

# **CHAPTER 1**

## **INTRODUCTION**

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## 1.1. Introduction

Cholesterol is an important biological molecule for manufacture of vitamins, bile acids and steroid hormones. It is found in cell membranes and transported in the blood plasma. High level of cholesterol in blood serum ( $> 240$  mg/dL) may cause hypertension, atherosclerosis, nephrosis, myxedema, jaundice and myocardial infarction. Low levels of cholesterol ( $< 200$  mg/dL) may result in hyperthyroidism, anaemia and malabsorption.

Similarly, acetylcholine is a prominent neurotransmitter found in peripheral and central nervous systems. In the central nervous system, acetylcholine is involved in attention, learning, memory, consciousness, sleep and control of voluntary movements. Variation of acetylcholine in nervous systems causes major neurological disorders such as Alzheimer, schizophrenia, Parkinson and Huntington's diseases.

Thus, there is always an increasing demand for the development of new methodologies for simple, rapid, and reliable quantification of cholesterol and acetylcholine in medical and clinical applications. Traditional medical techniques for measurement of these biomolecules are mainly based on laboratory tests which are time consuming, require the involvement of highly skilled and experience staff and a large amount of laboratory instruments and devices. As far as point-of-care systems or in vivo measurements are concerned, fastest; smallest, highly sensitive and low power consuming devices are required. Development of portable, low-cost, and user friendly analytical platform is, therefore, highly desirable for reliable rapid testing of these biomolecules. To meet these requirements, research in the field of enzyme modified field effect transistors (ENFETs), a potentiometric type biosensor has picked up pace over the recent years. ENFET is a bioelectronic device which incorporates an enzyme system in conjunction with an ion sensitive field effect transistor (ISFET). Because of the use of silicon based field effect transistor (FET) as the transducing device, ENFETs have lot of advantages such as: