

Amniotic membrane localization of polycyclic aromatic hydrocarbons and aryl hydrocarbon receptor in preterm and term births in relation to maternal plasma levels.

Poster

Environmental pollutants and pregnancy

Antonia Parada¹, Macarena Aguilera Olguín^{2, 3}, Claudio Cordova⁴, Juan Varas Muñoz⁴, Sebastian San Martín⁴, Ady Giordano⁵, Ivo Carrasco Wong¹, Anyelo Durán¹, Carolina Muñoz-Zamorano⁶, Jaime Gutierrez¹, Sebastian Illanes^{7, 8, 9}, Delia Indira Chiarello¹.

(1) School of Medical Technology, Faculty of Sciences, Universidad San Sebastián, Santiago, Chile.

(2) CEBICEM, Centro de Biología Celular y Biomedicina, Universidad San Sebastián, Facultad de Ciencias, Avenida Valle Norte 725, Santiago, Chile.

(3) Doctorado Biología Celular y Biomedicina, Facultad de Ciencias, Universidad San Sebastián, Santiago, Chile.

(4) Center of Interdisciplinary Biomedical and Engineering Research for Health (MEDING), School of Medicine, Faculty of Medicine, Universidad de Valparaíso, Viña del Mar 2540064, Chile.

(5) Inorganic Chemistry Department, Faculty of Chemistry and of Pharmacy, Pontificia Universidad Católica de Chile, Santiago, Chile.

(6) PhD Program in Chronic Disease, Faculty of Medicine and Science, Universidad San Sebastián, Santiago, Chile.

(7) Department of Obstetrics and Gynecology, Faculty of Medicine, Universidad de los Andes, Santiago, Chile.

(8) IMPACT, Center of Interventional Medicine for Precision and Advanced Cellular Therapy, Santiago, Chile.

(9) Reproductive Biology Program, Center for Biomedical Research and Innovation (CiiB), Universidad de los Andes, Santiago, Chile.

aparadam1@correo.uss.cl

Aim: Research highlights the role of polycyclic aromatic hydrocarbons (PAHs) in preterm birth through oxidative stress and inflammation, mediated by the aryl hydrocarbon receptor (AhR). Although the nuclear localization and expression of AhR in placental trophoblasts are documented, its presence and role in amniotic

membranes (AMs) remain poorly understood. AMs play a role in signaling cascade leading to parturition. Our study aims to elucidate the localization and expression patterns of PAHs and AhR in amniotic membranes for normal and preterm births, correlating these with PAHs levels, thereby contributing to understanding of environmental effects on pregnancy outcomes.

Methods: Following approval from the scientific ethics committee, 10 pregnant women were recruited for the study at the Universidad de los Andes Clinic in Santiago, Chile. The concentration of 16 priority PAHs was determined using a gas chromatography-mass spectrometry system (Perkin Elmer, model Clarus 680). Formalin-fixed amniotic membrane biopsies underwent routine processing, sectioning, and immunohistochemical staining for AhR and PAHs, analyzed with a confocal microscope (Leica Microsystems, Wetzlar, Germany) and ImageJ software. Statistical analyses were conducted using Graphpad Prism 9. The study was approved by the Universidad de los Andes Ethics Committee (Code CEC2025146 and CEC2022058).

Results: In this study, PAHs labeling was mainly observed in cytoplasm of chorion cells of AMs from term deliveries, whereas in preterm deliveries, PAHs labeling was nuclear and was observed in chorion, amnion, and decidua. Remarkably, AhR expression was exclusive to the amniotic membranes of preterm deliveries, and colocalization with PAHs was also observed. This correlates with significantly ($p < 0.05$) higher maternal plasma levels of benzo(a)pyrene and benzo(b)fluoranthene.

Conclusions: These observations indicate a possible link between AhR activation by PAHs in amniotic membranes and the mechanism of preterm labor. It underscores the necessity for more research on the impact of elevated PAH levels on AhR function and preterm labor risks.

Palabras Clave

(1) Preterm birth, (2) aryl receptor, (3) polycyclic aromatic hydrocarbons.

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