Masterclass Certificate in Longevity Coaching

The Science of Aging

Apoptosis: Programmed cell death, a natural process that eliminates damaged or unnecessary cells to maintain tissue homeostasis. It plays a crucial role in aging and age-related diseases.

Caloric Restriction: A dietary intervention that involves reducing caloric intake while maintaining adequate nutrient intake. It has been shown to extend lifespan and delay age-related diseases in various organisms, including mammals.

Cellular Senescence: The state of irreversible cell cycle arrest caused by various stressors, such as DNA damage, oxidative stress, and oncogene activation. Senescent cells accumulate with age and contribute to aging and age-related diseases.

Deoxyribonucleic Acid (DNA): The genetic material that contains the instructions for the development, growth, and function of all living organisms. DNA damage and mutations accumulate with age and contribute to aging and age-related diseases.

Epigenetics: The study of heritable changes in gene expression that do not involve changes in the DNA sequence. Epigenetic changes include DNA methylation, histone modification, and non-coding RNA regulation, and play a crucial role in aging and age-related diseases.

Free Radicals: Highly reactive molecules that contain unpaired electrons. They can damage various cellular components, such as DNA, proteins, and lipids, and contribute to aging and age-related diseases.

Geroprotectors: Compounds or interventions that delay aging and extend lifespan by targeting specific aging mechanisms, such as cellular senescence, inflammation, and oxidative stress.

Glycation: The non-enzymatic reaction between sugars and proteins, lipids, or nucleic acids. Glycation products, such as advanced glycation end products (AGEs), accumulate with age and contribute to aging and age-related diseases.

Heat Shock Proteins (HSPs): A group of chaperone proteins that assist in protein folding, assembly, and degradation. HSPs play a crucial role in protecting cells from stress-induced damage and contribute to longevity.

Inflammation: A complex immune response to tissue injury, infection, or stress. Chronic low-grade inflammation is a hallmark of aging and contributes to age-related diseases.

Longevity Genes: Genes that are associated with extended lifespan and delayed aging in various organisms, such as yeast, worms, flies, and mice. Examples include SIRT1, FOXO, and AMPK.

Mitochondria: Membrane-bound organelles that generate energy for the cell through oxidative phosphorylation. Mitochondrial dysfunction is a major contributor to aging and age-related diseases.

MicroRNAs (miRNAs): Small non-coding RNAs that regulate gene expression at the post-transcriptional level. MiRNAs play a crucial role in aging and age-related diseases.

NAD+ (Nicotinamide Adenine Dinucleotide): A coenzyme that plays a crucial role in energy metabolism, DNA repair, and cellular signaling. NAD+ levels decline with age and contribute to aging and age-related diseases.

Oxidative Stress: An imbalance between the production of reactive oxygen species (ROS) and the cellular antioxidant defense systems. Oxidative stress is a major contributor to aging and age-related diseases.

Proteostasis: The maintenance of protein homeostasis, which involves protein folding, trafficking, and degradation. Proteostasis declines with age and contributes to aging and age-related diseases.

Reactive Oxygen Species (ROS): Highly reactive molecules that contain oxygen, such as superoxide anion, hydrogen peroxide, and hydroxyl radical. ROS play a dual role in aging, as they can cause oxidative damage to cellular components, but also act as signaling molecules that regulate various cellular processes.

Senolytics: Compounds or interventions that selectively target and eliminate senescent cells. Senolytics have shown promise in delaying aging and improving healthspan.

Stem Cells: Undifferentiated cells that have the potential to differentiate into various cell types and regenerate tissues. Stem cell function declines with age and contributes to aging and age-related diseases.

Telomeres: Repeating DNA sequences and associated proteins that cap the ends of chromosomes and protect them from degradation and fusion. Telomeres shorten with each cell division and are a biomarker of aging.

Telomerase: A ribonucleoprotein enzyme that elongates telomeres by adding repeating DNA sequences. Telomerase activity declines with age and is associated with aging and age-related diseases.

Transcription Factors: Proteins that regulate gene expression by binding to specific DNA sequences and recruiting RNA polymerase. Transcription factors play a crucial role in aging and age-related diseases.

Wnt Signaling: A conserved signaling pathway that regulates cell fate determination, proliferation, and differentiation. Dysregulation of Wnt signaling is associated with aging and age-related diseases.

Xenohormesis: The induction of stress response pathways in response to plant-derived compounds, such as polyphenols and flavonoids. Xenohormesis has shown promise in delaying aging and improving healthspan.

Yeast Artificial Chromosome (YAC): A vector used for cloning large DNA fragments in yeast. YACs have been used to study the effects of aging genes and gene interactions on lifespan in yeast.

Zebrafish (Danio rerio): A model organism used in aging research due to its high fecundity, short lifespan, and genetic similarity to humans. Zebrafish have been used to study the effects of aging genes, drugs, and environmental factors on lifespan and healthspan.