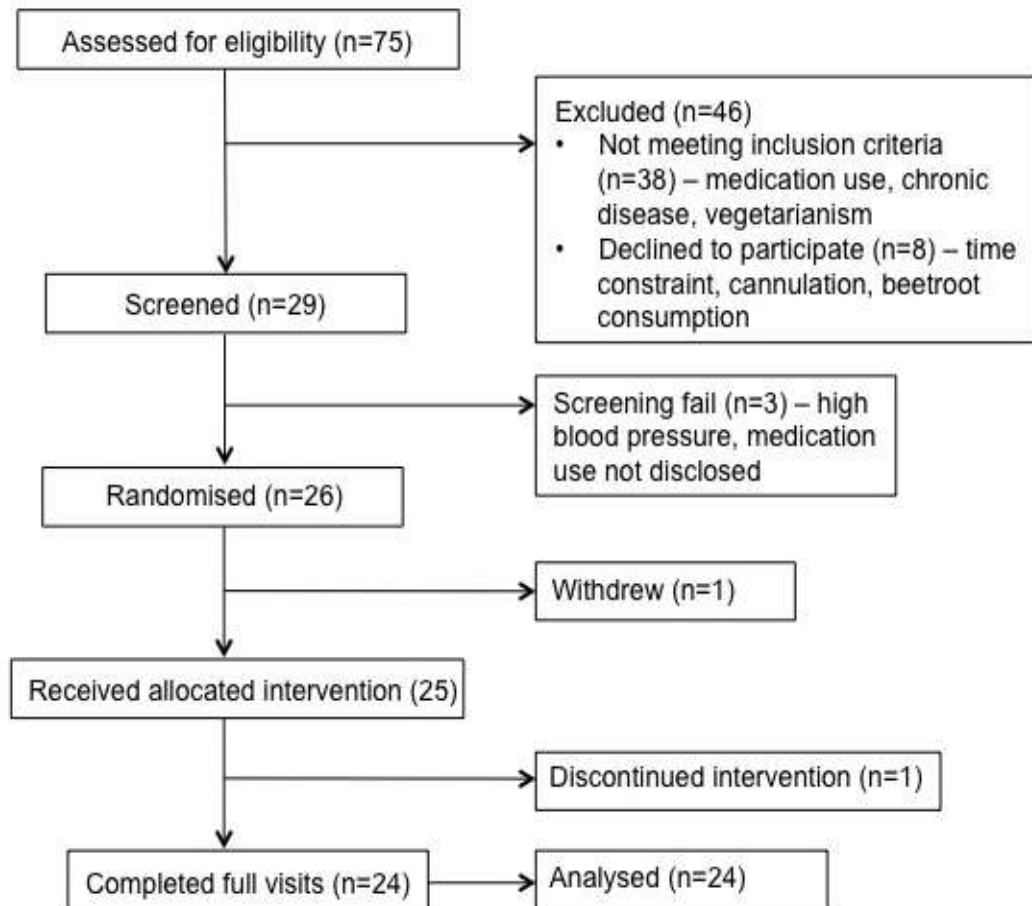


Bioavailability of beetroot compounds in older adults

Reference: ISRCTN86706442

Participant flow:



Baseline characteristics:

Table 1: Mean ($\pm$ SD) baseline characteristics.

	<i>All</i>	<i>Young</i>	<i>Old</i>
<i>Number</i>	24	12	12
<i>Gender (male/female)</i>	9/15	6/6	3/9
<i>Age (years)</i>	45.8 $\pm$ 19.0	27.3 $\pm$ 3.8	64.3 $\pm$ 4.6
<i>Height (cm)</i>	169.0 $\pm$ 8.3	172.1 $\pm$ 7.5	166.0 $\pm$ 8.5
<i>Weight (kg)</i>	68.2 $\pm$ 8.6	70.0 $\pm$ 9.0	66.4 $\pm$ 7.9
<i>Body mass index (kg/m²)</i>	23.9 $\pm$ 2.5	23.6 $\pm$ 2.1	24.2 $\pm$ 2.9
<i>Waist circumference (cm)</i>	82.9 $\pm$ 6.3	80.3 $\pm$ 4.8	85.5 $\pm$ 6.6
<i>Body fat (%)</i>	26.7 $\pm$ 10.0	22.6 $\pm$ 8.9	30.8 $\pm$ 9.1
<i>SBP (mmHg)</i>	117.7 $\pm$ 11.5	115.3 $\pm$ 9.2	120.2 $\pm$ 13.1
<i>DBP (mmHg)</i>	74.6 $\pm$ 6.7	72.6 $\pm$ 4.7	76.5 $\pm$ 7.7
<i>FeNO (ppb)</i>	26.4 $\pm$ 19.4	30.7 $\pm$ 22.9	22.1 $\pm$ 14.1
<i>PORH (PU)</i>	3.6 $\pm$ 1.4	3.7 $\pm$ 1.2	3.5 $\pm$ 1.6
<i>Nitrate intake (mg/day)</i>	238.4 $\pm$ 126.7	223.8 $\pm$ 124.6	252.9 $\pm$ 132.6
<i>Physical activity (MET-min/wk)</i>	3839.5 $\pm$ 517.2	4221.0 $\pm$ 2088.2	3454.6 $\pm$ 2650.8
<i>Plasma nitrate (μmol/l)</i>		28.5 $\pm$ 17.3	25.5 $\pm$ 12.7
<i>Plasma nitrite (nmol/l)</i>		135.6 $\pm$ 21.7	114.1 $\pm$ 26.9
<i>Salivary nitrate (mmol/l)</i>		0.9 $\pm$ 1.1	0.7 $\pm$ 0.5
<i>Salivary nitrite (μmol/l)</i>		189.8 $\pm$ 110.9	162.3 $\pm$ 119.2

Abbreviations: SBP = systolic blood pressure, DBP = diastolic blood pressure, FeNO = exhaled nitric oxide, PORH = post-occlusive reactive hyperaemia.

Primary outcome measures (bioavailability of nitrate following incremental doses of beetroot and compared to a positive control (KNO₃) over five hours):

Marker	Young				Old		
	Dose	1 hour	3 hour	5 hour	1 hour	3 hour	5 hour
Plasma nitrate (μmol/l)	100g	84.4±57.7	86.0±45.8	71.1±38.0	118.4±78.9	127.6±111.4	89.5±64.1
	200g	134.8±91.2	147.8±105.7	103.6±61.3	172.7±171.1	195.9±202.6	165.2±159.9
	300g	173.6±112.9	204.4±132.9	149.1±95.9	172.1±137.9	216.5±169.3	164.2±129.9
	KNO ₃	338.5±185.7	280.4±119.4	250.4±133.4	421.4±184.7	419.5±172.7	361.6±162.9
Plasma nitrite (nmol/l)	100g	216.6±44.4	270.3±51.0	291.2±73.6	172.3±31.5	268.3±51.7	281.4±46.9
	200g	255.8±34.6	335.4±35.6	348.6±53.2	216.8±38.8	300.5±43.5	328.2±49.1
	300g	286.7±34.5	497.4±78.2	521.3±65.9	294.2±70.4	405.9±87.1	443.8±99.3
	KNO ₃	453.7±53.4	1069.8±148.4	1128.2±162.6	542.9±188.3	829.2±218.5	928.8±209.9
Salivary nitrate (mmol/l)	100g	2.3±2.2	1.9±0.8	2.3±0.3	4.1±0.7	3.1±0.6	2.4±0.8
	200g	3.6±3.6	2.6±1.4	2.3±1.3	4.7±0.8	4.3±0.8	2.8±0.6
	300g	5.3±4.8	4.7±2.6	3.8±2.1	5.8±1.2	6.0±2.1	4.0±0.8
	KNO ₃	8.1±6.1	8.2±5.0	6.2±2.4	10.6±2.8	9.7±2.0	6.8±3.0
Salivary nitrite (μmol/l)	100g	433.8±307.0	335.6±255.4	408.5±164.4	511.8±560.7	428.5±418.4	295.0±224.8
	200g	559.8±381.4	364.2±203.4	388.8±288.7	571.4±433.7	595.3±619.2	649.2±559.8
	300g	819.4±971.1	723.8±379.0	617.5±489.6	512.4±343.1	850.2±784.4	612.3±316.0
	KNO ₃	1284.8±1168.8	819.8±630.1	1082.4±834.1	896.1±617.2	957.7±713.2	1027.9±682.8

Table 2: Mean (±SD) concentration of plasma and saliva markers in the young and old groups over five hours following the ingestion of nitrate. KNO₃ = potassium nitrate positive control. 100g, 200g, 300g whole beetroot

Secondary outcomes measures (blood pressure, endothelial function and exhaled nitric oxide over five hours following incremental doses of beetroot and a positive control):

<i>Outcome</i>	<i>Young</i>				<i>Old</i>		
	Dose	1 hour	3 hour	5 hour	1 hour	3 hour	5 hour
<i>SBP</i> <i>(mmHg)</i>	100g	113.2±8.1	108.3±10.3	111.3±11.2	117.4±14.8	121.0±15.9	122.9±15.0
	200g	113.2±11.4	107.5±9.1	108.1±6.4	115.8±15.4	119.4±15.1	122.7±14.7
	300g	112.8±9.1	110.8±9.5	108.9±9.8	118.0±16.3	118.5±13.0	122.6±15.0
	KNO3	112.9±7.6	107.4±9.0	106.6±6.0	115.3±14.9	117.8±14.4	118.6±18.6
<i>DBP</i> <i>(mmHg)</i>	100g	70.5±5.3	69.3±6.3	68.0±4.6	73.3±5.3	77.6±8.8	75.7±7.5
	200g	70.3±7.8	68.3±5.5	69.3±4.5	73.3±8.4	74.1±7.0	75.3±4.6
	300g	68.0±4.9	68.4±6.1	68.6±6.0	72.3±10.2	75.8±7.8	73.8±6.8
	KNO3	70.5±6.5	65.9±6.1	68.4±3.8	73.3±9.4	71.1±7.3	73.2±8.6
<i>PORH</i> (<i>PU</i>)	100g	3.7±1.2	3.8±1.4	3.6±1.1	3.5±1.6	2.2±0.8	2.9±0.8
	200g	3.5±0.9	3.6±0.6	3.6±1.2	3.5±1.6	3.5±1.2	3.6±1.6
	300g	3.1±1.2	3.1±1.6	3.6±1.4	2.9±0.7	2.6±0.7	2.9±0.8
	KNO3	3.8±1.0	3.8±1.7	3.1±1.2	2.9±0.9	3.0±1.3	2.9±1.3
<i>FeNO</i> (<i>ppb</i>)	100g	37.4±23.5	38.6±26.4	39.8±24.1	26.2±12.4	25.5±13.5	25.8±12.5
	200g	38.4±26.9	39.8±29.5	38.8±27.8	32.4±16.4	28.3±12.7	29.7±12.7
	300g	41.7±28.7	42.1±26.3	40.5±24.0	32.5±19.3	31.6±14.5	33.2±12.9
	KNO3	39.0±23.9	39.9±19.9	41.8±20.2	34.1±22.2	35.8±23.6	36.3±23.1

Table 3: Mean (±SD) secondary outcome measures in the young and old following nitrate doses over five hours. SBP = systolic blood pressure, DBP = diastolic blood pressure, PORH = post-occlusive reactive hyperaemia, PU = perfusion units, FeNO = fractional exhaled nitric oxide.

Adverse events:

There were no adverse events associated with this trial.