

The Impact of Prenatal Chronic Auditory Stimulation to the Development of Chicken Embryos' Hippocampus: What Have Been Done and the Established Protocol

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Abstract	<p>Background: Auditory stimulation can differently modulate the development of auditory system and hippocampus. Using chicken embryos make it possible for researchers to focus on examining the direct impact of chronic auditoric stress to the development of fetal brain, especially to hippocampus without confounding factors from mother and placenta. We focus to review studies that examined the influence of prenatal chronic auditory stimulation exposure (both as environmental enrichment and as stressor) to the development of chicken embryos' hippocampus. We wanted to gather information on what have been done and the what would be the established auditory stimulation protocol. Methods: We searched all in vivo studies in chicken that used prenatal chronic auditory stimulation to observed the changes in the developing hippocampus. The comparison was made in terms of characteristics of the studies, auditory stimulation regimen, parameters studied, results, conclusion and suggestion for further research. Results: Eight studies fulfilled the selection criteria and were included in the analysis. Discussion: Researchers have been exploring the influence of auditory stimulation in form of music, species-specific sound and noise to the developing chicken embryos' brainstem auditory nuclei, auditory imprinting area and hippocampus. They have used moderate intensity (65 dB) and high intensity (110 dB). The hippocampal parameters observed were morphology, molecular/biochemistry and behavioral/cognitive changes. Conclusion: Chicken embryos are representative for studying the impact of prenatal chronic auditory stimulation to the developing brain. Studies have convincingly shown the benefits of species-specific sound and music exposure and the negative effects of noise to the developing hippocampus. However, further research are still needed to address some issues. In doing so, researchers may replicate the established auditory stimulation protocol that have been consistently used in the studies reviewed.</p>
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