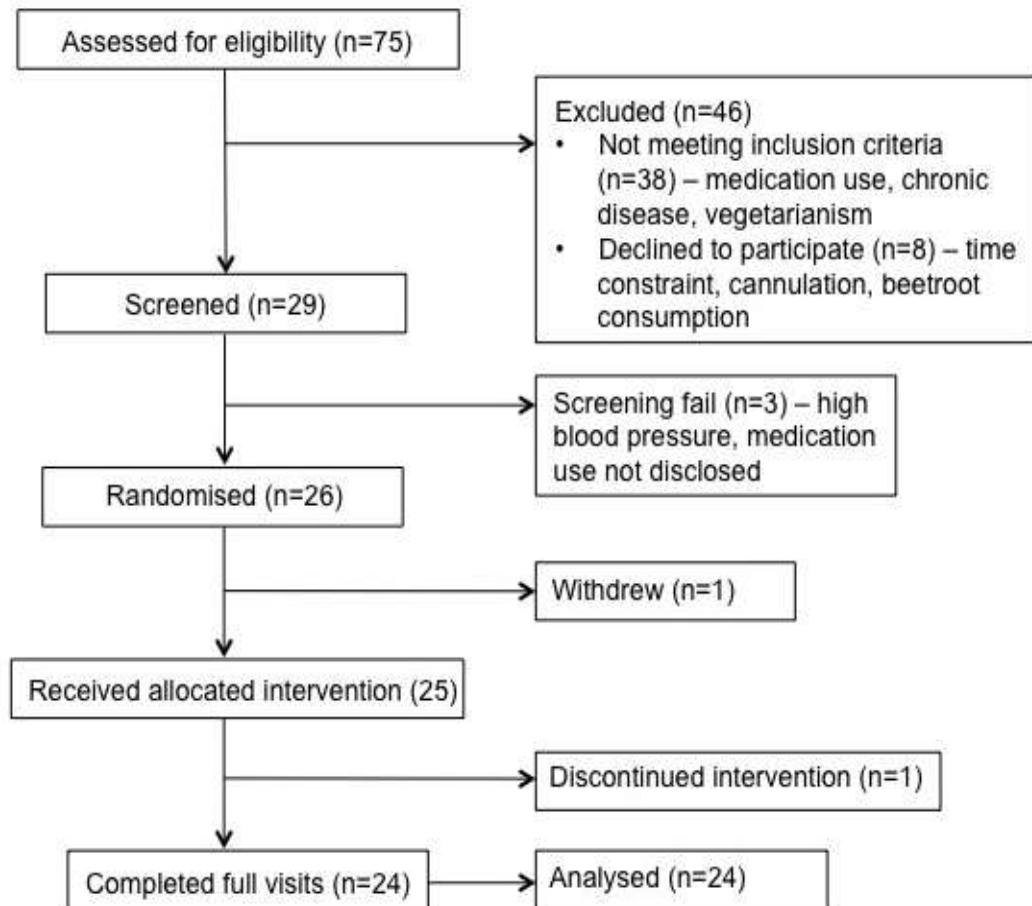


Bioavailability of beetroot compounds in older adults

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	30.6 $\pm$ 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	4260.4 $\pm$ 2088.2	3456.7 $\pm$ 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>		0.8 $\pm$ 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	85.9±45.8	71.2±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	149.0±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	2.5±1.2	1.8±0.6	0.7±0.6	2.6±0.5	2.3±0.4	0.6±0.4
	200g	3.2±2.2	2.8±1.3	0.5±0.4	4.3±0.9	3.7±0.4	0.8±0.9
	300g	5.3±4.8	3.8±1.6	1.2±0.9	5.8±1.2	5.3±1.9	1.1±0.6
	KNO ₃	8.9±6.8	9.2±6.9	1.3±0.8	10.2±2.7	10.2±4.0	1.3±0.5
Salivary nitrite (μmol/l)	100g	594.4±463.0	326.8±264.1	189.2±164.4	412.7±366.8	377.4±274.6	330.5±327.7
	200g	586.3±406.9	379.5±248.3	283.3±261.5	574.8±510.6	666.0±593.4	354.8±252.9
	300g	733.6±578.7	759.3±434.5	349.6±443.4	787.3±489.2	656.9±357.5	467.8±335.9
	KNO ₃	925.0±768.9	964.0±726.3	454.3±354.7	805.8±362.5	1137.0±767.4	554.3±357.8

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> (mmHg)	100g	112.0±9.0	108.8±9.8	110.4±9.5	119.0±13.8	121.1±14.1	122.8±17.1
	200g	112.5±8.9	110.4±9.2	110.5±7.4	116.9±14.5	121.2±16.6	121.3±17.0
	300g	113.7±8.6	111.8±8.8	110.8±8.6	120.6±14.8	118.9±12.9	122.3±15.0
	KNO3	111.0±6.1	109.8±7.5	108.5±6.5	116.9±13.8	115.4±12.7	116.6±17.2
<i>DBP</i> (mmHg)	100g	68.6±3.9	67.1±6.3	67.8±4.3	73.8±6.5	76.3±7.5	76.4±8.9
	200g	69.1±6.1	67.8±4.3	69.3±4.4	73.9±6.9	74.2±6.9	75.2±6.8
	300g	68.4±5.9	69.3±5.5	68.4±5.9	73.8±6.4	73.4±7.7	73.9±6.6
	KNO3	68.8±5.4	67.4±4.8	68.6±4.1	72.5±6.8	71.4±7.3	71.5±7.5
<i>PORH</i> (PU)	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> (ppb)	100g	38.1±23.6	38.8±24.7	39.1±24.3	26.3±12.9	25.8±13.3	27.5±13.4
	200g	38.3±27.6	38.9±28.1	38.8±28.6	32.6±19.3	28.8±12.6	30.3±13.5
	300g	42.0±29.9	43.3±27.2	41.5±26.9	31.9±18.1	32.0±14.3	33.5±13.0
	KNO3	40.2±22.9	40.1±20.2	43.5±22.7	35.0±20.0	35.1±23.7	35.3±21.8

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.