



Significance of Circadian Rhythm and Immunoglobulin in Autophagy of Hepatocytes.

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Abstract

Autophagy is found in all types of eukaryotic cells. It involves a constitutive process and maintains cellular homeostasis. In a different type of cells through encapsulation of damaged proteins or organelles into double membrane vesicles. It serves as an active recycling system, making new building blocks and providing energy for cellular renovation and homeostasis. There are findings of autophagy in physiobiochemical and pathological processes. Hepatocyte autophagy is not only essential for homeostatic functions but also implicated in some diseases such as viral hepatitis, alcoholic hepatitis, and hepatic hepatitis. Here, it is summarized the physiobiochemical molecular mechanism of autophagy and its role in different liver diseases.

Keywords: Autophagy, Liver Diseases, Bio-physiology, Apoptosis, Circadian Rhythm, Homeostasis.

Introduction

Consumption of the body's own tissue as a metabolic process, occasional starvation, and certain diseases. The process of starvation-induced autophagy was recently the focus of extensive research. Destruction of damaged or redundant cellular components occurring in vacuoles within the cell. The autophagy is a critical process for normal physiological events,

which allows the lysosomal turnover of cellular energy metabolites, including degradation of intracellular organelles and specific proteins. The dynamic recycling process, autophagy plays a vital role in the increase in renovation and homeostasis of cells. The programmed cell death (PCD) pathway, such as apoptosis and regulated necrosis, also plays a vital role in normal cell renewing and homeostasis of the tissue.

Autophagy is greatly induced during starvation or under other highly stressful conditions, leading to a rapidly increased number of autophagosomes. As a katabolic process, autophagy plays a key role in the maintenance of hepatocellular and tissue homeostasis. In the present study, it is observed that in autophagy of amino acid and lipids are increased when cells are starved. Moreover, reactive oxygen species (ROS) can lead to mutations in mitochondrial DNA (mt DNA) that lacks histones and mitochondria have limited DNA repair capacity compared with the nucleus making mt DNA more vulnerable to oxidative damage. The damaged or mutated mt DNA would be degraded by mitophagy. Therefore, mitophagy is necessary for keeping hepatocellular homeostasis. Beside this mitophagy have physiological functions, such as the regulation of apoptosis, circadian rhythm and immune response.

Materials and Methods

A total number of (two hundred and fifty) 250 positive cases of liver diseases and 300 (three hundred) healthy controls have been taken from the department of gastroenterology, Ayaan hospital & Research Centre (a Teaching Hospital to Ayaan Institute of Medial Sciences) their physiological and biochemical parameters were measured.. There in more increase and significant values are found in the positive liver diseases cases compare to healthy controls. The p value is more significant and found <0.001.

Results

Table: 1. Comparison of immunoglobulin in Autophagy of Hepatocytes with Healthy Controls

Tests	Patients	Controls	P value
IgA (mg/dl)	614	92 – 503	< 0.001
IgG (mg/dl)	2018	680 – 18187	< 0.001
IgM (mg/dl)	456	44 - 375	< 0.001

Table: 2. Comparison of Amino Acid, Lipid and Histone in Autophagy of Hepatocytes with Healthy Controls

Tests	Patients	Controls	P value
Amino Acid (mmol/L)	25	7.6 – 15.0	< 0.001
LIPID Triglycerides(mg/dl)	266	100 – 200	< 0.001
Histone(units)	2.5	0.2 – 1.5	< 0.001

Cardiac Rhythm in Autophagy

Autophagy is activated rhythmically in a clock dependent manner; autophagy can affect circadian rhythm by degrading circadian proteins.

Immune Responses in Autophagy

Autophagy acts as an immune effect that mediates pathogens clearance. The role of autophagy bridges both the innate and adaptive immune system and includes functions in thymic selection, antigen presentation, promotion of lymphocyte homeostasis and survival and regulation of cytokine production.

Conclusion

To maintain cellular homeostasis and normal functions of tissues, cells routine renew their components through same specific processes, such as autophagy. In this review, we summarized various physiological and biochemical functions of autophagy in the liver. Moreover, reactive oxygen species (ROS) can lead to mutations in mitochondria DNA (mt DNA) that lack’s histones and mitochondria have limited DNA repair capacity compared with the nucleus,, marking mt DNA more vulnerable to oxidative damage. The damaged or muted mt DNA would be degraded by mitophagy. Therefore mitophagy is necessary for keeping hepatocellular homeostasis.

References

1. Amir M, Zhao E, Fontana L, Rosenberg H, Tanaka K, Gao G et al (2013) Inhibition of hepatocyte autophagy increases tumor necrosis factor-dependent liver injury by promoting caspase-8 activation. *Cell Death Differ* 20(7):878-887.
2. Atsama Amougou M, Marchio A, Bivigou-Mboumba B, Noah Noah D, Banai R, Atangana PJA et al (2019) Enrichment in selected genotypes, basal cre and precore mutations of hepatitis B virus in patients with hepatocellular carcinoma in Cameroon. *J Viral Hepat* 26(9):1086-1093.
3. Bronte V, Zanovello P (2005) Regulation of immune responses by L-arginine metabolism. *Nat Rev Immunol* 5 (8):641 – 654.
4. Carchman EH, Rao J, Loughran PA, Rosengart MR, Zuckerbraun BS (2011) Heme oxygenase-1- mediated atophagy protects against hepatocyte cell death and hepatic injury from infection/sepsis in mice. *Hepatology* 53(6):2053-2062.
5. Carotti S, Aquilano K, Zalfa F, Ruggiero S, Valentini F, Zingariello M et al (2020) Lipophagy Impairment Is Associated With Disease Progression in NAFLD. *Front Physiol* 11:850.
6. Chen W, Zhang Z, Yao Z, Wang L, Zhang F, Shao J et al (2018) Activation of autophagy is required for Oroxylin A to alleviate carbon tetrachloride-induced liver fibrosis and hepatic stellate cell activation. *Int Immu*
7. Chen X, Hu Y, Zhang W, Chen K, Hu J, Li X et al(2019) Cisplatin induces autophagy to enhance hepatitis B virus replication via activation of ROS/JNK and inhibition of the Akt/Mtor pathway. *Free Radic Biol Med* 131;225-236.
8. Chen L, Ming X, Li W, Bi M, Yan B, Wang X et al (2020) The micro RNA -155 mediates hepatitis B virus replication by reinforcing SOCS1 signalling-induced autophagy. *Cell Biochem Funct* 38(4):436-442.
9. Chu H, Wu C, Zhao Q, Sun R, Yang K, Zhao B et al (2021) Quantitative proteomics identified FOLR1 to drive sorafenib resistance via activating autophagy in hepatocellular carcinoma cells. *Carcinogenesis* 42(5):753-761.
10. Deretic V, Saitoh T, Akira S (2013) Autophagy in infection, inflammation and immunity. *Nat Rev Immunol* 13(10): 722-737.

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