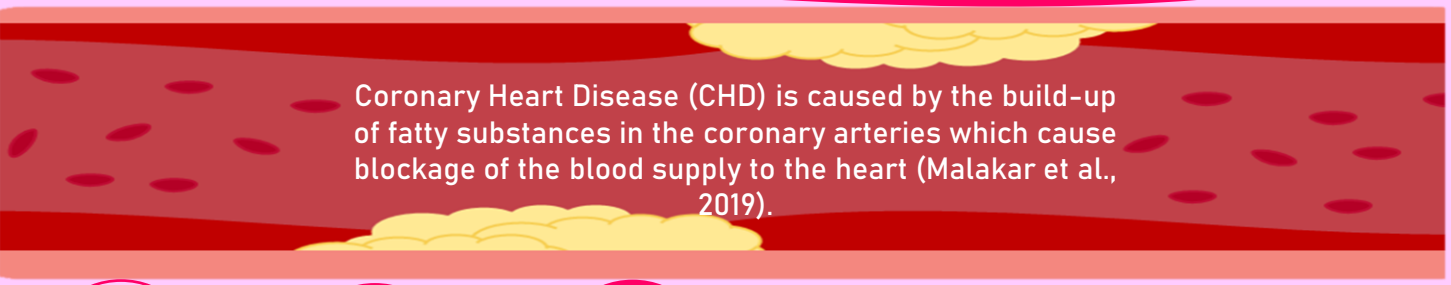
Coronary Heart Disease: A study on reductionism in medicine

By Mariam Ogunbadejo

Reductionism is the practice of breaking down complex things into it's simpler constituents.



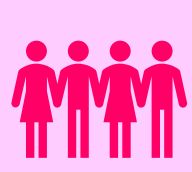
Reductionist Approach

- The reductionist approach aims to identify an isolatable factor, which may then be targeted for the resolution of the disease.
- CHD can begin with a heart attack or its 'counterpart' symptoms such as shortness of breath and angina (Malakar et al., 2019).
- Research found that CHD was caused by restricted blood flow in the arteries(Malakar et al., 2019).
- This was then followed by discoveries of atherosclerotic plaques, made up of cholesterol and other fatty acids.
  - This guided treatment for the use of balloon angioplasties and stents (Malakar et al., 2019)

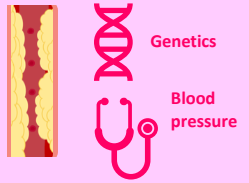
Benefits of Reductionism ✓

- **Aids to determine causality**
- **Simplifies decision-making** – Atherosclerotic plaques identified as a cause of CHD has meant the development of treatments targeting these plaques.
- **Enables the identification of risk factors.** – For example, Hypertension has been identified as a risk factor and therefore is used as a diagnostic marker of CHD (Malakar et al., 2019).

Limitations of Reductionism ✗



Reductionism bases its treatment recommendations on the premise that all patients who exhibit the same symptoms of an illness share the same pathophenotype. (Ahn et al., 2006)



Reductionism is not as effective for a 'multi-factorial' disease as all these causes can have a combinatory influence on the development of the disease. (Poulter, 1999)

Reductionism does not always consider non-biological factors such as lifestyle and environmental factors which can interact to increase the risk of CHD or co-existing diseases. (Ahn et al., 2006)

Following the Framingham study, one of the common risk factors of CHD was identified to be hypertension. However, only a small proportion of the population experiences hypertension.

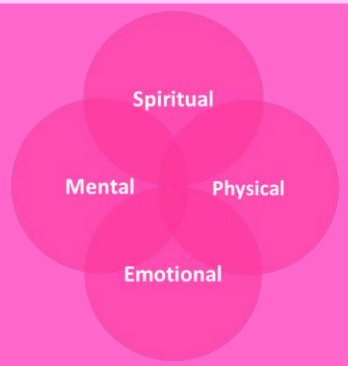
~ 1 in 3 adults in the UK have high blood pressure

Therefore, trying to identify one risk as a point of focus for the disease has its limits (Ahn et al., 2006).

Alternative Approaches

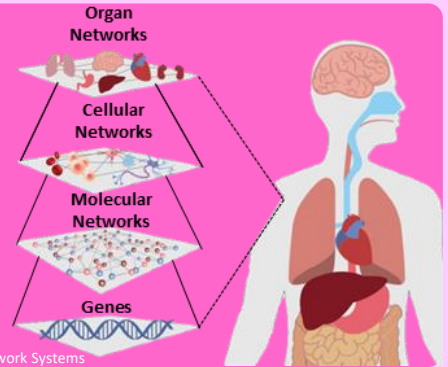
1. Holistic Approach

- Looks at the whole body for imbalance based on the local problem and identifies non-biological factors.
- Atherosclerotic plaques were found to be associated with cholesterol which can be found in the food we eat. This indicated that dietary changes can mitigate or even prevent the development of CHD (Malakar et al., 2019).



2. Systems Biology Approach

- Considers the whole network and interaction of the whole system, instead of looking at individual parts (Ahn et al., 2006).
- Systems techniques have been used to identify factors such as genes and proteins which show associations with CHD (Joshi et al., 2021).



Biological Network Systems

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