Nuclear DNA v mtDNA: principles of inheritance

### Nuclear DNA (nDNA)
- Found in the nucleus of the cell
- 3,300,000,000 bases (A, T, C and G)
- Arranged in linear chromosomes
- Two copies of each chromosome
- Maternally and paternally inherited
- Contains approximately 20,000 genes
- 93% of the genome is non-coding DNA

### Mitochondrial DNA (mtDNA)
- Found in the mitochondrial matrix
- 16,569 bases (A, T, C and G)
- Arranged in a circular chain of DNA
- Multiple copies present
- Maternally inherited
- Contains 37 genes
- 3% of the genome is non-coding DNA

### Mendelian inheritance
- Mother: ‘healthy’ carrier
- Father: ‘healthy’ carrier
- ‘healthy’ child: 1 in 4 chance
- ‘healthy’ carrier child: 2 in 4 chance
- ‘diseased’ child: 1 in 4 chance

### Non-Mendelian inheritance
- Healthy mitochondria
- Diseased mitochondria with mutated mtDNA
- Healthy child
- ‘Healthy’ oocytes
- Low level of mutation: healthy child
- Intermediate level of mutation: mild disease
- High level of mutation: severe disease

- Example of an autosomal recessive disease
- Disease severity is correlated to ratio of healthy to diseased mitochondria