







Abstract

Electrochemical Determination of Serotonin Exocytosis in Human Platelets with BDD-on-Quartz Multielectrode Array Biosensors [†]

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1. Introduction

About 90% of blood serotonin is stored in secretory granules of platelets and is released by exocytosis. Serotonin is a biogenic amine and the mechanisms for its accumulation in secretory granules and exocytosis are similar to some neurotransmitters. As it is an electroactive molecule, its release can be detected via amperometry. Thus, platelets are an easily accessible human cell model to study exocytosis.

2. Methods

We have optimized boron-doped diamond (BDD) on multielectrode array (MEA) systems that allow the detection of amperometric recordings from the quantum release of serotonin from human platelets. Exocytotic events are detected as transient oxidation currents. Our initial experiments were carried out with microelectrode devices on silicone substrate (BDD-on-silicon MEAs) [1]. We introduce here a new transparent material which allows microscopy observations: a BDD-on-quartz MEA.

3. Results

BDD-on-quartz MEA devices exhibit excellent electrochemical properties similar to BDD-on-silicon MEAs [1]. We present the amperometric data obtained from unloaded platelets and after loading the platelets with 10 μ M serotonin for 2 h, as well as a comparative study of the quantum and kinetic characteristics of amperometric spikes obtained with both MEA chips.

4. Conclusions

We demonstrate the effectiveness of BDD-on-quartz MEAs as biosensors for the amperometric measurement of serotonin exocytosis from human platelets.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/proceedings2024104018/s1>. Conference presentation.

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Institutional Review Board Statement: This study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethical Committee at the University of La Laguna (CEIBA2017-0244) and by the Ethical Committee at the Canary Islands Health Services (CHUC_2020_80) for the use of human samples.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available in the references.

Conflicts of Interest: The authors declare no conflict of interest.

Reference

1. González Brito, R.; Montenegro, P.; Méndez, A.; Carabelli, V.; Tomagra, G.; Shabgahi, R.E.; Pasquarelli, A.; Borges, R. Multielectrode Arrays as a Means to Study Exocytosis in Human Platelets. *Biosensors* **2023**, *13*, 86. [[CrossRef](#)] [[PubMed](#)]

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