Abattoir-sourced Isolated Ileum from Gallus gallus domesticus as an Experimental Tool

Gaurav Kaithwas,1 Satya D. Sharma2 and Dipak K. Majumdar3

1Department of Pharmaceutical Sciences, Faculty of Health and Medical Sciences, Allahabad Agricultural Institute-Deemed University, Allahabad, India; 2Department of Medical Technology, Faculty of Health and Medical Sciences, Allahabad Agricultural Institute-Deemed University, Allahabad, India; 3Delhi Institute of Pharmaceutical Sciences and Research, Pushp Vihar, New Delhi, India

Summary — A study was undertaken to determine the longevity of active muscarinic receptors on abattoir-sourced isolated ileum preparations from Gallus gallus domesticus, with a view to using the tissue as an experimental tool for functional response assays in laboratory experiments. A concentration–response curve for acetylcholine (1–256 μM) was plotted, in the presence and absence of 1, 3 and 6 nM atropine. In a second experiment, unknown concentrations of acetylcholine samples were determined by using an interpolation method. In this experiment, four sample concentrations were used and the calculated values were found to be almost equal to the actual values. Finally, an experiment was carried out to elucidate the effects of post-sacrifice time on the contractile response of the tissue. The results showed that the tissue maintained considerable contractile response at the 6-hour post-sacrifice time-point. Competitive antagonistic activity was observed between acetylcholine and atropine on the chicken ileum, and the pA2 value was calculated to be 9.21 by using an Arunlakshana–Schild plot. The results suggest that isolated ileum preparations of Gallus gallus domesticus, obtained from a meat abattoir, can be used as a basic experimental tool for bioassays in routine laboratory experiments. However, its potential as a research tool still needs to be confirmed.

Key words: abattoir, acetylcholine, atropine, Gallus gallus domesticus, muscarinic receptors.

Address for correspondence: Gaurav Kaithwas, Department of Pharmaceutical Sciences, Faculty of Health and Medical Sciences, Allahabad Agricultural Institute-Deemed University, Allahabad-211007, India.
E-mail: gauravpharm@gmail.com

Introduction

Isolated tissue preparations are one of the most commonly employed tools in the in vitro study of receptor specificity and sensitivity. Isolated frog heart, frog rectus abdominis muscle, and isolated guinea-pig ileum are some of the isolated muscle preparations used for these purposes (1). Enteric smooth muscle is extensively used for studying the effects of various parasympathetic drugs on muscarinic receptors. The muscarinic M3 cholinoreceptor on enteric smooth muscle preparations exhibits high affinity for the selective antagonist, hexahydro-sila-diphenidol (HHSiD; 2). Conversely, the M3 receptor exhibits low affinity for both the muscarinic M2 receptor-selective antagonist, AF-DX 116 (3), and the muscarinic M1 receptor-selective antagonist, pirenzepine (4). Similar observations have been reported with rat ileum (5) and human colon (6). However, the use of enteric smooth muscle or rat ileum in experiments requires considerable skill, and is relatively expensive for routine laboratory practical experiments. Moreover, the availability of ethically-sourced human tissue is always problematic, and the use of rat ileum in such experiments would necessitate the sacrifice of a large number of laboratory animals. All of the above factors have driven us to search for and standardize an alternative tissue for experimentation — one which is both ethically and financially advantageous. Sacrificing an animal merely for the acquisition of skills is unethical, and, throughout the world, committees for the purposes of control and supervision of experiments on animals have strictly limited the use of animals and have emphasised the importance of using alternative methods when they are available. Computer-simulated software programs (e.g. CAL software, X-cology [R.C. Patel College of Pharmacy, Shirpur, India]) have provided support to a certain extent, but students are still facing practical impediments.

Everett has previously shown that isolated, innervated intestine, derived from very young