**Clinical Utility**
Quaternary ammonium ions are considered to be the major allergenic epitopes in IgE-mediated anaphylaxis to neuromuscular blocking agents (NMBA), also called muscle relaxants. ImmunoCAP® Allergen c260 Morphine, is a marker for sensitization to NMBA and is intended for use as a diagnostic tool in NMBA-induced anaphylaxis. A recent clinical study has shown that IgE testing using Morphine has somewhat higher sensitivity than Suxamethonium (1,2). ImmunoCAP Allergen c260 Morphine is an alternative quaternary ammonium ion marker to Suxamethonium.

**Allergen Description**
NMBA are mainly administered intravenously but may also be given intramuscularly. The structure of morphine is similar to the quaternary ammonium ion found in NMBA, which contains a hydrophobic ring skeleton and a hydrophilic tertiary amine. It has been shown by Baldo and Fischer that morphine can be used to detect IgE antibodies against various NMBA, enabling it to be used as a marker allergen for NMBA sensitization (1). Cross-inhibition results indicate that some patients have IgE not only against the ammonium ion, but also to the hydrophobic part of the morphine molecule (3).

**Cross-Reactivity**
Cross-reactivity between different NMBA is common since they all share the quaternary ammonium ion allergenic epitope (4). However, the extent of cross-reactivity varies considerably between patients and it is unusual for an individual to be allergic to all NMBA (5). The explanation for this limitation in cross-reactivity is that IgE antibody paratopes may not only recognize the quaternary ammonium ion; sometimes the molecular environment around the ammonium ion is also part of the allergenic epitope (3). The possibility of multiple allergies should therefore be considered.

**Clinical Experience**
It has been estimated that 60% of all hypersensitivity reactions during anesthesia are IgE-mediated and that NMBA are responsible for 60% of those reactions (6). The reported prevalence of anaphylaxis was 1 in 6,500 NMBA exposed patients (6). Anaphylactic reactions to NMBA tend to be severe and often life-threatening. Approximately 80% of reactions were of grade III and IV (on a scale of I to IV) in a French study (4). Diagnosis of anaphylactic reactions during anesthesia can be difficult since, in most cases, a large number of drugs can have been administered to the patient. Follow-up investigation is therefore necessary in order to save the patient from a potentially life-threatening re-exposure to the offending drug (7). In a previous study ImmunoCAP c260 Morphine, was evaluated in a study with 25 rocuronium allergic patients (2). In this study, a sensitivity of 88% and a specificity of 100% were recorded.
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For further reading, see: www.immunocapinvitrosight.com