

Electrochemical detection of anxiolytic and antituberculosis drugs using nanomaterial: A new era in clinical and bio analytical chemistry.

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Electrochemical sensors are miniature analytical devices which are broadly employed in many fields such as Clinical, Bio analytical, Pharmaceutical, environment monitoring, industrial, military and medical applications to monitor the drugs levels and toxic levels. The basic components of an electrochemical sensor are a reference electrode, working electrode and a counter electrode. These electrodes are covered in the sensor box and in contact with a liquid electrolyte in a small reactor vessel. The basic principle is flow of electrons from the electrode through the circuit and will be measured through the amplifier. Thus the electrochemical sensors comprise the largest group of chemical sensors. These sensors have more advantage over the others type of sensors and divided in to two types of sensors like chemical sensors and biosensors [1-3].

The most of the chemical and biosensors methods are based on the principle of changing the applied potentials between the electrode-solution interface and the resulting measuring the produced current. In this electrochemical field the most widely used voltammetric methods are cyclic (CV), linear sweep (LSV), normal pulse (NPV), differential pulse (DPV), square wave (SWV), and stripping voltammetry. Moreover these electrochemical methods are rapid, selective, sensitive and user-friendly techniques, hence electrochemical sensors are widely used in the most of the fields such as Clinical, Pharmaceutical, Research, medical and environmental pollution monitoring.

In recent years carbon nanomaterials were attracted widely in the electrochemical fields due to their excellent properties like wide surface area, high thermal conductivity, and High response, low cost and sensitive. These carbon based nanomaterials are available in different forms and Graphene and Carbon nanotubes are the attracted widely in the sensor fields due to their excellent conductivity as well as afore mentioned properties. The carbon nanomaterials were widely employed in the pharmaceutical and clinical, medical fields to monitor the drug toxic levels. This nanomaterial's used as modifiers for electrodes and these modified electrodes are playing a key role in the sensor fields compared to bare electrodes.

Buspirone hydrochloride is an anxiolytic medication drug and used for the treatment of anxiety disorder and it is a highly variable drug, exhibits a pre systemic metabolism in the blood circulatory system. Hence, the drug levels in the human body fluids will be important to monitor for therapeutic treatments. The Buspirone Hydrochloride drug was estimated by using the electrochemical techniques such as Cyclic Voltammetry, Amperometry and differential pulse voltammetry, by using

the Multiwalled carbon nanotubes modified glassy carbon electrode. The obtained peak response for modified electrode was more when compared to unmodified electrode (bare electrode). The practicality of the electrode performance was performed in blood serum as well for commercially available tablets. Similarly the glassy carbon electrode was modified with Graphene oxide and poly-L-arginine, determined by using the same cyclic voltammetry and differential pulse voltammetry techniques. Practicality was demonstrated in blood serum and commercially available pharmaceutical tablets and proved the selectivity. Hence these simple modified electrodes were produced the good results and were good agreement with the commercially available tablets label claim and these methods could be used in the clinical and bio analytical laboratories in future [4,5].

As stated above Buspirone Hydrochloride, similarly Isoniazid and Pyrazinamide were broadly prescribed drugs for the tuberculosis treatment, caused by *Mycobacterium tuberculosis*. The regular consumption of Isoniazid causes formation of hydrazine, which induces hepatotoxicity and increases death rate. Similarly the pyrazinamide is also known as pyrazinecarboxamide and prescribed for the treatment of Tuberculosis and causes more side effects such as hepatotoxicity and exanthema. Isoniazid was electrochemically detected by using electrochemically reduced graphene oxide modified glassy carbon electrode. Similarly the pyrazinamide was determined by using the poly methionine and reduced graphene oxide modified electrode. The both the detections were performed by using the carbon nanomaterials with simple electrochemical methods, and the obtained results were good and comparable with other electrochemical methods published recently [5,6].

Based on the above statements, electrochemically modified electrodes were widely used in the clinical, bio analytical, pharmaceutical and medical fields to monitor the drug toxic levels for further treatments and these nanomaterials modified electrodes will play a key role in near future.

References

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