

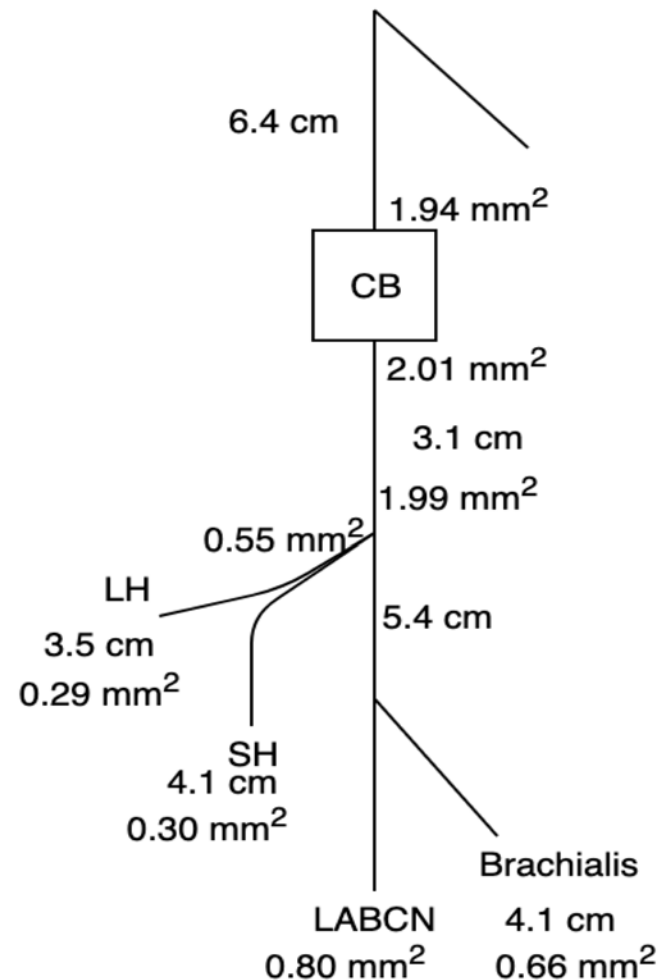
## Introduction

The musculocutaneous nerve (MCN) is the recipient of nerve transfers for restoration of elbow flexion in patients with brachial plexus injury. Depending on feasibility and surgeon preference, either the MCN proper or the more distal motor branches will undergo neurotization with the nerve donor. The purpose of this study is to better delineate the relative branching pattern of the MCN and compare dimensions of MCN branches to the MCN proper.

## Methods

In this cadaveric study, the MCNs course was tracked and measured relative to distance from the acromion, normalized by humeral and arm length. Secondary outcomes included distance between the motor branch to the biceps (MBB) and motor branch to the brachialis (MBBr), lengths and cross sections of the MCN proper and individual nerve branches along the MCNs course in the upper extremity, and relative position of motor branches to the biceps. Nerve cross sections were estimated using a caliper with a precision of  $\pm 0.03\text{mm}$ . Cross sections of individual MCN branches were normalized by the cross-sectional area of the MCN proper.

**Figure 1.** Distances and cross-sectional areas of the segments and branches of the musculocutaneous nerve



## Results

The right arms of seventeen cadavers (11 males; 6 females) were used. The MBB was  $12.6\text{ cm}$  (SD:  $2.0\text{ cm}$ ) from the acromion. This distance represented 40% the length of the humerus, and 17% of the length of the upper extremity. The MBBr was on average  $18.6\text{ cm}$  (SD:  $1.2$ ) from the acromion. This distance represented 59% the length of the humerus, and 26% the length of the arm. The distance between the motor branch to the biceps and the motor branch to the brachialis was  $6\text{ cm}$  (SD:  $1.2$ ), which is 17.7% of the length of the humerus. In three cases, there were discrete branches to the common belly of the biceps. When divided by the area of the MCN proper, the MBB had 25% of this cross-sectional area, MBBr had 33% of this cross-sectional area. There were discrete fascicles to the biceps other than the MBB in 5 cases (30%).

## Conclusions

In this study we describe the anatomy of the MCN in relation to the length of the upper extremity. Anatomical consistency between normalized distances will be useful in planning MCN neurotization and intraoperative identification of motor branches of the MCN. The greater variability in cross sectional ratios of MCN branches along with the high incidence of fascicles to the biceps branching outside of the MBB are both very helpful in determining the optimal surgical plan.