Review of: "Critical Review on Carbon Nanomaterial Based Electrochemical Sensing of Dopamine the Vital Neurotransmitter"

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This paper offers a thorough examination of the present status and recent developments in electrochemical sensing techniques utilizing carbon nanomaterials for dopamine detection. Dopamine, an important neurotransmitter, is integral to several physiological and psychological functions, and its precise measurement is critical for detecting nervous system problems. The review emphasizes the growing necessity for dependable dopamine sensors, especially as diagnostics evolve towards more accessible, real-time, and individualized healthcare. This paper provides a thorough assessment of the current state and recent breakthroughs in electrochemical sensing approaches for dopamine detection using carbon nanomaterials. Dopamine, a key neurotransmitter, is required for various physiological and psychological activities, and precise measurement is essential for recognizing nervous system abnormalities. The review underlines the growing need for dependable dopamine sensors, particularly as diagnostics move toward more accessible, real-time, and personalized healthcare solutions. The authors thoroughly investigate the advantages of carbon nanomaterials such as graphene, carbon nanotubes, and their derivatives, which have unique properties that boost electrode performance. These substances improve electron transport, sensitivity, and discrimination against interfering molecules such as ascorbic acid and uric acid. The study addresses recent advancements in non-enzymatic sensors, which offer advantages over enzyme-based sensors in terms of stability, cost-effectiveness, and production process efficiency. The review's strength is that it critically evaluates numerous electrochemical methods, including cyclic voltammetry, differential pulse voltammetry, and fast-scan cyclic voltammetry. These techniques offer a wide range of methodologies for dopamine detection, and the authors expertly assess their efficacy in a variety of circumstances, from laboratory settings to potential clinical applications. Finally, the authors emphasize the difficulty in commercializing and implementing these sensors. To meet the growing need for portable dopamine monitoring, future research should focus on the development of more cost-effective, durable, and small sensor technologies, such as wearable and implanted sensors. The paper also advocates for enhanced selectivity.