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**Background:** To develop and evaluate an alternative technique to standard CT/US guided thermal ablations of liver metastases, aiming at avoiding hepatic resections in the subset of patients with CT/US invisible lesions, subcentimeter lesions, and/or lesions at challenging locations.

**Study:** MRI-guided laser ablations were performed in 22 patients (13M, 9F, age = 45–84y) with 43 liver metastases (20 colon, 2 gastric, 3 melanoma, 17 pancreatic neuroendocrine, 1 pancreatic adenocarcinoma). Procedures were performed within an interventional MRI suite equipped with 1.5T wide bore scanner. Interventions were performed under general anesthesia within the scanner bore while viewing real-time image updates on an in-room monitor. A laser fiber with 15 mm diffusing tip encased in 5.5 F cooling catheter (Visualase, TX) was inserted in the target lesion under interactive visualization on a tri-orthogonal plane FLASH sequence. A test dose of diode laser energy (980 nm, 30 sec, 4.5 W) was applied to verify the location of ablation nidus on real-time temperature and cumulative damage estimate mapping. Subsequently, ablative energy dose was delivered utilizing an average of 27 watts with treatment endpoint based on on-line thermal monitoring of growing ablation. Fiber repositioning for additional ablation was conducted as needed. Final ablation was evaluated on TSE T2 and enhanced TSE T1 in 3 planes.

**Results:** Accurate targeting was achieved in all tumors regardless of size and location. This was facilitated by reliable breathholds under general anesthesia. Target tumor sizes were 0.9–4.0 cm. Locations included all liver segments but the caudate lobe. Complete ablation was achieved in 1 session for each lesion. Applied laser energy was 1080–36720J per lesion. Post procedure pain ratings were 0–7. No complications were encountered on follow-up durations of up to 51.6 weeks. Laser ablation zones demonstrated central iso-to-hypointense signal surrounded by hyperintense/enhancing rim on T2&T1, respectively. Follow-up scans showed involution of ablation zones. One patient with 2 ablated gastric sarcoma metastases underwent subsequent resection of ablated zones during partial hepatectomy performed for additional lesions. Pathology demonstrated complete necrosis of resected ablations.

**Conclusion:** Percutaneous focal laser ablation of subtle liver metastases under real-time MR-guided fiber placement and temperature mapping is feasible, well tolerated, and effective on short and intermediate term follow-up. The technique maintains a minimally invasive option for treating liver metastases that cannot otherwise be approached under CT or ultrasound guidance.

## #222

### MRI-GUIDED AND MONITORED FOCAL LASER ABLATION FOR PROSTATE CANCER

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**Background:** Current options for patients with prostate cancer include whole gland treatment, hormonal therapy, or active surveillance. These options represent a dilemma for younger patients with localized low-grade cancer who are offered a choice of either observation or disproportionately aggressive therapy

resulting in significant complications including urinary incontinence and erectile dysfunction. We describe a technique for a minimally-invasive focal treatment using laser ablation to target the cancer area while preserving the rest of the prostate gland.

**Study:** A 51-year-old patient presented with high PSA level (6.73 ng/ml). Transrectal ultrasound guided biopsy (TRUS) showed low-grade (Gleason 3 + 3 = 6) prostate cancer. Multiparametric MRI confirmed the presence of a 1.7 cm left central gland confined cancer. Laser ablation was performed within an interventional MRI suite utilizing a 3T-MRI system (Magnetom-Trio, Siemens, Germany) under conscious sedation. The rectal piece of an MR-compatible prostate biopsy system (DynaTRIM<sup>®</sup>, In-Vivo, USA) was inserted into the rectum. A 1.0-cm-active-tip diode laser fiber (Visualase, TX, USA) was introduced within an internally cooled catheter through a 14-gauge introducing sheath. The catheter tip location was confirmed on TSE-T2WIs. A laser test dose of 5 watts was applied for 20 s. Definitive ablation was then conducted utilizing 12 watts for 191 s. These resulted in the delivery of 2392J of energy to tumor site. Simultaneous temperature maps and cumulative damage maps were obtained, co-registered and overlaid on anatomical imaging to obtain real-time monitoring of extent of ablation. The procedure was concluded when the cumulative damage map was noted to encompass the entire tumor.

**Results:** The patient tolerated the procedure well and was discharged 4 hours after procedure. Complete tumor necrosis was achieved in a single session as shown on intraprocedural Gadolinium-enhanced MRI. A follow-up MRI after 3 weeks showed no residual tumor. The patient has been under follow-up for 6 months without evidence for early or late complications. PSA level dropped to 2.9 ng/ml. Laser ablation zone demonstrated central iso-to-hypointense signal surrounded by hyperintense/enhancing rim on T2&T1, respectively.

**Conclusion:** This report describes a technique for MRI-guided and monitored transrectal focal laser ablation for minimally-invasive targeting of localized low-grade prostate cancer. The technique appeared to be feasible, tolerated and efficacious in this case report. Prospective assessment of safety and efficacy awaits further evaluation on a larger cohort of subjects.

## #223

### CAN HIGH POWER LASER ON SWINE MITRAL VALVE CHORDAE TENDINEAE IMPROVE MITRAL REGURGITATION? INSIGHTS FOR A NEW SURGICAL ERY TECHNIQUE

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**Background:** Rheumatic fever remains a significant worldwide cause of mitral regurgitation, responsible for approximately 90% of early childhood valvular surgery in Brazil. Elongated/flail chordate are frequently responsible for this condition, that must be surgically corrected. Despite recent progress in mitral valve reconstruction techniques, there are no published reports shortening the chordate tendineae applying Surgical Laser. The aim of this study was to analyze and compare the histological

tissue mitral valve chordae and its mechanical resistance with and without High Power Laser (HPL) application. The present work being, therefore, the first attempt to obtain some information.

**Study:** A total of 20 porcine mitral valve chordae from three healthy hearts were measured and divided in 2 groups: Control Group (GI): chordae without HPL. Laser Group (GII): chordae submitted to HPL procedure. Diode CW (TheraLase Surgery-DMC, Brazil) Laser application, through 400 µm fiber thickness, under controlled conditions with following parameters:

? = 980 nm, P = 3 W, T = 15–25s, E = 30–60J was performed. The chordae temperature was controlled in real time by ultra sensible thermography equipment (Flir Systems ThermoCAM SC3000). A testing machine (Emic DL 200 MF, Linha DL) was used to measure the chordae tensile properties and histological analysis was carried out.

**Results:** Histological analysis showed in GI the presence of collagen bundles organized arrangement, while in GII, after the temperature has been reached (raised above) 43°C, collagen bundles were organized differently however with chordae tendineae reduction. We found changes in the resistance of chordae tendineae in GII.

**Conclusion:** It is clear that the temperature were critical in this work in order to alter the chordae tendineae size and avoid the valve insufficient problem although keeping the regular strength of valve's function. More studies are needed to verify this method usefulness, especially in human pathological valves, avoiding each decade artificial replacement or anticoagulant administration continuously.

## #224

### LASER ASSISTED MINIMALLY INVASIVE SURGERY FOR PRIMARY HYPERHIDROSIS

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**Background:** Primary axillary hyperhidrosis is a frequent disease affecting all aspects of the lives of patients suffering this problem. Up to these days, no permanent solution existed but the excision of the axillary skin with its undesirable consequences. Today the use of 924/975 nm diode laser subdermally, via a 1.5 mm diameter flexible fiber, destroys selectively and permanently the axillary sweat glands as confirmed clinically and histologically.

**Study:** We present 19 patients (12 males-7 females, ages 19–41) operated from January to April 2012 (to comply with the minimum 6 months follow up required) with primary axillary hiperhidrosis. All but one were grade 4 in HDSS, the other was grade 3. No exclusion criteria were used and no starch iodine test performed (sweat can be seen with the naked eye). Klein modified solution was used and the laser fiber inserted subdermally delivering the energy as superficially as possible. We use only the 924 nm wavelength at 20 watts (the selective one for melting the adipose tissue) and our end point is to reach 38–39 degrees Celsius in the skin. The total energy delivered is not an end point per se because, lasering is finished when the temperature is reached. Aspiration and curettage with a special cannula ends the procedure.

**Results:** 18 patients reported grade 1 in HDSS after the procedure and 1 patient reported grade 2 in HDSS. Most of the patients referred a slight soreness in the axillas for 2–3 days after the procedure and the sweating disappeared almost immediately. All of them are fully satisfied with results.

**Conclusion:** This procedure offers a safe and permanent solution for more than 90% of patients with P.A.H. (2 m mp4 video available).

## #225

### EVALUATION OF UNIQUE SIDE FIRING 1440 nm FIBERLASER FOR JOWL REDUCTION AND SELECTIVE SMAS TIGHTENING

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**Background:** Recent technological improvements in fiberlaser design have resulted in the development of a unique sidefiring laser which was initially introduced for the treatment of cellulite. The device's novel 1440 nm Nd:YAG laser with a Sidelight 3D™ optical fiber transmits energy bi-directionally under the skin to thermally smooth out fat cells and heat dermal tissue to promote skin thickening and tightening; resulting in tighter and smoother skin and jowl reduction. The benefits possible with a multidirectional laser include the ability to focus the fiber deep to jowl fat superficially for skin tightening and also side wise for selective SMAS tightening. Use of a real time temperature sensor can also permit selective SMAS heating to be monitored as it reaches a predetermined temperature to maximize tissue contraction due to thermal injury and wound remodeling including neocollagenesis and dermal contraction.

**Study:** Patients interested in minimally invasive facial rejuvenation were evaluated for lower face and jaw line signs of aging including loss of defined mandibular contour, the development of jowls and facial and skin laxity. Patients with mild signs of facial aging were selected for sidelase facial rejuvenation which utilized the multidirectional sidelight 3D™ optical fiber to selectively target fat of the jowl, dermis for collagen stimulation and dermal tightening and the SMAS for deep layer myofascial tightening. Procedures were completed under local anesthesia and jowl treatment included aspiration of most patients.

**Results:** Patients were evaluated by side by side photo comparison by the author and graded for improvement based on the improvement of mandibular definition, jowl reduction and facial and skin laxity improvements. All patients undergoing treatment experienced improvements in the study parameters.

**Conclusion:** A new Sidelight 3D™ optical fiber transmits 1440 nm optical energy bi-directionally under the skin to thermally smooth out fat cells and heat dermal tissue to promote skin thickening and tightening; results in tighter and smoother skin and jowl reduction with added definition to the mandibular contour. The 3D options for the first time allows fat dermis and SMAS to be targeted resulting in enhanced improvements for laser facial sculpting and contouring.

## #226

### EVALUATION OF THE 1064 nm Nd:YAG LASER FOR THE TREATMENT OF CERVICOFACIAL ADIPOSTY

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**Background:** To evaluate the safety and efficacy of the 1064 nm Nd:YAG laser for the treatment of neck and jowl adiposity.