Unraveling Gene Expression Profiles of Cardiac Genes That Participate in Embryonic Development of Congenital Heart Defects Using Chick Embryo
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ABSTRACT
Hypoplastic left heart syndrome (HLHS) is a rare but serious subtype of congenital heart defects (CHDs) at which the hemodynamics are disturbed. In this project, HLHS was introduced surgically by left atrial ligation (LAL) to embryonic chicks and the subsequent effects of it were studied. Different tests were done post-LAL to study cardiac morphology, function, and gene expression of cardia markers.

INTRODUCTION
• Congenital heart defects (CHDs) are heart disorders that may arise when cardogenesis is disturbed. CHDs affects 1 – 2 % of newborns and considered as the primary cause of death in children under the age of one year.
• Hypoplastic left heart syndrome (HLHS) is a severe subtype of CHDs where the left ventricle volume is remarkably reduced. Thus, the heart will not be able to support the systemic circulation.
• The etiology of most CHDs cases believed to be because of disturbed hemodynamics.
• LAL is a surgical intervention that induce HLHS in vivo.
• Chicken embryos are commonly used animal models as it resembles the configuration of the four chambers and the four valves of human.

METHODOLOGY
Chick embryo culture
Fertilized eggs were incubated under 37.5°C, 60% humidity, and continuous rocking, the eggs were opened at ED3.

Introducing HLHS via Left Atrial Ligation (LAL)
Figure 2: a heart with hypoplastic left heart syndrome (HLHS)

Heart function assessment via echocardiography

Effect of LAL on cardiac markers gene expiration
LAL group has alterations in the expression level of all cardiac markers as compared to normal chick embryo hearts. LAL has significantly decreased the expression level of VEGF-a, TGF-b, BMP2, NKX2.5, and KLF2. No significant effect was shown of ACTA2.

CONCLUSION
• Disturbing hemodynamics can lead to drastic malformations in the embryonic heart morphology.
• Disturbed hemodynamics negatively affect cardiac parameters and alter the heart ability to function.
• Changing hemodynamics leads to significant decrease in cardiac development markers expression level
• These findings put the starting to understand HLHS as a disease and think of candidate therapeutic techniques.

REFERENCES

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