u>4vs2</u> -0.26 (-0.57, 0.05) <u>4vs1</u> -0.32 (-0.58, -0.06)	
Gordon 70030	Randomized: unclear Self-selected: yes Included: hypertensive and moderately obese Mean age: 48 Mean weight: 98 Female/Total 38/55	Moderately obese	Diet: to lose 10% of baseline weight Exercise: yes Groups 1 and 3 30-45 min, 3-5x/wk Max HR: 60-85% Behavioral: no	4. Exercise training 5. Diet 6. Exercise and diet	4. 0/14 5. 2/17 6. 5/24	<u>Weight (kg)</u> 4. (14) -1 (2.0,04) 5. (15) -5.8 (-7.9, -3.6) 6. (19) -7.1 (-8.5, -5.7)	<u>SBP</u> 4. (14) 145 (138, 152) 5. (15) 141 (133, 149) 6. (19) 145 (139, 151) <u>DBP</u> 4. (14) 96 (91.3, 100.6) 5. (15) 93 (89.1, 96.9)	<u>SBP</u> 4. (14) -9.9 (-13.6, -6.2) 5. (15) -11.3 (-18, -4.6) 6. (19) -12.5 (-15.5, -9.5) <u>DBP</u> 4. (14) -5.9 (-8.6, -3.2) 5. (15) -7.5 (-9.8, -5.1)	

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
				1.			6. (19) 95 (91.6, 98.4)	6. (19) -7.9 (-9.9, -5.8)	
Stevens 376	Randomized: unclear Self-selected: unclear Included: 115-165% IBW hypertension Mean age: 42.5 Mean weight: 89.7 Female/Total: 179/564	115-165%	Diet: yes goal to lose max 0.9 kg/2w Exercise: yes 30-45 min/4-5x/w mostly not supervised Behavioral: yes weekly x 14, then qmo	2. Control (no intervention) 3. Diet, behavioral and exercise	not given	<u>Weight in kg, women</u> 2. (ns) -1.6 (n/a, n/a) <u>Weight in kg, men</u> 2. (ns) -4.7 (n/a, n/a)	<u>DBP</u> 1. (256) 84 (83.6, 84.4) 2. (308) 83.7 (83.4, 84.0) <u>SBP</u> 1. (256) 124.6 (123.6, 125.6) 2. (308) 124.3 (123.4, 125.2)	<u>DBP</u> 1. (236) -3.8 (-4.6, -3.0) 2. (295) -6.2 (-7.0, -5.4) <u>2vs1</u> -2.40 (-3.20, -1.60) <u>DBP, men</u> 1. (151) -3.4 (-4.4, -2.4) 2. (212) -6.4 (-7.2, -5.6) <u>2vs1</u> -3.00 (-3.89, -2.11) <u>DBP, women</u> 1. (85) -4.5 (-5.9, -3.1) 2. (83) -5.6 (-7.0, -4.2) <u>2vs1</u> -1.10 (-2.49, 0.29) <u>SBP</u> 1. (236) -2.3 (-3.3, -1.3) 2. (295) -5.3 (-6.1, -4.5) <u>2vs1</u> -3.00 (-3.82, -2.18) <u>SBP, men</u> 1. (151) -2.7 (-3.9, -1.5) 2. (212) -5.8 (-6.6, -5.0) <u>2vs1</u> -3.10 (-4.08, -2.12) <u>SBP, women</u> 1. (85) -1.7 (-3.7, 0.3) 2. (83) -4 (-6.0, -2.0) <u>2vs1</u> -2.30 (-4.29, -0.31) <u>DBP, >9.5 kg loss</u> 0. (ns) -9.4 (n/a, n/a) <u>DBP, 4.5-9.5 kg loss</u> 0. (ns) -6.9 (n/a, n/a) <u>DBP, 2.0-4.5 kg loss</u> 0. (ns) -5.2 (n/a, n/a) <u>DBP, 1.0-2.0 kg loss</u>	The results showed that for every kg of weight loss DBP decreased by 0.33 mm Hg (p<0.001) and SBP decreased by 0.43 mm Hg (p<0.001). Linear regression models identified a significant trend (p<0.05) in the relationship of change in DBP and SBP with quintile of weight loss for both men and women, although the effect was somewhat diminished in women.

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Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
								0. (ns) -4.4 (n/a, n/a) <u>DBP, <1.0 kg loss</u> 0. (ns) -3.3 (n/a, n/a) <u>SBP, <1.0 kg loss</u> 0. (ns) -1.4 (n/a, n/a) <u>SBP, 1.0-2.0 kg loss</u> 0. (ns) -2.5 (n/a, n/a) <u>SBP, 2.0-4.5 kg loss</u> 0. (ns) -4.8 (n/a, n/a) <u>SBP, >9.5 kg loss</u> 0. (ns) -8.4 (n/a, n/a)	
Blonk 470	Randomized: unclear Self-selected: no Included: BMI>27 diabetes Mean age: ng Mean weight: ng Female/Total: ng/153	BMI>27	Diet: yes 500 kcal less than usual intake Exercise: yes 60 min daily Max HR 60-80% Behavioral: yes q4mo	1. Conventional diet program (diet counseling alone) 2. Comprehensive diet, behavioral and exercise program	1. 4/26 (15%) 2. 3/27 (11%)	Weight in kg <u>2vs1</u> -1.3 (-3.3, 0.7)	Not given	<u>SBP</u> <u>2vs1</u> -5.0 (-4.0, 13.0) <u>DBP</u> <u>2vs1</u> -0.1 (-5.0, 5.0)	
Wood 380	Randomized: unclear Self-selected: yes Included: BMI 28-34 for premenopausal women and 24-30 for men Mean age: 39.7 Mean weight: 86.7 Female/Total: 132/264	BMI >24	Diet: NCEP I Exercise: yes 45 min x3 Max HR: 60-80% Behavioral: no	1. No intervention 2. Diet alone 3. Diet and exercise	overall 27/264 (10%)	<u>Weight in kg, men</u> 1. (40) 1.7 (0.2, 3.2) 2. (40) -5.1 (-7.0, -3.2) 3. (39) -8.7 (-10.5, -6.9) <u>EOT Weight, men</u> <u>2vs1</u> -6.80(-8.48, -5.12) <u>3vs1</u> -10.40(-12.03, -8.77) <u>3vs2</u> -3.6 (-5.4, -1.8) <u>Weight in kg, women</u> 1. (39) 1.3 (-0.4, 3.0)		<u>SBP, men</u> 1. (40) 0.1 (-2.4, 2.6) 2. (40) -4.1 (-6.7, -1.5) 3. (39) -5.4 (-8.1, -2.7) <u>2vs1</u> -4.20 (-6.71, -1.69) <u>3vs1</u> -5.50 (-8.06, -2.94) <u>3vs2</u> -1.30 (-3.91, 1.31) <u>DBP, men</u> 1. (40) 2.1 (0.5, 3.7) 2. (40) -2.4 (-4.5, -0.3) 3. (39) -4.9 (-6.7, -3.1)	

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						2. (31) -4.1 (-6.1, -2.1) 3. (42) -5.1 (-6.8, -3.4) <u>EOT Weight, women</u> 2vs1 -5.40 (-7.20, -3.60) 3vs1 -6.80 (-29.61, 16.01) 3vs2 -1.00 (-25.27, 23.27)		2vs1 -4.50 (-6.34, -2.66) 3vs1 -7.00 (-8.67, -5.33) 3vs2 -2.50 (-4.43, -0.57) <u>SBP, women</u> 1. (39) -0.2 (-2.3, 1.9) 2. (31) -4.1 (-6.3, -1.9) 3. (42) -3.6 (-6.0, -1.2) 2vs1 -3.90 (-6.01, -1.79) 3vs1 -3.40 (-5.63, -1.17) 3vs2 0.50 (-1.78, 2.78) <u>DBP, women</u> 1. (39) 0.9 (-0.8, 2.6) 2. (31) -2.2 (-4.1, -0.3) 3. (42) -2 (-3.3, -0.7) 2vs1 -3.10 (-4.86, -1.34) 3vs1 -2.90 (-4.38, -1.42) 3vs2 0.20 (-1.35, 1.75)	
Svensden 384	Randomized: unclear Self-selected: unclear Included: BMI >25 Mean age: ng Mean weight: 77.8 Female/Total: 121/121	BMI>25	Diet: 4.2 MJ/d Exercise: yes 90 min x3 Max HR: ng Behavioral: no	1. Control (no diet, exercise) 2. Diet alone 3. Diet + exercise	none	<u>Weight in kg</u> 1. (20) 0.5 (95%CI -0.3, 1.3) 2. (50) -9.5 (95%CI -10.3, -8.7) 3. (48) -10.3 (95%CI -11.2, 9.4) <u>EOT change scores</u> 3vs2 -0.80 (-1.64, 0.04) 2vs1 -10.00 (-10.79, -9.21) 3vs1 -10.80 (-11.68, -9.94)	<u>SBP</u> 1. (21) 129 (125.4, 132.6) 2. (51) 129 (124.8, 133.2) 3. (49) 128 (122.8, 133.2) <u>DBP</u> 1. (21) 80 (76.4, 83.6) 2. (51) 79 (76.5, 81.5) 3. (49) 79 (76.1, 81.9)	<u>SBP</u> 1. (20) -2 (-7.1, 3.1) 2. (50) -13 (-16.0, -9.6) 3. (48) -11 (-14.2, -7.8) <u>DBP</u> 1. (20) -4 (-7.3, -0.7) 2. (50) -7 (-9.3, -4.7) 3. (48) -9 (-11.3, -6.7)	
Wing 473	Randomized: unclear Self-selected: unclear Included: >120% IBW diabetes Mean age: 55 Mean weight: 103 Female/Total: 42/55	>120% IBW	Diet: ADA to lose 1 kg/wk Exercise: yes groups 2: 2x/wk group 4: 3-5x/wk 60 min/3 x10w then monthly Max HR: ng Behavioral: yes	1. Diet plus placebo exercise 2. Diet plus moderate exercise Duration: 10 week intensive then up to 24 weeks of maintenance <u>Study 2</u> 3. Diet alone (study 2)	1. 1/13 (7%) 2. 2/12 (17%) 3. 0/15 (0%) 4. 2/15 (13%)	<u>Weight in kg (week 10)</u> 1. (12) -7.3 2. (10) -8.5 3. (15) -5.6 4. (13) -9.3 <u>Weight in kg 12 months</u> 1. (11) -4 (-8.2, 0.2) 2. (8) -7.8 (-16.5, 0.9) 3. (15) -3.8 (-14.9, 7.3)	<u>SBP</u> 1. (12) 140 (133.4, 146.6) 2. (10) 137 (130.2, 143.8) <u>DBP</u> 1. (12) 87 (82.6, 91.4) 2. (10) 86 (81.5, 90.5) <u>SBP</u> 3. (15) 141 (128.1, 153.9) 4. (13) 132 (121.1, 142.9)	<u>SBP at 10 weeks</u> 1. (12) 127 (118.2, 135.8) 2. (10) 126 (121.5, 130.5) <u>DBP at 10 weeks</u> 1. (12) 79 (76.8, 81.2) 2. (10) 80 (75.5, 84.5) <u>SBP at 10 weeks</u> 3. (15) 135 (122.1, 147.9) 4. (13) 130 (119.1, 140.9)	

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			q2wx10,qmo	4. Diet and more intensive exercise (study 2)		4. (13) -7.9 (-22, 6.3)	DBP 3. (15) 84 (77.6, 90.4) 4. (13) 80 (73.5, 86.5)	DBP at 10 weeks 3. (15) 85 (76.4, 93.6) 4. (13) 83 (78.6, 87.4)	
Diet Interventions									
Mellies 683	Randomized: unclear Self-selected: unclear Included: >115% IBW dyslipidemic subjects Mean age: 52.9 Mean weight: ng Female/Total: ng/45	>115% IBW	Diet: yes group 2: 17g fiber Exercise: no Behavioral: no	1. Control (no diet) 2. Low-fat diet plus placebo 3. Low-fat diet plus sucrose polyester (17 g)	1. 4/15 (27%) 2. 0/12 3. 5/18 (28%)	<u>Weight in kg</u> 1. (11) -2.6 (-4.2, -1.0) 2. (12) -3.9 (-5.4, -2.4) 3. (13) -3.4 (-4.9, -1.9) <u>2vs1</u> -1.30 (-2.75, 0.15) <u>2vs3</u> -0.50 (1.92, 0.92) <u>3vs1</u> -0.80 (-2.25, 0.65)	not given	<u>SBP</u> 1. (11) -2 (-8.7, 4.7) 2. (12) -3 (-7.4, 1.4) 3. (13) 1 (-5.5, 7.5) <u>3vs2</u> 4.00 (-1.30, 9.30) <u>3vs1</u> 3.00 (-3.21, 9.21) <u>2vs1</u> -1.00 (-6.26, 4.26) <u>DBP</u> 1. (11) -2 (-8.7, 4.7) 2. (12) -6 (-10.4, -1.6) 3. (13) -3 (-7.4, 1.4) <u>2vs1</u> -4.00 (-9.26, 1.26)	
Simkin-Silverman 373 *Women's Health Lifestyle Project	Randomized: unclear Self-selected: no Included: BMI 20-34 includes non overweight Mean age: 47 Mean weight: ng Female/Total: 535/535	BMI 20-34	Diet: yes 1300-1500 kcal/d Exercise: Yes 1500 cal/week Behavioral: Yes group, qwx10,q2w	1. Control (no intervention) 2. Intervention group (low fat, exercise and behavioral therapy)	3%	<u>Weight in kg 6 months</u> 1. (267) -0.22 (95% CI -0.59, -.15) 2. (253) -4.8 (95% CI -5.4, -4.3) <u>2vs1</u> -4.58 (-4.99, -4.17)	<u>SBP</u> 1. (267) 110 (95% CI 109, 112) 2. (253) 110 (95% CI 108, 111) <u>DBP</u> 1. (267) 68 (95% CI 67, 69) 2. (253) 68 (95% CI 67, 69)	<u>SBP 6 months</u> 1. (267) -1.2 (95% CI -2.3, -0.09) 2. (253) -3.5 (95% CI -4.6, -2.3) <u>2vs1</u> -2.3 (-3.58, -1.02) <u>DBP 6 months</u> 1. (267) -0.09 (95% CI -.92, 0.74) 2. (253) -2.2 (95% CI -3.1, -1.4) <u>2vs1</u> -1.3 (-1.89, -0.71)	
Rigaud 686	Randomized: unclear Self-selected: no Included: BMI >=25 Mean age: 36.9 Mean weight: 78.9 Female/Total: 41/52	BMI >=25	Diet: yes 25-30% below EER + fiber Exercise: no Behavioral: no	1. Placebo 2. Fiber	1. 8% 2. 11%	<u>Weight in kg</u> 1. (9) -3 (95% CI -1.8, -4.2) 2. (17) -5.5 (95% CI -4.0, -7.0)	<u>SBP</u> 1. 126.7 (95% CI 121.6, 131.8) 2. (26) 126.5 (95% CI 122.4, 130.6)	<u>SBP</u> 1. (9) -3.1 (95% CI n/a, n/a) 2. (17) -4.4 (95% CI n/a, n/a) p=ns	DBP was significantly reduced in the placebo group (p<0.05). There was, however, no significant difference in DBP

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
									between the fiber-treated group 74.4, SEM ,1.4 and the placebo 75.0, SEM,1.8.
Wing 709	Randomized: unclear Self-selected: yes Included: >130% or more than 18 kg >IBW diabetes Mean age: 52 Mean weight: 107 Female/Total: 60/93	>130% IBW or >18kg >IBW	Diet: yes 1. LCD 2. Intermittent VLCD Exercise: no Behavioral: yes group, weekly	1. LCD 2. Intermittent VLCD for 12 weeks x 2	1. 7/48 (15%) 2. 7/38 (18%)	<u>Weight in kg</u> 1. (41) -10.5 (-14.2, -6.8) 2. (38) -14.2 (-17.6, -10.8) <u>2vs1</u> -3.70 (-7.20, -0.20)	<u>SBP</u> 1. (41) 140 (135.3, 144.7) 2. (38) 139 (134.1, 143.9) <u>DBP</u> 1. (41) 87 (83.5, 90.5) 2. (38) 87 (84.0, 90.0)	<u>SBP</u> 1. (41) 137 (132.6, 141.4) 2. (38) 133 (128.4, 137.6) <u>DBP</u> 1. (41) 84 (80.5, 87.5) 2. (38) 79 (76.0, 82.0)	
Ryttig 688	Randomized: unclear Self-selected: yes Included: BMI >30 Mean age: 41.5 Mean weight: 112.4 Female/Total: 49/60	BMI >30	Diet: yes 1. VLCD x12w, LCD 2. VLCD x12, + supplemented with VLCD sachets Exercise: no Behavioral: yes group, 17 sessions	1. VLCD x12 weeks followed by LCD maintenance 2. VLCD x12 weeks followed by LCD supplemented with VLCD sachets	1. 7/29 (24%) 2. 8/31 (26%)	<u>Weight in kg 52 weeks</u> 1. (22) 12.3 (8.0, 16.6) 2. (23) 8 (4.5, 11.5)	<u>SBP</u> 1. (29) 138.5 (131.4, 145.6) 2. (31) 131.6 (126.3, 136.9)	<u>SBP</u> 1. (22) 15.4 (8.3, 22.5) 2. (23) 6.8 (-1.6, 15.2) <u>1vs2</u> p<0.0001	
Rigaud 686	Randomized: unclear Self-selected: no Included: BMI: ≥25 Mean age: 36.9 Mean weight: 78.9 Female/Total: 41/52	BMI: ≥25	Diet: yes 25-30% below EER Exercise: no Behavioral: no	1. Low-calorie diet 2. Low-calorie diet + fiber	1. 2/26 (8%) 2. 3/26 (11%)	<u>Weight in kg</u> 1. (9) -3 (-1.8, -4.2) 2. (17) -5.5 (-4.0, -7.0) <u>2vs1</u> -2.50 (-3.84, -1.16)	<u>SBP</u> 1. (26) 126.7 (121.6, 131.8) 2. (26) 126.5 (122.4, 130.6)	<u>SBP</u> 1. (9) -3.1 (n/a, n/a) 2. (17) -4.4 (n/a, n/a) p=ns	DBP was significantly reduced in the placebo group (p<0.05). There was, however, no significant difference in DBP between the fiber-treated group 74.4, SEM, 1.4 and the placebo 75.0,

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
									SEM, 1.8.
Jalkanen 400	Randomized: unclear Self-selected: no Included: BMI 27-34 hypertension Mean age: 49 Mean weight: 83 Female/Total: ng/50	BMI 27-34	Diet: yes 1. n/a 2. 1000-1500 kcal Exercise: yes lectures Behavioral: yes group, qwx24, q3w	1. Control (no diet or advice) 2. Intervention program Duration: 52 weeks	overall 1/50 (2%)	<u>Weight in kg</u> 1. (25) 0 2. (24) -4 <u>2vs1</u> -4 (-9.32, 1.32)	<u>SBP</u> 1. (25) 155 (149.2, 160.8) 2. (24) 152 (144.8, 159.2) <u>DBP</u> 1. (25) 102 (99.1, 104.9) 2. (24) 101 (97.6, 104.4)	<u>SBP</u> 1. (25) 140 (133.4, 146.6) 2. (24) 144 (135.6, 152.4) <u>DBP</u> 1. (25) 91 (88.1, 93.9) 2. (24) 90 (85.8, 94.2)	
Puddey 370	Randomized: unclear Self-selected: yes Included: BMI >120% IBW Mean age: 44.3 Mean weight: 92.5 Female/Total: 0/86	>120% IBW	Diet: yes 1000-1500± ETOH Exercise: no Behavioral: no	1. Normal diet and normal alcohol intake 2. Hypocaloric diet and normal alcohol intake 3. Normal diet and reduced alcohol intake 4. Hypocaloric diet and reduced alcohol intake	20%	<u>Weight in kg</u> 2. (ns) -7 (95%CI-5.4, -8.5) 3. (ns) -1.7 (95%CI -0.4, -3.0) 4. (ns) -9.6 (95%CI -7.9, -11.3)	<u>SBP, supine</u> 2. (20) 136.0 (95%CI 130.2, 141.8) 3. (22) 136.8 (95%CI 133.1, 140.5) 4. (21) 137.6 (95%CI 134.2, 141.1) 5. (23) 139.1 (95%CI 135.3, 142.8) <u>DBP, supine</u> 1. (20) 85.5 (95%CI 80.7,88.2) 2. (22) 85 (95%CI 81.9, 88.1) 3. (21) 83.8 (95%CI 80.6, 87.1) 4. (23) 85.6 (95%CI 83.0, 88.3)	<u>DBP, supine</u> 2. (22) -4.2 (95%CI -6.2, -2.2) 3. (21) -3.3 (95%CI -5.2, -1.3) 4. (23) -7.5 (95%CI n/a, n/a) <u>SBP, standing</u> 2. (22) -9.2 (95%CI -12.2, -6.2) 3. (21) -5.1 (95%CI -8.1, -2.1) 4. (23) -14.3 (95%CI n/a, n/a) <u>DBP, standing</u> 2. (22) -4.8 (-7.0, -2.6) 3. (21) -4.2 (-5.0, -0.6) 4. (23) -7.5 (n/a, n/a)	Both caloric reduction and alcohol restriction resulted in decreases in both systolic and diastolic BP. Of the subjects with elevated DBP identified at baseline 100% of those who decreased both caloric and alcohol intake developed normal DBP compared to 80% for group 2 and 75% for group 3 and 57% for group 1. Similarly for SBP, 80%, 40%, 63% and 43%, respectively. Baseline weight correlated with change in neither

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
									SBP nor DBP but change in weight was strongly correlated with change in both SBP and DBP (r=0.49, p<0.001 and r=0.49, p<0.001)
Walker 693	Randomized: unclear Self-selected: unclear Included: diabetes, includes non-overweight Mean age: 58.3 Mean weight: 79.8 Female/Total: 15/48	not given	Diet: yes 1. HCLF 2. Modified fat Exercise: no Behavioral: no	1. High-CHO/low-fat diet 2. Modified fat diet *Cross-over 1 month wash-out period Duration: 12 weeks	none	<u>Weight in kg</u> 1. (24) -0.7 2. (24) -1.3 <u>2vs1</u> -0.6 (-0.77, -1.43)	<u>SBP</u> 1. (24) 132 (125.8, 138.2) 2. (24) 133 (126.8, 139.2) <u>DBP</u> 1. (24) 75 (68.8, 81.2) 2. (24) 77 (72.9, 81.1)	<u>SBP</u> 1. (24) 130 (121.7, 138.3) 2. (24) 134 (125.7, 142.3) <u>DBP</u> 1. (24) 74 (69.9, 78.1) 2. (24) 76 (71.9, 80.1)	
Lean 70219	Randomized: unclear Self-selected: unclear Included: BMI >25 kg/m ² Mean age: 50.6 Mean weight: 84.4 Female/Total: 110/110	Not given	Exercise: no Behavioral: no	<u>Group description</u> 1. Low carbohydrate diet 2. High carbohydrate diet	Not given	<u>Weight (kg)</u> 1. (40) -6.8 (-8.4, -5.2) 2. (42) -5.6 (-7.1, -4.1) <u>2vs1</u> 1.2 (-0.33, 2.73)	<u>SBP</u> 1. (48) 135.7 (129, 143) 2. (51) 136.7 (131, 143) <u>DBP</u> 1. (48) 86 (82.6, 89.4) 2. (51) 84.2 (81, 88)	<u>SBP</u> 1. (36) -0.3 (-6.1, 5.6) 2. (38) -1.1 (-6.6, 4.4) <u>DBP</u> 1. (36) -2.3 (-6.1, 1.5) 2. (38) -2.7 (-6.4, 1.1)	
Katzel 369	Randomized: yes Self-selected: yes Included: 120-160% IBW, non-smokers Mean age: 61 Mean weight: 91.07 Female/Total: 0/170	120-160% IBW	Diet: yes 1260-2100 kcal Exercise: yes 45 minx3 Behavioral: no	<u>Group description</u> 1. Control 2. Weight loss 3. Aerobic exercise Duration: 9 months	2. 8/26 (31%) 3. 25/73 (34%) 4. 19/71 (27%)	<u>Weight in kg</u> 2. (44)- 9.5 (-8.1, -10.9)	<u>SBP</u> 2. (73) 132 (128.0, 136.0) 3. (71) 128 (124.0, 132.0) <u>DBP</u> 2. (73) 83 (81.0, 85.0) 3. (71) 86 (82.0, 90.0)	<u>SBP</u> 2. (44) -8%, p<0.01 3. (49) -3%, p,0.02 <u>3vs1</u> p=ns <u>DBP</u> 2. (44) -8%, p<0.01 3. (49) -2%, p<0.02 <u>3vs1</u> p=ns	
Jeffery 680	Randomized: unclear Self-selected: no Included: 10-50%	10-50% desirable weight	Diet: yes Reduce intake, low salt diet.	1. Group treatment 2. Individual counselling	1. 5/47 (10.6%) 2. 7/47	<u>Weight in kg</u> 1. (42) -6 (-7.0, -5.0) 2. (40) -5.7 (-6.6, -4.8)	<u>SBP</u> 1. (42) 134.5 (131.0, 138.0) 2. (40) 135.8 (133.5, 138.1)	<u>SBP</u> 1. (42) -9.1 (-13.1, -5.1) 2. (40) -7 (-10.2, -3.8)	

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
	desirable weight, high normal blood pressure Mean age: ng Mean weight: ng Female/Total: ng/94		Exercise: no Behavioral: no		(14.9%)	<u>2vs1</u> -0.30 (-1.24, -0.64)	<u>DBP</u> 1. (42) 85 (82.9, 87.1) 2. (40) 83.8 (81.9, 85.7)	<u>2vs1</u> 2.10 (-1.48, 5.68) <u>DBP</u> 1. (42) -4.8 (-7.7, -1.9) 2. (40) -5.4 (-7.5, -3.3) <u>2vs1</u> -0.6 (-3.10, 1.90)	
Singh 689	Randomized: yes Self-selected: yes Included: hypertension Mean age: 47.0 Mean weight: 66.7 Female/Total: ng/217	BMI:>25	Diet: yes 1. 2100 kcal 2.1600 kcal Exercise: no Behavioral: no	1. Usual diet 2. Low-calorie, low-cholesterol, low-salt diet	none	<u>Weight in kg</u> 1. (109) -0.8 (95% CI n/a, n/a) 2. (108) -3.6 (95% CI n/a, n/a) net change: 2.8 (95% CI 1.5, 4.1) <u>Weight in kg, in overweight patients</u> 1. (83) -1.8 2. (82) -4.2 net change: 2.4 (95% CI 0.44, 4.36)	<u>SBP</u> 1. (108) 154.8 (152.5, 157.1) 2. (108) 152.5 (150.6, 154.4) <u>DBP</u> 1. (108) 100.5 (99.6, 101.4) 2. (108) 99.6 (98.2, 101.0) <u>SBP, in overweight patients</u> 1. (83) 161.8 (95%CI 159.7, 163.9) 2. (82) 160.8 (95%CI 159.2, 162.4) <u>DBP, in overweight patients</u> 1. (83) 97.5 (95%CI 95.4, 99.6) 2. (82) 106.8 (95%CI 105.2, 108.4)	<u>SBP</u> 1. (109) -3 (n/a, n/a) 2. (108) -10.5 (n/a, n/a) p<.01 net change: 7.5 (3.47, 11.52) <u>DBP</u> 1. (109) -1.5 (n/a, n/a) 2. (108) -8 (n/a, n/a) p<.01 net change: 6.5 (3.33, 9.67) <u>SBP, in overweight patients</u> 1. (83) -6.7 (95%CI n/a, n/a) 2. (82) -18.1 (95%CI n/a, n/a) net change: 12.1 (4.57, 27.15) <u>DBP, in overweight patients</u> 1. (83) -3.6 (95%CI n/a, n/a) 2. (82) -13.6 (95%CI n/a, n/a) net change: 10.0(95%CI 3.86, 16.14)	Results: 2.8 kg net reduction in mean body weight and 1 kg/m2 decrease in mean BMI at 16 weeks produced a significantly greater reduction (7.6/6.5 mm Hg) in SBP and DBP than did drug therapy and placebo in the control group.
Gordon 70030	Randomized: unclear Self-selected: yes Included: postmenopausal women,	not given	Diet: none for group 2 Exercise: yes 30-45 min, 3-	7. Exercise training 8. Diet 9. Exercise and diet	7. 0/14 8. 2/17 9. 5/24	<u>Weight (kg)</u> 7. (14) -1 (2.0,04) 8. (15) -5.8 (-7.9, -3.6) 9. (19) -7.1 (-8.5, -5.7)	<u>SBP</u> 7. (14) 145 (138, 152) 8. (15) 141 (133, 149) 9. (19) 145 (139, 151)	<u>SBP</u> 7. (14) -9.9 (-13.6, -6.2) 8. (15) -11.3 (-18, -4.6) 9. (19) -12.5 (-15.5, -9.5)	

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
	included non-overweight Mean age: not given Mean weight: 79.7 Female/Total 40/40		5x/wk Max HR: 60-85% Behavioral: no				<u>DBP</u> 7. (14) 96 (91.3, 100.6) 8. (15) 93 (89.1, 96.9) 9. (19) 95 (91.6, 98.4)	<u>DBP</u> 7. (14) -5.9 (-8.6, -3.2) 8. (15) -7.5 (-9.8, -5.1) 9. (19) -7.9 (-9.9, -5.8)	
Croft 347	Randomized: unclear Self-selected: no Included BMI: >25 hypertension Mean age: ng Mean weight: 85.7 Female/Total: 103/210	BMI >25	Diet: yes not described Exercise: no Behavioral: no	1. Hypertensive with no dietary intervention 2. Hypertensive with weight reduction diet 3. Normotensive with weight reduction intervention (not randomized)	1. 3/64 (5%) 2. 17/66 (26%) 3. 47/80 (59%)	<u>Weight in kg</u> 1. (64) -0.2 2. (66) -6.5 3. (80) -3.2 <u>2vs1 p<0.001</u> <u>Weight in kg</u> 1. (compl, 50) +0.5 2. (compl, 47) -8.0 <u>2vs1 p<0.001</u>	<u>SBP</u> 1. (64) 161 (95% CI n/a, n/a) 2. (66) 161 (95% CI n/a, n/a) <u>DBP</u> 1. (64) 96 (95% CI n/a, n/a) 2. (66) 98 (95% CI n/a, n/a) <u>SBP</u> 1. (compl, 50) 158 (95% CI n/a, n/a) 2. (compl, 47) 160 (95% CI n/a, n/a) <u>DBP</u> 1. (compl, 50) 94 (95% CI n/a, n/a) 2. (compl, 47) 97 (95% CI n/a, n/a)	<u>SBP</u> 1. (64) -4 2. (66) -11 <u>2vs1 p<0.01</u> <u>DBP</u> 1. (64) -5 2. (66) -7 <u>2vs1 p<0.001</u> <u>SBP</u> 1. (compl, 50) -3 2. (compl, 47) -13 <u>2vs1 p<0.01</u> <u>DBP</u> 1. (compl, 50) 0 2. (compl, 47) -9 <u>2vs1 p<0.001</u>	Commenced antihypertensive therapy before 6 months: group 1: 5/64 group 2: 2/66 group 3: 0/80 * 6 patients of the non-dieting group (1) expressed a spontaneous wish to lose weight (data not given separately for these individuals)
MacMahon 356	Randomized: unclear Self-selected: no Included BMI: >26 hypertension Mean age: 42 Mean weight: 97.1 Female/Total: 14/56	BMI: >26	Diet: yes Gr 2 low-calorie Exercise: no Behavioral: no	1. Placebo (no diet) 2. Low-calorie diet 3. Metoprolol 100 mg bid. (no diet)	1. 2/18 (11%) 2. 1/20 (5%) 3. 1/18 (5%)	<u>Weight in kg</u> 1. (18) +.5 (n/a, n/a) 2. (20) -7.1 (n/a, n/a) 3. (18) -2.0 (n/a, n/a) <u>2vs1 p<0.05</u> <u>3vs1 p=ns</u>	<u>SBP</u> 1. (18) 150.3 (144.7, 155.9) 2. (20) 149.8 (145.2, 154.4) 3. (18) 151.2 (146.2, 156.2) <u>DBP</u> 1. (18) 98.9 (94.2, 103.6) 2. (20) 101.2 (98.7, 103.7) 3. (18) 100.9 (98.5, 103.3)	<u>SBP</u> 1. (18) 142.9 (n/a, n/a) 2. (20) 136.5 (n/a, n/a) 3. (18) 141.3 (n/a, n/a) <u>2vs1 p<.05</u> <u>3vs1 not sig</u> <u>DBP</u> 1. (18) 95.8 (n/a, n/a) 2. (20) 91.2 (n/a, n/a) 3. (18) 94.7 (n/a, n/a) <u>2vs1 p<.05</u> <u>3vs1 p not sig</u>	Results In the weight reduction group, the changes in SBP and DBP were closely correlated with the change in weight (SBP r=0.73, DBP r=0.68) At the end of follow-up, 50% of subjects in the weight reduction group, 39% in

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Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
									metoprolol and 17% in placebo had DBP <90. The reductions in blood pressure by metoprolol did not differ significantly from placebo (not because of non-compliance)
Andersson 675	Randomized: unclear Self-selected: unclear Included: hypertension Mean age: 51 Mean weight: 97.1 Female/Total: 0/30	not stated	Diet: yes 1. no salt restriction 2. salt restriction Exercise: no Behavioral: no	1. Energy restricted only 2. Energy restricted and salt restricted	not given	<u>Weight in kg</u> 1. (13) -9.2 (n/a, n/a) 2. (10) -8.8 (n/a, n/a) <u>2vs1</u> 0.4 (-5.39, 6.19)	<u>SBP</u> 1. (13) 151.1 (142.5, 159.7) 2. (10) 151.1 (139.4, 162.8) <u>DBP</u> 1. (13) 89.5 (84.8, 94.2) 2. (10) 88.6 (81.6, 95.6)	<u>SBP</u> 1. (13) 146.4 (137.5, 155.3) 2. (10) 138 (126.9, 149.1) <u>DBP</u> 1. (13) 84.5 (81.1, 87.9) 2. (10) 79 (73.4, 84.6)	
Haynes 351	Randomized: yes Self-selected: no Included: >110% IBW, hypertension Mean age: ng Mean weight: 91.8 Female/Total: ng/60	>110% IBW	Diet: yes Caloric restriction to lose 1lb/w x8w, then 1/2 lb/w Exercise: no Behavioral: yes group weekly	1. Control (no diet) 2. Low-calorie diet	1. 4/30 (13%) 2. 2/30 (6%)	<u>Weight in kg @ 6 months</u> 1. (24) -0.8 2. (27) -4.1 p=0.018	<u>SBP</u> 1. (30) 134.0 2. (30) 135.0 <u>DBP</u> 1. (30) 88.9 2. (30) 91.3	<u>SBP</u> 1. -0.2 mm Hz p=.203 2. +4.8 <u>DBP</u> 1. -0.1 2. +1.4 p=0.177 measurements done at home by surprise	
Fagerberg 349	Randomized: unclear Self-selected: unclear Included: >20-40% desirable weight, hypertension Mean age: 51 Mean weight: 97.4 Female/Total: 0/30	>20-40% desirable weight	Diet: yes Low-calorie 1230 kcal Exercise: no Behavioral: no	1. Normal energy and sodium intake for 4 weeks then crossed over to a restricted diet and restricted sodium intake for 9 months 2. Energy restricted diet with unchanged sodium intake for 12 weeks	none	<u>Weight in kg</u> 1. (15) -8.3 (n/a, n/a) 2. (15) -8.7 (n/a, n/a) <u>2vs1</u> -0.4 (-5.53, 4.73)	<u>SBP</u> 1. (15) 155.5 (146.5, 164.5) 2. (15) 151.7 (142.7, 160.7) <u>DBP</u> 1. (15) 101.3 (96.8, 105.8) 2. (15) 98.7 (94.0, 103.4)	<u>SBP</u> 1. (15) 138.8 (131.5, 146.1) 2. (15) 148.3 (141.0, 155.6) <u>DBP</u> 1. (15) 90.5 (85.4, 95.6) 2. (15) 94.6 (90.5, 98.7)	

Reference numbers refer to the Reference List in the Clinical Guidelines Report.

Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
Langford 355	Randomized: yes Self-selected: unclear Included: 110-160% IBW, hypertension Mean age: 48 Mean weight: 136 Female/Total: 398/878	110-160% IBW	Diet: yes low-calorie 1-6, no Na/K restriction 7-9 Na 52-100 K 62-115 Exercise: no Behavioral: no	1. Usual diet plus placebo 2. Usual diet plus chlorthalidone 25 mg 3. Usual diet plus atenolol 50 mg 4. Weight loss diet plus placebo 5. Weight loss diet plus chlorthalidone 25 mg 6. Weight loss diet plus atenolol 50 mg 7. Low Na/High K diet plus placebo 8. Low Na/High K diet plus chlorthalidone 25 mg 9. Low Na/High K diet plus atenolol 50 mg	not given	<u>Weight in kg</u> 1. (89) -0.6 (-1.3, 0.1) 2. (87) -1.5 (-2.3, -0.7) 3. (86) 0.5 (-0.1, 1.1) 4. (88) -4.4 (-5.7, -3.1) 5. (85) -6.8 (-7.8, -5.8) 6. (88) -3 (-3.8, -2.2) 7. (79) -0.4 (-1.5, 0.7) 8. (88) -1 (-1.9, -0.1) 9. (90) 0.5 (-0.1, 1.1) <u>4vs1</u> -3.80 (-4.84, -2.76) <u>4vs2</u> -2.90 (-3.97, -1.83) <u>4vs3</u> -4.9 (-5.91, -3.89) <u>4vs7</u> -4 (-5.32, -2.68)	<u>DBP</u> 1. (90) 93.7 (n/a, n/a) 2. (87) 93.4 (n/a, n/a) 3. (87) 93.7 (n/a, n/a) 4. (90) 94 (n/a, n/a) 5. (87) 93.7 (n/a, n/a) 6. (88) 93.7 (n/a, n/a) 7. (79) 94.4 (n/a, n/a) 8. (89) 93.7 (n/a, n/a) 9. (90) 94 (n/a, n/a) <u>4vs1</u> -0.82 (-33.09, 31.45) <u>4vs2</u> 2.00 (0.07, 3.93) <u>4vs3</u> 3.65 (1.72, 5.58) <u>4vs7</u> -0.87 (-3.15, 1.41) <u>SBP</u> 1. (90) 144.5 (n/a, n/a) 2. (87) 141.9 (n/a, n/a) 3. (87) 142.8 (n/a, n/a) 4. (90) 143.2 (n/a, n/a) 5. (87) 141.0 (n/a, n/a) 6. (88) 142.8 (n/a, n/a) 7. (79) 144.9 (n/a, n/a) 8. (89) 143.1 (n/a, n/a) 9. (90) 146.3 (n/a, n/a)	<u>DBP</u> 1. (90) -7.96 (-9.8, -6.2) 2. (87) -10.78 (-12.3, -9.3) 3. (87) -12.43 (-13.9, -10.9) 4. (90) -8.78 (-11.1, -6.5) 5. (87) -15.06 (-16.9, -13.2) 6. (88) -14.81 (-16.7, -12.9) 7. (79) -7.91 (-10.2, -5.6) 8. (89) -12.18 (-13.9, -10.5) 9. (90) -12.76 (-14.4, -11.1) <u>SBP</u> 1. (90) -10.34 (n/a, n/a) 2. (87) -17.41 (n/a, n/a) 3. (87) -15.06 (n/a, n/a) 4. (89) -11.49 (n/a, n/a) 5. (86) -21.72 (n/a, n/a) 6. (88) -18.11 (n/a, n/a) 7. (79) -8.66 (n/a, n/a) 8. (88) -19.51 (n/a, n/a) 9. (90) -18.29 (n/a, n/a)	
Berglund 431	Randomized: no Self-selected: unclear Included BMI: ≥ 26 hypertension Mean age: 54 Mean weight: 99 Female/Total: 0/64	BMI ≥ 26	Diet: yes Low fat Exercise: no Behavioral: no	1. Low salt, weight loss diet 2. Atenolol	Overall 3/64 (5%)	<u>Weight in kg 12 months</u> 1. (31)-7.8 (n/a, n/a) 2. (30) 1.0 n/a, n/a) <u>EOT Weight change</u> <u>2vs1</u> 8.80(-4.36, 13.24)	<u>SBP</u> 1. (31) 152 (95% CI 146.5, 157.5) 2. (30) 155 (95% CI 150.1, 159.9) <u>DBP</u> 1. (31) 96 (95% CI 94.5, 97.5) 2. (30) 97 (95% CI 95.1, 98.9)	<u>SBP 12 months</u> 1. (31) 147 (95% CI 142, 151.8) 2. (30) 140 (95% CI 134.0, 146.0) <u>2vs1</u> 10.00 (4.15, 15.85) <u>DBP 12 months</u> 1. (31) 92 (95% CI 89.3, 94) 2. (30) 86 (95% CI 83.0, 89.0) <u>2vs1</u> -7.00(-4.43, -9.57)	

Reference numbers refer to the Reference List in the Clinical Guidelines Report.

Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
Oberman 433	Randomized: unclear Self-selected: yes Included: >110-160% IBW hypertension Mean age: 48.6 Mean weight: 88.0 Female/Total: 310/692	>110-160% IBW	Diet: yes 4-6: Goal weight loss 4.5 kg 7-9: Low Na, high K Exercise: no Behavioral: no	1. Usual diet plus placebo 2. Usual diet plus chlorthalidone 25 mg 3. Usual diet plus atenolol 50 mg 4. Weight loss diet plus placebo 5. Weight loss diet plus chlorthalidone 25 mg 6. Weight loss diet plus atenolol 7. Low sodium high potassium diet plus placebo 8. Low salt high potassium diet plus chlorthalidone 25 mg 9. Low salt high potassium diet plus atenolol 50 mg	Overall: 91(13%)	<u>Weight in kg</u> 0. (692) -1.99 (n/a, n/a) 1. (79) -0.83 (n/a, n/a) 2. (75) -1.77 (n/a, n/a) 3. (75) 0.42 (n/a, n/a) 4. (84) -4.35 (n/a, n/a) 5. (75) -6.95 (n/a, n/a) 6. (76) -3.26 (n/a, n/a) 7. (69) -0.34 (n/a, n/a) 8. (78) -0.98 (n/a, n/a) 9. (81) 0.27 (n/a, n/a)	<u>SBP</u> 0. (692) 143.4 <u>DBP</u> 0. (692) 93.9	<u>SBP</u> 0. (692) -16.1 (n/a, n/a) 1. (79) -10.51 (n/a, n/a) 2. (75) -18.88 (n/a, n/a) 3. (75) -14.72 (n/a, n/a) 4. (84) -11.89 (n/a, n/a) 5. (75) -22 (n/a, n/a) 6. (76) -18.89 (n/a, n/a) 7. (69) -9.35 (n/a, n/a) 8. (78) -19.58 (n/a, n/a) 9. (81) -18.96 (n/a, n/a) <u>DBP</u> 0. (692) -11.7 (n/a, n/a) 1. (79) -8.2 (n/a, n/a) 2. (75) -11.83 (n/a, n/a) 3. (75) -12.19 (n/a, n/a) 4. (84) -9.48 (n/a, n/a) 5. (75) -15.29 (n/a, n/a) 6. (76) -15.07 (n/a, n/a) 7. (69) -8 (n/a, n/a) 8. (78) -11.94 (n/a, n/a) 9. (81) -13.26 (n/a, n/a)	no stats available
Darne 677	Randomized: unclear Self-selected: unclear Included: >110% IBW hypertension Mean age: 48 Mean weight: 86 Female/Total: 22/54	>110% IBW	Diet: yes Low-calorie Exercise: no Behavioral: no	1. Hypocaloric diet with or without antihypertensive drug therapy 2. No diet, antihypertensive therapy	1. 5/26 (19%) 2. 1/28 (3%)	<u>Weight in kg</u> 1. (27) -2.4 (n/a, n/a) 2. (21) -5.1 (n/a, n/a) <u>1vs2</u> p<0.01	<u>SBP</u> 1. (28) 156 (152.1, 159.9) 2. (26) 162 (156.7, 167.3) <u>DBP</u> 1. (28) 100 (98.4, 101.6) 2. (26) 102 (100.4, 103.6)	<u>SBP</u> 1. (27) 138 (132.5, 143.5) 2. (21) 140 (134.1, 145.9) <u>DBP</u> 1. (27) 72 (68.0, 76.0) 2. (21) 84 (80.4, 87.6)	p not sig p not sig
TOHP Phase II 70028	Randomized: yes Self-selected: unclear Included: BMI 26.1-32.4 for men and 24.4-37.4 for women High normal blood pressure Mean age: 43.6 Mean weight: 94 Female/Total: 804/1578	Not given	Exercise: yes encouraged Behavioral: no	<u>Group description</u> 1. Usual care 2. Weight loss 3. Sodium reduction 4. Weight loss and sodium reduction	1. 82/596 2. 68/595 3. 79/594 4. 60/597	<u>Weight in kg</u> 1. (554) 1.8 (1.4, 2.2) 2. (547) -0.2 (-0.7, 0.3) 3. (549) 1.7 (1.3, 2.1) 4. (552) -0.3 (-0.8, 0.2) <u>2vs1</u> -2.0 (-2.45, -1.55)	<u>SBP</u> 1. (596) 172.3 (126.8, 127.8) 2. (595) 127.6 (127.1, 128.1) 3. (594) 127.7 (127.2, 128.2) 4. (597) 127.4 (126.9, 127.9) <u>DBP</u> 1. (596) 85.8 (85.6, 85.9) 2. (595) 86 (85.8, 86.2) 3. (594) 86.1 (85.9, 86.2)	<u>SBP</u> 1. (596) 0.3 (-0.4, 1.0) 2. (595) -0.8 (-1.5, -0.05) 3. (594) -0.7 (-1.4, 0.04) 4. (597) -0.6 (-1.3, 0.1) <u>DBP</u> 1. (596) -2.4 (-2.9, -1.8) 2. (595) -3.2 (-3.7, -2.7) 3. (594) -3 (-3.5, -2.4)	

Reference numbers refer to the Reference List in the Clinical Guidelines Report.

Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
				1.			4. (597) 86 (85.8, 86.1)	4. (597) -3 (-3.5, -2.4)	
Langford 354	Randomized: unclear Self-selected: no Included: includes non overweight hypertension Mean age: 56.9 Mean weight: 80.0 Female/Total: ng/496	includes non-overweight	Diet: yes low sodium or low calorie Exercise: no Behavioral: no	2. Control (continue medication) 3. No medication, no diet 4. No medication, sodium restriction 5. No medication, weight reduction diet 6. Not overweight, continue medication 7. Not overweight, no medication, no diet 8. Not overweight, no medication/sodium restriction diet	not reported	<u>Weight in kg</u> 1. (43) -0.46 (95% CI -1.2, 0.2) 2. (77) -0.46 (95% CI -1.3, 0.4) 3. (79) 0 (95% CI -0.8, 0.8) 4. (67) -4 (95% CI -5.2, -2.8) 5. (63) 0.46 (95% CI -0.3, 1.3) 6. (63) 0 (95% CI -0.8, 0.8) 7. (46) 0.46 (95% CI -0.3, 1.3) <u>4vs1</u> -3.54 (-4.57, -2.51) <u>4vs2</u> -3.54 (-5.63, -1.45)	not given	not given	Overall 96.6% of all participants were withdrawn successfully from medication. Relative odds of success for sodium group was 2.17 (p<0.05) compared to the discontinue medication, no intervention group. Weight reduction group 3.43 (p<0.05) compared to the obese discontinue medication, no intervention. Overweight groups: The successes reduced their weight by 5,a,6, while those who were returned to medications lost an average of 3.5,a,4 which was not a statistically significant difference. The highest success rates were found in the overweight weight reduction group

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
									(59.5%) and the non-overweight sodium restriction group.
Liao 729	Randomized: unclear Self-selected: unclear Included: hypertension Mean age: 38.01 Mean weight: 85.2 Female/Total: 7/85	not stated	Diet: yes Calorie controlled fat modified diet Exercise: no Behavioral: no	1. Control (no diet) 2. Low-salt, low-calorie diet with moderate physical activity	Withdrawals: overall 25/85 at 2 years	<u>Weight in kg</u> 1. (37) 0.9(95% CI -0.5, 2.3) 2. (45)-1.6(-3.0, -0.2) <u>2vs1</u> -2.50 (-3.88, -3.61)	<u>SBP</u> 1. (37) 121.4 (118.6, 124.2) 2. (48) 119.7 (95% CI 117.2, 122.2) <u>DBP</u> 1. (37)81.5(80.0, 83.0) 2. (48)80.5(79.0, 82.0)	<u>SBP</u> 1. (37) -2.3 (-5.5, 0.9) 2. (48) -1 (95% CI -3.6, 1.6) <u>2vs1</u> 1.3 (-1.53, 4.13) <u>DBP</u> 1. (37) 0.6 (95% CI -1.4, 2.6) 2. (48) 0.6 (95% CI -1.6, 2.8) <u>2vs1</u> 0.00 (-2.09, 2.09)	Resting SBP or DBP did not significantly change over the 2-3 years of follow-up in either group. There were reductions in pulse rate and standing double product but the changes were not significantly different between the 2 groups. Differences in changes in exercise response double product values Max DP: Intervention (48) -27.1 vs -15.5 Control (37) p=0.08 Max increase DP -22.1 vs -9.9 p=0.065 Recovery lowest DP -12.7 -4.8 p=0.042 Debt recovery DP -7.7 0.9 p=0.029 Max SBP at exercise test -8.6,a,15.4 vs -5.1,a,14.6 Max increase in SBP

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
									-1.4,a,16.4 vs 0.5,a,15.0
Grimm 679	Randomized: unclear Self-selected: unclear Included: non-overweight hypertension Mean age: 54.8 Mean weight: 85 Female/Total: 342/902	includes non-overweight	Diet: Yes 1000-1600 kcal/d Exercise: yes 600 cal/w Behavioral: yes group, qwx8, qmo	1. Placebo (salt restriction) 2. Acebutolol 400 mg/d 3. Amlodipine 5 mg/d 4. Chlorthalidone 15 mg/d 5. Doxazosin 2 mg/d 6. Enalapril 5 mg/d	2 deaths otherwise not given	<u>Weight in kg 12 months</u> 1. (212) -4.5 (95% CI -4.5, -4.5) 2. (119) -4.3 (95% CI -4.4, -4.2) 3. (118) -5 (95% CI -5.1, -4.9) 4. (117) -5.6 (95% CI -5.7, -5.5) 5. (123) -3.9 (95% CI -4.0, -3.8) 6. (113) -5.3 (95% CI -5.4, -5.2)	<u>SBP</u> 1. (221) 141.2 (95% CI 139.6, 142.8) 2. (126) 140.5 (95% CI 138.2, 142.8) 3. (120) 138.4 (95% CI 136.1, 140.7) 4. (124) 141.1 (95% CI 138.8, 143.4) 5. (129) 141.1 (95% CI 139.0, 143.2) 6. (127) 141 (95% CI 138.7, 143.3) <u>DBP</u> 1. (221) 90.6 (95% CI 90.1, 91.1) 2. (126) 90.8 (95% CI 90.2, 91.4) 3. (120) 90.9 (95% CI 90.3, 91.5) 4. (124) 90.5 (95% CI 89.9, 91.1) 5. (129) 90.6 (95% CI 90.0, 91.2) 6. (127) 90.1 (95% CI 89.5, 90.7)	<u>SBP 12 months</u> 1. (221) -10.6 (95% CI -10.7, -10.5) 2. (126) -20.1 (95% CI -20.3, -19.9) 3. (120) -17.5 (95% CI -17.7, -17.3) 4. -17.7, -17.3 5. (124) -21.8 (95% CI -22.0, -21.6) 6. (129) -16.1 (95% CI -16.3, -15.9) 7. (127) -17.6 (95% CI -17.8, -17.4) <u>DBP 12 months</u> 1. (221) -8.1 (95% CI -8.2, -8.0) 2. (126) -13.7 (95% CI -13.8, -13.6) 3. (120) -12.9 (95% CI -13.0, -12.8) 4. (124) -13.1 (95% CI -13.2, -13.0) 5. (129) -12 (95% CI -12.1, -11.9) 6. (127) -12.2 (95% CI -12.3, -12.1)	At the end of 4 years follow-up period, 70% of participants remained below their baseline weight and 34% had maintained at least 10 lb weight loss. Men maintained a greater proportion of their initial loss at 4 years (55 vs 44%) Men achieved their maximum weight loss of 13 lb at 6 months while women reached their maximum loss of 8.2 at 1 year. The trend in BP change by weight change was highly significant (p<0.001) for both DBP and SBP
Stamler 374	Randomized: yes Self-selected: yes included: % desirable weight: >110 to 149% IBW but <150% IBW if DBP 80-84 Female/Total: 27/201	% desirable weight: >110 to 149% IBW but <150% IBW if DBP 80-84	Diet: yes provided <1800 mg Na,<26g ETOH lose 4.5 kg or 5% of weight Exercise: yes isotonic	1. Control (no intervention) 2. Low-salt, low-fat diet with moderate exercise	small for both groups with 87% participating for 4 years or more	<u>Weight in kg 5 years</u> 1. (98) 0.8 2. (95) -2.0 *Weight: weight data are reported for patients with relative weight greater than 1.0	<u>DBP</u> 1. (99) 82.6 (82.0, 83.2) 2. (102) 82.5 (81.9, 83.1) <u>SBP</u> 1. (99) 122.7 (121.3, 124.1) 2. (102) 122.5 (121.2, 123.8)	<u>DBP 2 years</u> 1. (74) -1.9 2. (82) -2.7 <u>DBP 5 years</u> 1. (99) 82.5 (81.4, 83.6) 2. (102) 81.2 (80.2, 82.2)	The proportion moving from hypertension-prone to definite hypertension was 19.2% of control group compared to 8.8% in group 2

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
	Mean age: 37.5 Mean weight: 84.2		Minutes/Time per wk 30 min x3 Behavioral: no			The largest group weight change was in the first years, -4.1 kg.		SBP 5 years 1. (99) 121.5 (119.7, 123.3) 2. (102) 119.8 (118.3, 121.3)	(p=0.027). The odds ratio for the incidence of hypertension in the control group was 2.4 (90% CI 1.2 to 4.8). BP Those who lost weight had a reduction of 4.4 mm Hg in SBP vs 1.1 mm Hg in those with little or no weight loss or with weight gain (p=0.007) Weight reduction in the intervention group was related significantly to average change during the trial in both SBP and DBP (r=0.31, p<0.001). Sodium restriction was related to SBP (r=0.14, p<0.089) and with DBP (r=0.03). In multiple regression analysis there was a significant relationship between weight change and change in BP while for sodium and alcohol change the relationship was not independent. The regression for

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
									weight change indicated that a difference of 4.5 kg was associated with a difference of 2.1 mm Hg in SBP and 1.5 mm Hg in DBP.
Andersson 674	Randomized: unclear Self-selected: unclear Included BMI: 26-36 Mean age: ng Mean weight: 82.7 Female/Total: 20/20	BMI: 26-36	Diet: yes Semistarvation Exercise: No Behavioral: No	1. Control (no intervention) 2. Semistarvation for 3 days	1. 0/9 2. 1/11(9%)	<u>Weight in kg</u> 1. (9) -0.2 (n/a, n/a) 2. (10) -2.5 (n/a, n/a) <u>2vs1</u> -2.3 (-9.49, 4.89)	<u>SBP</u> 1. (9) 148 (138.8, 157.2) 2. (10) 148 (139.0, 157.0) <u>DBP</u> 1. (9) 96 (91.4, 100.6) 2. (10) 93 (88.5, 97.5)	<u>SBP</u> 4 months 1. (9) 146 (136.8, 155.2) 2. (9) 142 (130.5, 153.5) <u>2vs1</u> -4.00 (-13.11, 5.11) <u>DBP</u> 4 months 1. (9) 94 (87.1, 100.9) 2. (9) 86 (76.8, 95.2) <u>2vs1</u> -5.00 (-11.40, 1.40)	
Singh 690	Randomized: yes Self-selected: no Included: AMI within 24 hours Mean age: 50.5 Mean weight: 66 Female/Total: ng/406	not stated	Diet: yes Low fat, low energy, high fruit and vegetable Exercise: no Behavioral: no	1. Usual diet 2. Low energy, high fruit and vegetable diet	1. 5/202 (2%) 2. 6/204 (2%)	<u>Weight in kg</u> 1. (179) -2.2 (n/a, n/a) 2. (182) -5.3 (n/a, n/a) net change: 3.1(1.28, 4.92)	<u>SBP</u> 1. (202) 134.2 (133.2, 135.2) 2. (204) 132.5 (131.8, 133.2) <u>DBP</u> 1. (202) 88.4 (87.8, 89.0) 2. (204) 85.3 (84.9, 85.7)	<u>SBP</u> 1. (179) -4.4 (n/a, n/a) 2. (182) 12.3 (n/a, n/a) net change: 7.9 (4.58, 11.2) <u>DBP</u> 1. (179) -3.4 (n/a, n/a) 2. (182) -8.1 (n/a, n/a) net change: 4.7 (2.1, 7.3)	
Hakala 364	Randomized: unclear Self-selected: yes Included: 30-50% IBW Mean age: 38 Mean weight: 96.3 Female/Total: 82/110	30-50% overweight	Diet: yes 2. moderate meat, fish and egg 3. no meat, fish or eggs Exercise: no Behavioral: no	1. Control (no intervention) 2. Lactovegetarian weight reduction group 3. Mixed diet weight reduction program	1. 2/46 (4%) 2. 15/46 (33%) 3. 9/46 (20%)	<u>Weight in kg</u> 1. (ng) 1.6 2. (ng) -9.2 3. (ng) -10.4 <u>2vs1</u> p<0.001 <u>3vs1</u> p<0.001	<u>Systolic BP</u> 1. (42) 133 (95% CI n/a, n/a) 2. (31) 127 (95% CI n/a, n/a) 3. (37) 130 (95% CI n/a, n/a) <u>Diastolic BP</u> 1. (42) 87 (95% CI n/a, n/a) 2. (31) 83 (95% CI n/a, n/a) 3. (37) 86 (95% CI n/a, n/a)	<u>Systolic BP</u> 1. (ng) 0 (95% CI n/a, n/a) 2. (ng) -2.5 (95% CI n/a, n/a) 3. (ng) -6.3 (95% CI n/a, n/a) <u>2vs1</u> p=ns <u>3vs1</u> p<0.05 <u>Diastolic BP</u>	

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
								1. (ng) 0 (95%CI n/a, n/a) 2. (ng) -1.5 (95%CI n/a, n/a) 3. (ng) -4.7 (95%CI n/a, n/a) 2vs1 p<0.01 3vs1 p<0.01	
Anderssen 346	Randomized: unclear Self-selected: no Included: BMI >24 kg/m ² Mean age: 44.9 Mean weight: 28.8 kg/m ² Female/Total: 21/212	BMI >24	Diet: yes low calorie to lose 0.5-1.0 kg/month Exercise: yes aerobic 60-80% max HR 60 min 3x/week Behavioral: no	1. Control (no diet or exercise) 2. Diet alone 3. Exercise alone 4. Diet and exercise	1. 0/43 2. 3/55 3. 5/54 4. 2/67	<u>BMI</u> 1a. (12) 0.2 (-0.46, 0.86) 2a. (16) -1.7 (-2.55, -0.85) 3a. (20) -0.4 (-1.03, 0.23) 4a. (24) -2.2 (-2.61, -1.79) <u>BMI</u> 1b. (16) 0.4 (-0.03, 0.83) 2b. (17) -1.4 (-2.46, -0.34) 3b. (16) 0 (-0.64, 0.64) 4b. (20) -2 (-2.84, -1.16) <u>BMI</u> 1c. (15) 0.4 (0.19, 0.61) 2c. (19) -0.7 (-1.12, -0.28) 3c. (13) -0.5 (-1.37, 0.37) 4c. (21) -1.2 (-2.03, -0.37)	<u>SBP</u> 1a. (12) 137.5 (132.00, 143.00) 2a. (16) 144.5 (134.91, 154.09) 3a. (20) 139.5 (135.31, 143.69) 4a. (24) 142.8 (137.84, 147.76) <u>DBP</u> 1a. (12) 95.6 (93.18, 98.02) 2a. (16) 97.3 (94.53, 100.07) 3a. (20) 96.4 (94.10, 98.70) 4a. (24) 97 (95.14, 98.86) <u>SBP</u> 2b. (17) 133.6 (128.94, 138.26) 1b. (16) 129.6 (125.55, 133.65) 3b. (16) 130.6 (125.91, 135.29) 4b. (20) 129.2 (n/a, n/a) <u>DBP</u> 1b. (16) 88 (86.93, 89.07) 2b. (17) 88.1 (87.04, 89.16) 3b. (16) 88.2 (86.92, 89.48) 4b. (20) 86.6 (85.55, 87.65) <u>SBP</u> 1c. (15) 120.8 (118.01, 123.59) 2c. (19) 122.2 (118.00, 126.40) 3c. (13) 122.7 (116.82, 128.58) 4c. (21) 121.9 (118.77, 125.03) <u>DBP</u> 1c. (15) 79.1 (76.31, 81.89) 2c. (19) 78.6 (76.08, 81.12) 3c. (13) 79.4 (77.44, 81.36)	<u>SBP</u> 1a. (12) 2.9 (-6.78, 12.58) 2a. (16) -8.4 (-15.43, -1.37) 3a. (20) -4.1 (-7.87, -0.33) 4a. (24) -8.3 (-12.64, -3.96) <u>DBP</u> 1a. (12) -0.4 (-8.32, 7.52) 2a. (16) -7.1 (-10.94, -3.26) 3a. (20) -5.5 (-9.06, -1.94) 4a. (24) -7.1 (-9.79, -4.41) <u>SBP</u> 2b. (17) -8.2 (-12.23, -4.17) 1b. (16) -1.7 (-7.88, 4.48) 3b. (16) -1.6 (-4.58, 1.38) 4b. (20) -6.1 (-8.82, -3.38) <u>DBP</u> 1b. (16) -2.2 (-6.25, 1.85) 2b. (17) -4.5 (-7.26, -1.74) 3b. (16) -2.4 (-5.38, 0.58) 4b. (20) -6.4 (-8.91, -3.89) <u>SBP</u> 1c. (15) -1.9 (-5.76, 1.96) 2c. (19) -3.2 (-7.19, 0.79) 3c. (13) 0.2 (-4.81, 5.21) 4c. (21) -3 (-6.55, 0.55)	

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
							4c. (21) 79 (77.54, 80.46)	<u>DBP</u> 1c. (15) 0.8 (-2.42, 4.02) 2c. (19) 0.8 (-2.35, 3.95) 3c. (13) 1.2 (-3.16, 5.56) 4c. (21) -1.8 (-5.35, 1.75)	
Karvetti 368	Randomized: unclear Self-selected: unclear Included: BMI >27 kg/m ² Mean age: 48.1 Mean weight: 33.9 kg/m ² Female/Total: 147/189	BMI >27 kg/m ²	Diet: 1200 kcal/d Exercise: no Behavioral: no	1. Control (no diet) 2. Weight reduction program Duration: 52 weeks	1. 21/117 (18%) 2. 33/126 (26%)	<u>Weight in kg, men</u> 2. (17) -10.9 <u>Weight in kg, women</u> 2. (62) -5.4 2vs1 p<0.05 per author	<u>Systolic BP, men</u> 1. (20) 148 (138.17, 157.83) 2. (22) 145 (134.36, 155.64) <u>Systolic BP, women</u> 1. (76) 142 (137.20, 146.80) 2. (69) 146 (141.20, 150.80) <u>Diastolic BP, women</u> 2. (69) 92 (89.60, 94.40) 1. (76) 91 (88.49, 93.51) <u>Diastolic BP, men</u> 1. (20) 92 (86.38, 97.62) 2. (22) 95 (86.13, 103.87)	<u>Systolic BP, men</u> 1. (ns) 147 (n/a, n/a) 2. (17) 145 (133.17, 156.83) <u>Systolic BP, women</u> 1. (ns) 142 (n/a, n/a) 2. (62) 140 (135.17, 144.83) 2vs1 p<0.05 <u>Diastolic BP, women</u> 2. (62) 86 (83.46, 88.54) 1. (ns) 88 (n/a, n/a) <u>Diastolic BP, men</u> 1. (ns) 87 (n/a, n/a) 2. (17) 88 (80.29, 95.71)	
Collins 676	Randomized: unclear Self-selected: yes Included: BMI 30-40 diabetes Mean age: ng Mean weight: ng Female/Total: ng/40	BMI 30 -40	Diet: yes VLCD, HMR 800 800 Kcal Exercise: no Behavioral: yes group weekly	1. HMR 800 (2 supplements per day) 2. HMR 800 (5 supplements per day)	1/32(3%) * 7 not included (\$ medication)	<u>Weight in kg</u> 0. (32) -15.3 (n/a, n/a)	<u>SBP</u> 1. (32) 140.6 (135.9, 145.3) <u>DBP</u> 1. (32) 88.2 (85.5, 90.9)	<u>SBP</u> 0. (32) 124.9 (118.4, 130.4) <u>DBP</u> 0. (32) 76.8 (73.7, 79.9) <u>SBP 64 weeks</u> 0. (30) 135.4 (127.2, 143.6) <u>DBP 64 weeks</u> 0. (30) 82.4 (79.3, 85.5)	
Stokholm 692	Randomized: unclear Self-selected: not	>180% IBW	Diet: yes Conventional: no	1. Conventional diet 2. Jejunioleal bypass (end	none	1. -10 kg 2. -42.8	<u>SBP, median</u> 1. (33) 140 (95% CI, 18, 197)	<u>max change SBP, median</u> 1. (33) 140 (95% CI 110,	Positive correlation between the

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
	Included: >180% IBW Mean age: 31.7 Mean weight: 125.2 kg Female/Total: 113/134		description Exercise: no Behavioral: no	to side)		<u>2vs1</u> -32.8 (-64.2, -1.39)	2. (101) 140 (95%CI 116, 180) <u>DBP, median</u> 1. (33) 90 (95%CI 67, 112) 2. (101) 85.0 (95%CI 70, 109)	187) 2. (101) 120 (95%CI 105, 150) <u>2vs1</u> -20 (-53, 13) <u>max change DBP, median</u> 1. (33) 90 (95%CI 70, 100) 2. (101) 80 (95%CI 60, 99) <u>2vs1</u> -5 (-26, 16)	maximum change in body weight and corresponding change in BP (r square=0.43) SBP (r square =0.46) DBP (r square =0.36). No correlation between weight changes and mean BP at allocation (r square =0.12, p>0.10).
	Behavioral								
Jeffery 367	Randomized: unclear Self-selected: yes Included: 14 to 32 kg overweight, multiple failed attempts Mean age: 37.5 Mean weight: 98.7 Female/Total: 22/54	14 to 32 kg overweight	Diet: yes 1000-1500 kcal/d Exercise: yes 2 and 5 1000 kcal/w Behavioral: yes group, qwx20, qmo	1. Control 2. Standard behavioral treatment 3. Standard behavioral treatment plus food provision 4. Standard behavioral treatment plus monetary incentive 5. Standard behavioral treatment plus food provision plus monetary incentive	not given	<u>Weight in kg</u> 1. (ns) 0.5 (95%CI n/a, n/a) 2. (ns) -3.5 (95%CI n/a, n/a) 3. (ns) -6 (95%CI n/a, n/a) 4. (ns) -3 (95%CI n/a, n/a) 5. (ns) -6 (95%CI n/a, n/a) <u>Weight in kg 12 months</u> 1. (ns) 0 (95%CI n/a, n/a) 2. (ns) -4 (95%CI n/a, n/a) 3. (ns) -8 (95%CI n/a, n/a) 4. (ns) -5 (95%CI n/a, n/a) 5. (ns) -8 (95%CI n/a, n/a) <u>Weight in kg 12 months</u> 1. (28) -1.5 (95%CI) 2,3,4,5. (131) -7.5 (95%CI) <u>Weight in kg 120 weeks</u> 1. (27) 0.6 (95%CI -1.5, 2.7) 2. (24) -1.4 (95%CI -4.4, 1.6) 3. (34) -2.2 (95%CI	<u>SBP</u> 1. (28) 110.6 (95%CI 107.1, 114.1) 2,3,4,5. (131) 111.9 (95%CI 110.0, 113.8) <u>DBP</u> 1. (28) 71.1 (95%CI 68.1, 74.1) 2,3,4,5. (131) 71.9 (95%CI 70.5, 73.3)	<u>SBP 6 months</u> 1. (28) -3.2 (95%CI) 2,3,4,5. (131) -6.9 (95%CI) <u>SBP, men 6 months</u> 2,3,4,5. (ns) -8.9 (95%CI) <u>SBP, women 6 months</u> 2,3,4,5. (ns) -4.7 (95%CI) <u>DBP 6 months</u> 1. (28) 0.5 (95%CI) 2,3,4,5. (131) 3.5 (95%CI) <u>DBP, men 6 months</u> 2,3,4,5. (ns) -4.7 (95%CI) <u>DBP, women 6 months</u> 2,3,4,5. (ns) -2.2 (95%CI) <u>SBP 12 months</u> 1. (ns) -0.2 (95%CI) 2,3,4,5. (ns) -5.4 (95%CI) <u>DBP 12 months</u> 1. (ns) 1.6 (95%CI)	An average weight loss of 11.8 kg or 13% of initial body weight produced significant and persistent improvements in TG, HDL, SBP, DBP, WHR, fasting insulin. The only exception is FBS, which returned to baseline.

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
						-4.5, 0.1) 4. (34) -1.6 (95% CI -3.5, 0.3) 5. (34) -1.6 (95% CI -3.8, 0.6) <u>Weight in kg 120 weeks</u> 1. (28) -1.2 (95% CI ,) 2,3,4,5. (131) -6.0 (95% CI)		2,3,4,5. (ns) -2.4 (95% CI) <u>SBP, men 12 months</u> 2,3,4,5. (ns) -7.1 (95% CI) <u>SBP, women 12 months</u> 2,3,4,5. (ns) -3.7 (95% CI) <u>DBP, men 12 months</u> 2,3,4,5. (ns) -3.7 (95% CI) <u>DBP, women 12 months</u> 2,3,4,5. (ns) -1.0 (95% CI) <u>SBP 120 weeks</u> 1. (ns) -3.8 (95% CI ,) 2,3,4,5. (ns) -6.3 (95% CI) <u>DBP 120 weeks</u> 1. (ns) 0.5 (95% CI) 2,3,4,5. (ns) -2.2 (95% CI) <u>SBP, men 120 weeks</u> 2,3,4,5. (ns) -8.1 (95% CI) <u>SBP, women 120 weeks</u> 2,3,4,5. (ns) -4.3 (95% CI) <u>15, men 120 weeks</u> 2,3,4,5. (ns) -3.3 (95% CI) <u>DBP, women 120 weeks</u> 2,3,4,5. (ns) -1.1 (95% CI)	
Lovibond 484	Randomized: unclear Self-selected: yes Included: non-overweight, subjects at high risk of CAD Mean age: ng Mean weight: ng Female/Total: 18/75	includes non-overweight	Diet: yes to reach or maintain weight Exercise: yes aerobic Behavioral: yes group and individual	1. Basic behavioral therapy 2. Extended behavioral therapy 3. Maximal behavioral therapy	1. (20%) 2. (8%) 3. (8%)	<u>Weight in kg</u> 1. (ns, overwgt) -5.15 (95% CI n/a, n/a) 2. (ns, overwgt) -8 (95% CI n/a, n/a) 3. (ns, overwgt) -10.35 (95% CI n/a, n/a) <u>Weight in kg 12 months</u> 1. (ns, overwgt) -5.5 (95% CI n/a, n/a)	<u>*SBP</u> 1. (20) 153.2 (95% CI n/a, n/a) 2. (18) 155.1 (95% CI n/a, n/a) 3. (21) 152.8 (95% CI n/a, n/a) <u>*DBP</u> 1. (20) 93.3 (95% CI n/a, n/a) 2. (18) 91.8 (95% CI n/a, n/a) 3. (21) 94.8 (95% CI n/a, n/a) *data given for 59 hypertensive	<u>SBP</u> 1. (20) -8.4 (95% CI n/a, n/a) 2. (18) -13.6 (95% CI n/a, n/a) 3. (21) -13.6 (95% CI n/a, n/a) <u>SBP 12 months</u> 1. (ns) -7.1 (95% CI n/a,	Blood pressure: Of the 59/75 patients who were initially hypertensive, 39% (n=23) had reduced their SBP to below the cutoff point for hypertension

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
						2. (ns, overwgt) -8.3 (95% CI n/a, n/a) 3. (ns, overwgt) -9.6 (95% CI n/a, n/a)	subjects	n/a 2. (ns) -12.4 (95% CI n/a, n/a) 3. (ns) -12.1 (95% CI n/a, n/a) DBP 12 months 1. (ns) 88.3 (95% CI n/a, n/a) 2. (ns) 85 (95% CI n/a, n/a) 3. (ns) 87 (95% CI n/a, n/a)	(SBP=140) by the 6-month assessment
Jeffery 680	Randomized: unclear Self-selected: no Included: 10-50% overweight, subjects with high normal BP Mean age: 45.7 Mean weight: 90 Female/Total: none/94	10-50% overweight	Diet: yes low calorie, low salt Exercise: no Behavioral: yes group vs individual	1. Group treatment 2. Individual counseling	1. 11% 2. 15%	<u>Weight in kg</u> 1. (42) -6 (95% CI -7.0, -5.0) 2. (40) -5.7 (95% CI -6.6, -4.8) <u>2vs1</u> -0.30 (-2.15, 1.55)	<u>SBP</u> 1. (42) 134.5 (95% CI 131.0, 138.0) 2. (40) 135.8 (95% CI 133.5, 138.1) <u>DBP</u> 1. (42) 85 (95% CI 82.9, 87.1) 2. (40) 83.8 (95% CI 81.9, 85.7)	<u>SBP</u> 1. (42) -9.1 (95% CI -13.1, -5.1) 2. (40) -7 (95% CI -10.2, -3.8) <u>2vs1</u> 2.10 (-1.48, 5.68) <u>DBP</u> 1. (42) -4.8 (95% CI -7.7, -1.9) 2. (40) -5.4 (95% CI -7.5, -3.3) <u>2vs1</u> -0.6 (-3.10, 1.90)	
Uсутupa 490	Randomized: unclear Self-selected: not Included: Diabetes >120% IBW Mean age: 53 Mean weight: 93kg Female/Total: ng	>120% IBW	Diet: yes Kcal ng, low fat Exercise: no Behavioral: yes Format: unclear q2w	1. Conventional diet education 2. Intensified diet education	overall 1. (4%)	<u>BMI</u> 1. (46) -0.8 2. (40) -1.8 <u>2vs1</u> -1 (-2.65, 0.65)	<u>SBP</u> 1. (48) 149 (95% CI 142.3, 155.7) 2. (40) 148 (95% CI 142.2, 153.8) <u>DBP</u> 1. (48) 88 (95% CI 84.5, 91.5) 2. (40) 91 (95% CI 86.8, 95.2)	<u>SBP</u> 1. (46) 144 (95% CI 138.7, 149.3) 2. (40) 137 (95% CI 131.9, 142.1) <u>2vs1</u> -6.00 (-12.19, 0.19) <u>DBP</u> 1. (46) 85 (95% CI 82.3, 87.7) 2. (40) 83 (95% CI 80.1, 85.9) <u>SBP 108 weeks</u> 1. (44) 150 (95% CI 143.3, 156.7)	

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
								2. (38) 146 (95% CI 139.8, 152.2) <u>2vs1</u> -3.00 (-9.79, 3.79) <u>DBP</u> 108 weeks 1. (44) 87 (95% CI 84.3, 89.7) 2. (38) 88 (95% CI 84.7, 91.3) <u>2vs1</u> -2.00 (-5.69, 1.69)	
Wing 694	Randomized: unclear Self-selected: unclear Included: 13.6-31.8 kg above IBW Mean age: 37.4 Mean weight: 89.8 Female/Total: 101/202	13.6-31.8 kg above IBW	Diet: yes Exercise: yes Behavioral: yes Format: group Frequency: weekly	0. Patients assigned to one to four groups which varied in the type of behavioral strategies used to promote adherence but not described further in this publication	not given	<u>Weight in kg</u> men (101) -9.77 (95% CI -11.12, -8.42) women (101) -6.43 (95% CI -7.57, -5.29)	<u>Systolic BP</u> men (101) 115 (95% CI 113.03, 116.97) women (101) 108 (95% CI 106.03, 109.97) <u>Diastolic BP</u> men (101) 73 (95% CI 71.42, 74.58) women (101) 70 (95% CI 68.42, 71.58)	<u>Systolic BP</u> men (101) -8.1 (95% CI -9.68, -6.52) women (101) -4.4 (95% CI -5.98, -2.82) <u>Diastolic BP</u> men (101) -3.4 (95% CI -4.92, -1.88) women (101) -1.9 (95% CI -3.40, -0.40)	
	Other								
Andersen 515	Randomized: unclear Self-selected: unclear Included: >60% overweight N:60 Female: 50 Mean age: 33.9 Mean weight: 117.4 kg	>60% overweight	Group 2: 500 Complete diet for gastroplasty group started on the 7 th day. Exercise: no Behavioral: no	1. VLCD 2. Horizontal gastroplasty and diet	overall 4%	Median wgt loss at 9 months 1. -22 kg 2. -26.1 kg <u>2vs1</u> 4 kg p=ns *unable to estimate 95% CI	<u>DBP</u> 0. (44) 85.0 (95% CI 82.4, 87.6) <u>SBP</u> 0. (44) 131.0 (95% CI 128.2, 133.8)	<u>4 wks DBP</u> 0. (44) 78 (95% CI 75.5, 80.5) <u>12 wks DBP</u> 0. (44) 77 (95% CI 74.5, 79.5) <u>5 mos DBP</u> 0. (44) 75 (95% CI, 72.6, 77.4) <u>7 mos DBP</u> 0. (44) 72(95% CI, 69.0, 75.0) <u>4 wks SBP</u> 0. (44) 121 (95% CI 118.2, 123.8)	

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Question 22: What is the evidence that weight loss directly affects high blood pressure?

Reference	Design	Overweight defined as:	Adjuvant therapy	Intervention	Drop-out total	Mean weight change (n) mean (95% CI)	BP Baseline (n) mean (95% CI)	Blood pressure change (n) mean (95% CI)	Side effects/comments
								<u>12 wks SBP</u> 0. (44) 122 (95% CI 118.9, 125.1) <u>5 mos SBP</u> 0. (44) 121 (95% CI 116.4, 125.6) <u>7 mos SBP</u> 0. (44) 121(95% CI 116.1, 125.9)	
Gordon 70030	Randomized: unclear Self-selected: yes Included: hypertensive and moderately obese Mean age: 48 Mean weight: 98 Female/Total 38/55	Moderately obese	Diet: yes Groups 2, 3 Goal to lose 10% of baseline Exercise: yes Groups 1 and 3 30-45 min, 3-5x/wk Max HR: 60-85% Behavioral: no	1. Exercise training 2. Diet 3. Exercise and diet	1. 0/14 2. 2/17 3. 5/24	<u>Weight (kg)</u> 1. (14) -1 (2.0, 0.04) 2. (15) -5.8 (-7.9, -3.6) 3. (19) -7.1 (-8.5, -5.7)	<u>SBP</u> 1. (14) 145 (138, 152) 2. (15) 141 (133, 149) 3. (19) 145 (139, 151) <u>DBP</u> 1. (14) 96 (91.3, 100.6) 2. (15) 93 (89.1, 96.9) 3. (19) 95 (91.6, 98.4)	<u>SBP</u> 1. (14) -9.9 (-13.6, -6.2) 2. (15) -11.3 (-18, -4.6) 3. (19) -12.5 (-15.5, -9.5) <u>DBP</u> 1. (14) -5.9 (-8.6, -3.2) 2. (15) -7.5 (-9.8, -5.1) 3. (19) -7.9 (-9.9, -5.8)	