Blood pressure & Heart Health

Dr Jamie Kitt
Consultant Cardiologist and General Internal Medicine Physician LNWH NHS Trust
& Post Doctoral Research Fellow in Hypertension and Hypertensive Pregnancy University of Oxford

Lay Definition[1]

Hypertension, is a condition in which the blood vessels have persistently raised pressure. Blood pressure is created by the force of blood pushing against the walls of blood vessels (arteries) as it is pumped by the heart. The higher the pressure the harder the heart has to pump[1].

[1]WHO Definition

Why is it important?

1.3 billion people worldwide affected most (2/3 living in low- and middle-income countries).

In 2015, 1/4 men and 1/5 women had hypertension.

Fewer than 1/5 with diagnosis controlled.

Major cause of premature death worldwide.

What I hope you take away

Blood pressure is not that boring really!

Doing the simple things really makes a massive difference to long-term complications

Complications of Hypertension

Atherosclerosis, Aneurysms, Aortic dissections		
Haematuria, Uraemia, Proteinemia	Chronic kidney disease
Pulmonary oedema, Myocardial infarction, Left ventricular hypertrophy	Cardiac failure
Haemorrhage / infarction, Seizures, Vascular dementia	Stroke / TIA
Haemorrhages, Exudates, A-V nipping, Papilloedema	Blindness

Causes

Essential HTN   **Secondary HTN**

•Environmental factors   Covered at the end

•Genetic factors (familial but gene loci unidentified largely)

•Fetal factors (prematurity or born to a hypertensive pregnancy)

•Insulin resistance/Metabolic syndrome

•Neuro-endocrine/hormonal factors

Environmental factors

- Obesity (associated risk with OSA)

- Alcohol - >14 units per week (Small amounts beneficial?[1])

- Smoking (acutely exerts a hypertensive effect through stimulation of sympathetic nervous system)

- Salt
    - Directly proportional (target <3g/day)

- Stress – acute pain and stress well linked. Chronic increasingly linked

- Exercise – BHF advocates 40mins 3 x (or 20mins 5 x)

[1] Red Wine Consumption and Cardiovascular Health. Luigi Castaldo,1,2 Alfonso Narváez,1 Luana Izzo,1 Giulia Graziani,1 Anna Gaspari,1 Giovanni Di Minno,2 and Alberto Ritieni1, Molecules. 2019 Oct; 24(19): 3626. PMCID: PMC6804046 PMID: 31597344
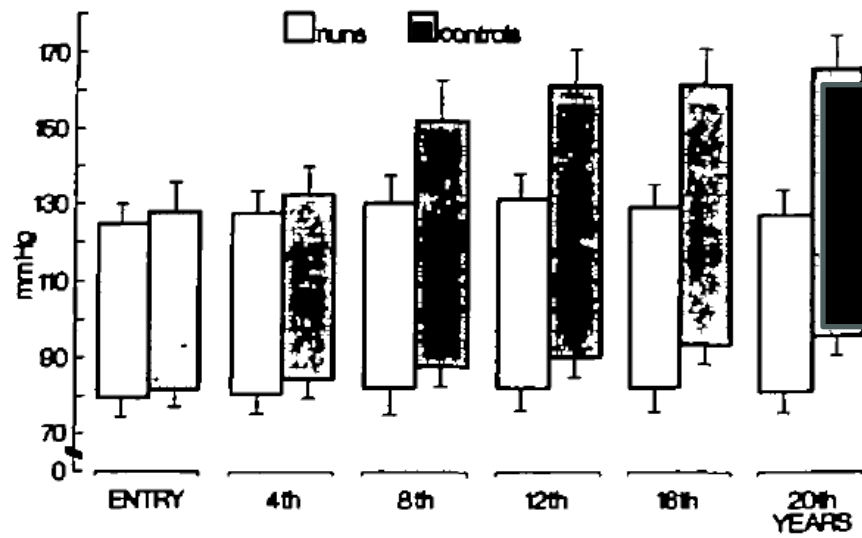
Neuro-endocrine factors

1. Renin-angiotensin-aldosterone system (the kidneys and small walnut sized glands called the adrenal glands…)

2. BNP (B-type natriuretic peptide)

3. Autonomic nervous system (fight, flight and fright)

Fig 1. **Position and structure of the adrenal gland**

Adrenal Gland

Left Kidney

Medulla

Cortex

Capsule
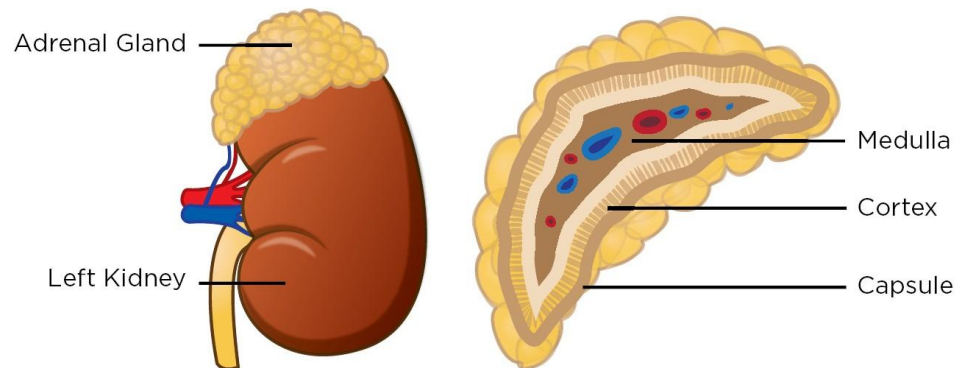
Untreated hypertension is a vicious circle

- **Larger arteries (> 1mm)**
  - Internal elastic lamina is **thickened**, smooth muscle is **hypertrophied** and **fibrous tissue** is deposited
  - The vessels **dilate** and become **tortuous**, and their walls become **less compliant**.
- **Smaller arteries (< 1mm)**
  - hyaline arteriosclerosis
  - lumen narrows and aneurysms
  - **Atheroma** develops : coronary and cerebrovascular disease
    - **Risk factor**: smoking, hyperlipidaemia, diabetes

Normal pressure on walls

Increased pressure on walls

Damaged walls

Plaque buildup

Measuring blood pressure

Standardise the environment and provide a relaxed, temperate setting with the person quiet and seated.

When using an automated device:

- palpate the radial or brachial pulse before measuring blood pressure. If pulse is irregular measure blood pressure manually

- ensure that the device is validated and an appropriate cuff size for the person's arm is used.

Diagnosis (1)

- If the clinic BP >140/90 mmHg or higher, offer ambulatory blood pressure monitoring (ABPM) to confirm the diagnosis of hypertension[1].

- Offer Home monitoring if ABPM not possible/not tolerated

[1]NICE NG136 August 2019 Hypertension in adults: Diagnosis and management

Diagnosis (2)

When using ABPM to confirm diagnosis, ensure[1]:

– at least 2 measurements/hr during usual waking hours (average >14 measurements to confirm)

When using HBPM[1]:

– 2 consecutive measurements >1 minute apart;
– 2 per day for >5 days;
– measurements on 1st day discarded (average value of remaining used.

[1]NICE NG136 August 2019 Hypertension in adults: Diagnosis and management

Definitions

Stage 1 hypertension:
- Clinic BP >140/90 mmHg **AND**
- ABPM or HBPM average is >135/85 mmHg

Stage 2 hypertension:

- Clinic BP >160/100 mmHg **AND**
- ABPM or HBPM day average >150/95 mmHg

Severe hypertension:

- Clinic BP is >180 mmHg **or**
- Clinic diastolic BP is >110 mmHg

Starting treatment

Lifestyle interventions

Offer guidance and advice about:

- – Diet (including low salt, 8 x fruit & veg, weight loss)

- – Exercise

- – Reduce alcohol consumption

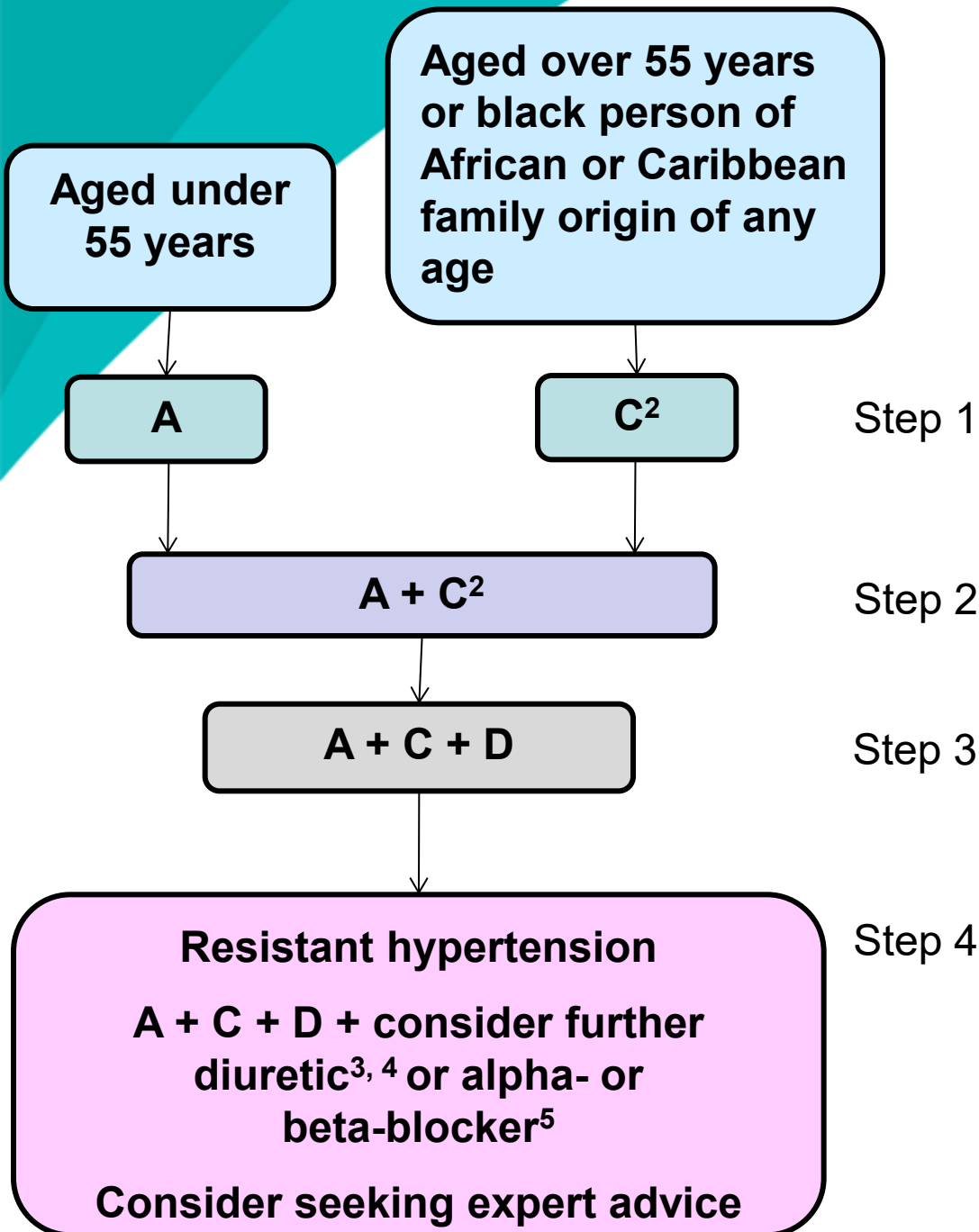- – Stop Smoking.

Patient education and adherence

Provide:

- – information about benefits of drugs and side effects

- – details of patient organisations

- – annual review

Initiating drug treatment

- Stage 1 hypertension, aged< 80 + evidence of damage in eye, heart, kidney, brain or increased CV risk score

- Stage 2 hypertension at any age.

- If <40 with stage 1 hypertension and without organ damage, CV disease, renal disease or diabetes consider:

- specialist evaluation of secondary causes
- further assessment for organ damage e.g. echo

Summary of antihypertensive drug treatment

Aged under 55 years

Aged over 55 years or black person of African or Caribbean family origin of any age

A C^2 Step 1

A + C^2 Step 2

A + C + D   Step 3

Resistant hypertension

A + C + D + consider further diuretic[3, 4] or alpha- or beta-blocker[5]

Consider seeking expert advice   Step 4

Key
A – ACE inhibitor or low-cost angiotensin II receptor blocker (ARB)[1]
C – Calcium-channel blocker (CCB)
D – Thiazide-like diuretic

Monitoring drug treatment (1)

Use clinic blood pressure measurements to monitor response to treatment[1]. Aim for target blood pressure below:

- Below 140/90 mmHg in people aged <80
- **Below 150/90 mmHg in people aged >80**

[1]NICE NG136 August 2019 Hypertension in adults: Diagnosis and management

Monitoring drug treatment (2)

For people identified as having a 'white-coat effect' consider ABPM/HBPM as an adjunct to clinic
BP to monitor response
to treatment[1].

Aim for ABPM/HBPM average of:

- <130/80 mmHg in people aged <80
- <145/85 mmHg in people aged >80.

White-coat effect: a discrepancy of more than 20/10 mmHg between clinic and average daytime ABPM or average HBPM blood pressure measurements at the time of diagnosis.

A Randomized Trial of Intensive versus Standard Blood-Pressure Control

The SPRINT Research Group*

Hazard ratio with intensive treatment, 0.75 (95% CI, 0.64–0.89)

Standard treatment

Intensive treatment
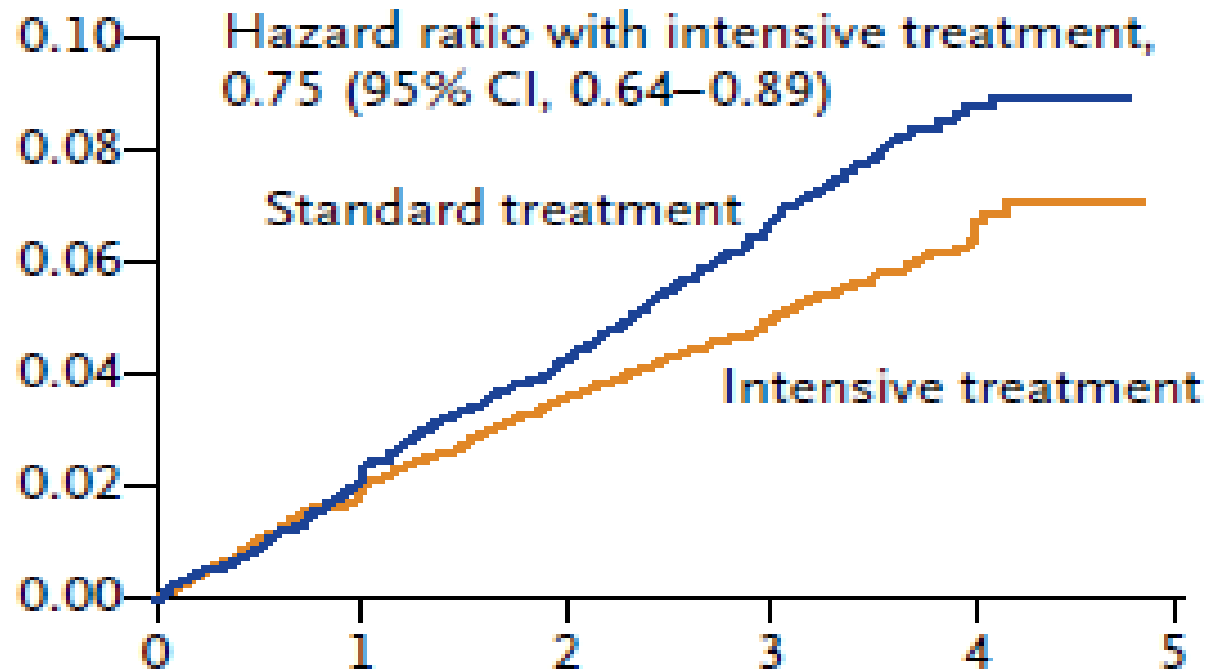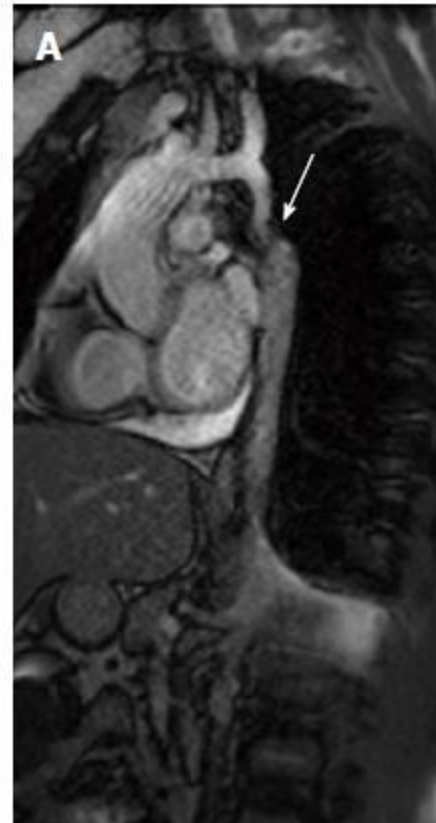
Secondary causes of Hypertension

Vascular

- Coarctation

- Renal artery stenosis

Metabolic/Endocrine

- Phaeochromocytoma

- Conns syndrome

- Cushing syndrome

- Thyroid/Parathyroid

- Acromegaly

Renal

- Polycystic kidneys

- Glomerulonephritis

- Renal Tumours

Secondary Hypertension

Drugs   Genetic

- Liquorice/Alcohol (Napoleon)   -Congenital adrenal
- **Combined contraceptive pill**
- Anabolic- or cortico-steroids   - Liddle's syndrome
- **Ibuprofen**/Neurofen
- Immunosuppressive drugs
- **VEGF Inhibitors and other cancer treatments**
- Cocaine
- Heavy metals

What else matters?

Conditions that can increase your risk

High cholesterol

Cholesterol is a fatty substance in your blood. Too much of it can increase your risk of heart and circulatory diseases.

High blood pressure

Around 50% of heart attacks and strokes are linked to high blood pressure. Knowing your blood pressure could save your life

Diabetes

Diabetes can cause damage to your lead to a heart attack or a stroke.

Free heart
health magazine

BLUE ZONES

Blue Zones are regions in the world where people live significantly longer and healthier lives. The five recognized Blue Zones are:

- **Okinawa, Japan**

- **Sardinia, Italy**

- **Nicoya, Costa Rica**

- **Ikaria, Greece**

- **Loma Linda, California**
  These areas are characterized by low rates of chronic diseases and high life expectancy, attributed to factors such as a healthy diet, regular physical activity, strong social connections, and low stress levels. 🔗 5

🔗 5 Sources
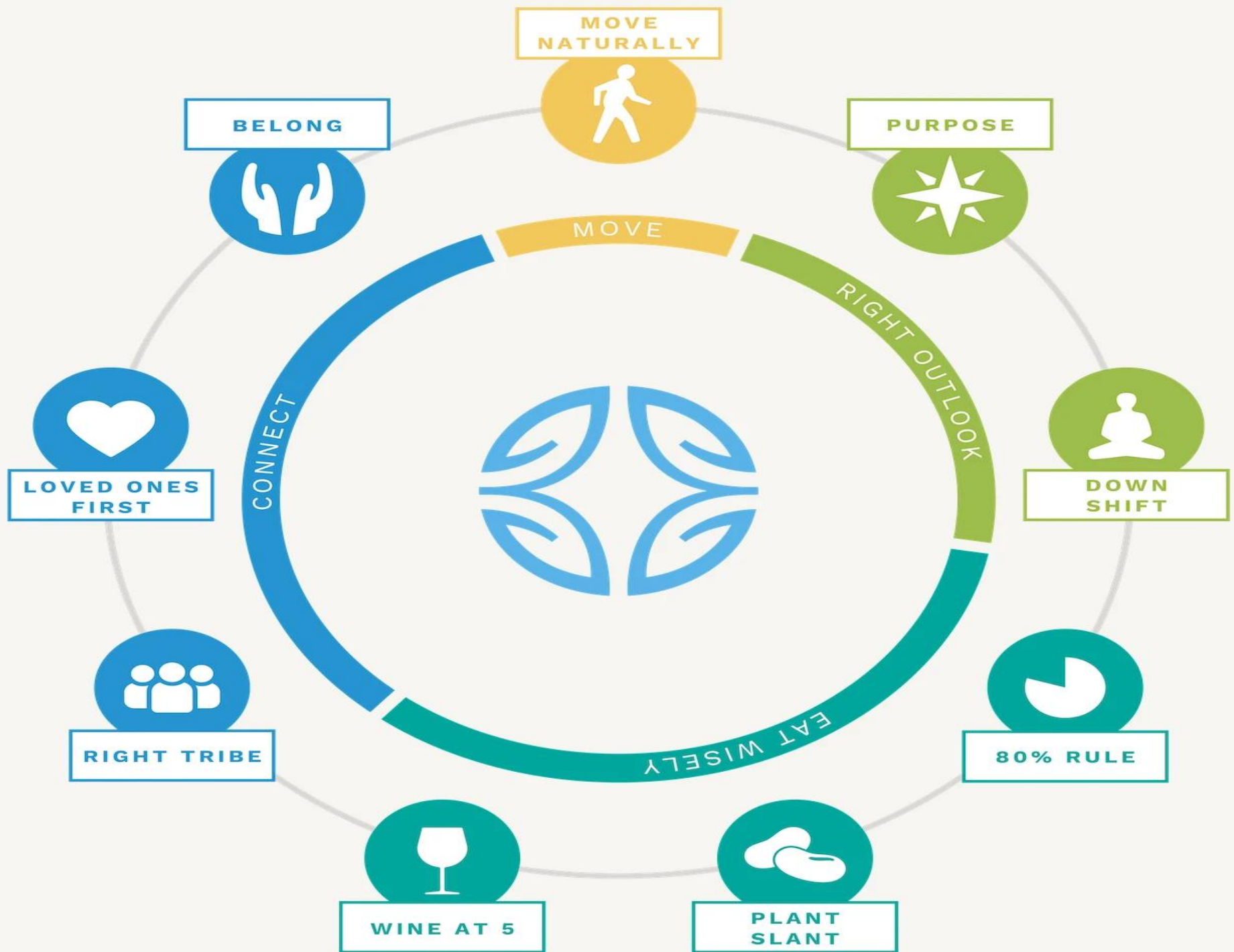
Where to learn more….

What is cholesterol?

Do you have two minutes to watch our video? We explain the different types of cholesterol and how too much bad cholesterol could put you at risk of heart and circulatory disease.

Symptoms and causes of high cholesterol >

Understanding Cholesterol (Subtitles)

Share

From a channel with a licensed health professional in the UK >

Non-HDL

Non-High-Density Lipoproteins

Watch on ▶ YouTube

Heartlink

Click here to get to our Home Page

Heart health advice & links

Questions...