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GRADIENT

Protecting Against Adverse Reproductive and Gestational Outcomes from Workplace Exposures: Screening Assessments for Developmental and Reproductive Toxicity

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According to the Bureau of Labor Statistics, women currently account for 52% of all workers employed in professional, management, and related occupations. As more households depend on women for financial support compared to previous generations, it is imperative to understand how reproductive and gestational outcomes are potentially impacted by workplace exposures to chemical and other agents. Over the past 20 years, Gradient has conducted developmental and reproductive toxicity (DART) screening assessments on over 3,000 chemicals of interest (COIs), including more than 1,800 individual chemicals and 1,600 chemical products, in order to ensure the safety of workers who are pregnant or planning to become pregnant. These DART assessments have been specific to occupational exposures that could occur *via* inhalation, and have aided clinicians in determining if maternal workplace exposures need to be eliminated or restricted in order to control the risk of adverse reproductive and developmental outcomes. The assessments consist of three steps: exposure assessment, DART hazard identification, and risk characterization. Results of the assessments were provided to the clinical staff within five business days of notification by the employee of their pregnancy status. Exposure assessments identified COIs in the workplace and quantified, if known, exposure concentration, duration, and frequency. For DART hazard identification, we conducted literature searches to identify toxicity data specific to the individual chemical COIs primarily *via* the data aggregator ToxPlanet – a federated search engine that extracts content from 500+ websites related to health effects, including those maintained by US EPA and the European Chemicals Agency – as well as occupational exposure limits (OELs) and information from COI-specific material safety data sheets (MSDSs). DART hazard identification of COI products was generally based on the assessment of its individual chemical constituents. Based on the information available, we categorized the COIs as either "known," "suspect," or "not suspect" DART agents. In instances where sufficient data were lacking to assess DART potential, the COI was listed as having "insufficient data." Finally, risk characterization involves the calculation of a DART reference dose (DRD) and worker dose (WD) for those COIs with "known" or "suspect" designations. The DRD was derived from animal or human DART data using the appropriate uncertainty factors to account for inter- and intra-species variation, or OELs that were specifically indicated to be protective against DART effects. A DART-specific hazard quotient ([HQ]; HQ = WD/DRD) was then established and served as the final assessment metric, which was provided to both the occupational clinician and the employee. To date, we have classified approximately 15% of individual chemical COIs and 20% of product COIs as "known" or "suspect" DART agents. Approximately 5% of the COIs we have classified as "known" or "suspect" DART agents do not have a DRD based on an OEL that specifically addresses the potential for DART effects. Our DART screenings have been a useful tool for informing both employers and employees in a timely manner of potential DART concerns, so that appropriate interventions can be considered, and continue to highlight the importance of considering DART effects regardless of whether a COI is at concentrations below an existing OEL.