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**INTRODUCTION & OBJECTIVES:** The clear visualization of prostate neuro-vascular bundle (NVB) is considered an actual problem to decrease the rate of erectile dysfunction (ED) after radical prostatectomy (RP) and radical cystectomy (RC). One of the modern methods of NVB visualization is the cross-polarized optical coherence tomography (CP OCT). The aim of our study was to assess the possibilities of CP OCT for imaging and differentiating of NVB.

**MATERIAL & METHODS:** Visualization of NVB during RP (N=23) and RC (N=7) was done by CP OCT (device was created IN IAP RAS) which demonstrated simultaneously two conjugate images: in co-polarization (the lower image) and in cross-polarization (the upper image) with strictly compatible spatial location of image elements. In all cases we used open RP and PC. All operations were done by one surgeon. In vivo CP OCT scanning of tissues in the NVB projection was performed before and after the complex (prostate or prostate+bladder) was removed. Then ex vivo control CP OCT imaging of specimen tissues in the NVB projection and synchronous specimen intake in the same points were performed. The CP OCT and histological data in all patients (N=30) with presence or absence of nerve fibers in the specimens on left and right side (N=60) were compared. Comparing was performed simultaneously by two OCT-specialists. The presence of nerve fibers in the specimens and CP OCT image in the same point in the case of non-nerve-sparing operation we supposed as a true-positive case.

**RESULTS:** In the study were 6 bilateral nerve-sparing operations, 10 one side nerve-sparing operations and in 14 cases NVB was totally removed. Various tissue structures forming NVB: nerve and adipose tissue, arterial and venous vessels were CP OCT imaged. Different tissues had specific characteristics in CP OCT images. Vessels (artery and vein) corresponded to large round inclusions in the images, visible in both polarizations, with well-defined walls with a hyper-intensive signal and a hypo-intensive zone in the center (lumen). Adipose tissue was represented in CP OCT images in both polarizations by a specific cellular structure. The sections of the nerve fiber in the CP OCT images corresponded to intensive rounded homogeneous inclusions in the upper layers of the images. The principal signs of the nerve trunk were positioning of the pattern in the upper layers of the images, intensive homogeneous inclusions in standard polarization, a strong signal in cross-polarization due to the depolarization properties. The study results are shown in the table below:

| Statistical parameters    | CP OCT ex vivo test, n=60 | (95%CI)      |
|---------------------------|---------------------------|--------------|
| Sensitivity               | 0,941                     | 0.809- 0.984 |
| Specificity               | 0,885                     | 0.750- 0.977 |
| Diagnostic accuracy       | 0,917                     | 0.819- 0.964 |
| Positive predictive value | 0,914                     | 0.776- 0.970 |
| Negative predictive value | 0,92                      | 0.750- 0.978 |

**CONCLUSIONS:** The CP OCT-scanning allows to visualize and differentiate the elements of the NVB.