Use Before or After Radiotherapy: Allow 2-4 weeks between PDT and subsequent radiotherapy.
Chest Pain: Substernal chest pain can occur.
Airway Obstruction and Respiratory Distress: Administer with caution to patients with tumors in locations where treatment-induced inflammation can obstruct the main airway. Monitor patients closely between the laser light therapy and the mandatory debridement bronchoscopy for any evidence of respiratory distress.
Esophageal Strictures: Esophageal strictures can occur.
Hepatic and Renal Impairment: Patients with hepatic or renal impairment may need longer precautionary measures for photosensitivity.
Thromboembolism: Thromboembolic events can occur.
Embryo-Fetal Toxicity: May cause embryo-fetal toxicity. Advise females of reproductive potential of the potential risk to a fetus and to use effective contraception.

MOST COMMON ADVERSE REACTIONS reported during clinical trials (>10% of patients) are:

Esophageal Cancer: Anemia, pleural effusion, pyrexia, constipation, nausea, chest pain, pain, abdominal pain, dyspnea, photosensitivity reaction, pneumonia, vomiting, insomnia, back pain, pharyngitis.
Obstructing Endobronchial Cancer: Dyspnea, photosensitivity reaction, hemoptysis, pyrexia, cough, pneumonia.
Superficial Endobronchial Tumors: Exudate, photosensitivity reaction, bronchial obstruction, edema, bronchostenosis.
High-Grade Dysplasia in Barrett's Esophagus: Photosensitivity reaction, esophageal stenosis, vomiting, chest pain, nausea, pyrexia, constipation, dysphagia, abdominal pain, pleural effusion, dehydration.

Other photosensitizing agents may increase the risk of photosensitivity reaction. Because of the potential for serious adverse reactions in the breastfed infant, advise patients that breastfeeding is not recommended during treatment with PHOTOFRIN and for 5 months after the last dose.

Please see accompanying full Prescribing Information for PHOTOFRIN® (porfimer sodium) for Injection at: www.photofrin.com

FOR MORE INFORMATION about PHOTOFRIN®, or if there are any questions regarding the information provided, visit **www.photofrin.com** or please contact the Medical Information Department at **1-866-248-2039**.
You are encouraged to report negative side effects of prescription drugs to the FDA.
Visit **www.fda.gov/medwatch**, or call **1-800-FDA-1088**.

ADP-038 08/2020

References: 1. Loewen GM, Pandey R, Bellnier D, Henderson B, Dougherty T. Endobronchial photodynamic therapy for lung cancer. Lasers Surg Med. 2006;38(5):364-370. 2. Demmy TL, Loewen GM. Management of superficial central airway lung cancers. In: Sugarbaker DJ, Bueno R, Colson YL, Jaklitsch MT, Krasna MJ, Mentzer SJ, et al eds. Adult Chest Surgery. 2nd ed. New York, NY: McGraw-Hill Education; 2015:706-717. 3. Jayaprakash V, Loewen GM, Dhillon SS, Moysich KB, Mahoney MC, Yendamuri S, et al. Early detection of lung cancer using CT scan and bronchoscopy in a high risk population. J Cancer Ther. 2012;3(4A):388-396. doi: 10.4236/jct.2012.324051. 4. Wisnivesky JP, Yung RC, Mathur PN, Zulueta JJ. Diagnosis and treatment of bronchial intraepithelial neoplasia and early lung cancer of the central airways: diagnosis and management of lung cancer, 3rd ed: American College of Chest Physicians evidence-based clinical practice guidelines. Chest. 2013;143(5 Suppl):e263S-e277S.

PDT with PHOTOFRIN®
[porfimer sodium] for injection

PINNACLE BIOLOGICS™

Endobronchial Microinvasive Squamous Cell Carcinoma

Courtesy of Gregory Loewen, DO, FCCP
Associate Professor of Medicine
Washington State University

Patient History

This 81-year-old male (current smoker) in a CT-based lung cancer screening program presented with severe COPD and asbestos exposure. Although no endobronchial airway lesions were visible, CT detected a suspicious pulmonary nodule in the right upper lobe (Figure 1).

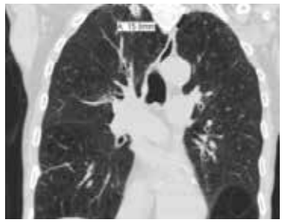

Figure 1 – CT imaging confirmed a 15.8-mm adenocarcinoma at the apex of the right lung, seen on coronal image.

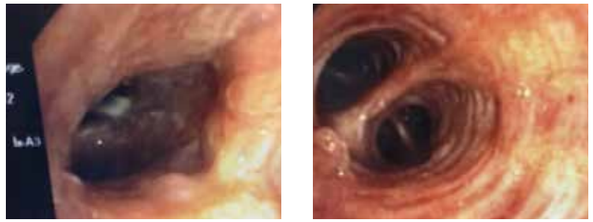

Figure 2 – The left upper lobe bronchial orifice mucosa was nodular, mildly erythematous, and friable (left). Friable mucosal nodularity was also noted on the tertiary carina of the right upper lobe orifice (right).

Examination

The patient reported a chronic cough and admitted to occasional scant hemoptysis. Although he did not use supplemental oxygen, his physical exam revealed diminished breath sounds bilaterally. Pulmonary function testing revealed obstructive disease with an FEV-1 of 1.55 liters (58% predicted) and a DLCO of 27% predicted.

Diagnostic Evaluation

CT-guided needle biopsy of the apical right upper lobe lesion confirmed the diagnosis of adenocarcinoma. Surveillance bronchoscopy was recommended prior to therapy. The patient underwent surveillance fiber optic bronchoscopy with white light and autofluorescence technique, which confirmed the presence of endobronchial mucosal nodularity in the left upper lobe (Figure 2) and in the right upper lobe (not shown). Endobronchial biopsies and brushings were obtained from both the left upper lobe orifice and the right upper lobe orifice, confirming the presence of multifocal microinvasive squamous cell carcinoma in situ (CIS) as synchronous primary lung cancers.

Course of Treatment

After review of the patient's case at a multidisciplinary chest tumor board, PET scan revealed fluorodeoxyglucose (FDG) uptake in the right apical lesion and a Standard Uptake Value (SUV) of 10 at the apex of the right lung.

See important prescribing and safety information for PHOTOFRIN® (porfimer sodium) for Injection on pages 3 and 4.

No FDG uptake was found in the microinvasive endobronchial squamous cell carcinoma lesions in the orifice of the right upper lobe and left upper lobe (Figure 3).

It was established that the patient had clinical stage 1a adenocarcinoma of the right upper lobe, in concert with 2 stage 0 squamous cell carcinomas in the right upper lobe and left upper lobe orifices. The patient was unwilling to consider surgical resection but agreed to stereotactic body radiotherapy (SBRT) as primary therapy for his adenocarcinoma at the right lung apex, and subsequent photodynamic therapy (PDT) for the 2 airway lesions.

The patient first underwent SBRT in five fractions to the right upper lobe, which was well tolerated. One month later, 2 mg/kg of PHOTOFRIN® (porfimer sodium) was administered intravenously and sunlight precautions were initiated. Forty-eight hours later, bronchoscopy was performed under general anesthesia. Under direct guidance, a 10-mm cylindrical fiber was positioned adjacent to the nodular mucosa in the left upper lobe orifice, which was treated at the energy setting of 200 Joules/cm with a nominal wavelength of 630 nm ±3 nm (Figure 4). Subsequently, the same treatment was performed adjacent to the nodular mucosa in the right upper lobe orifice.

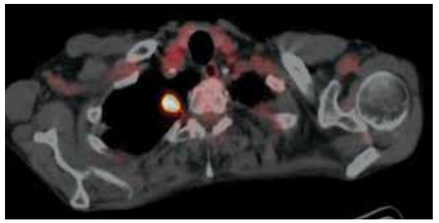

Figure 3 – PET image of the right lung, in the area of adenocarcinoma and at the sites of microinvasive endobronchial squamous cell carcinoma. PET slices through right and left upper lobe were negative for FDG uptake.

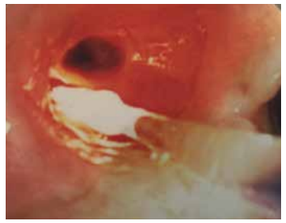

Figure 4 – Endoscopy during PHOTOFRIN® (porfimer sodium) treatment adjacent to the area of CIS in the left upper lobe as well as the right upper lobe.

Clean-out debridement bronchoscopy was performed 48 hours later under local anesthesia and monitored sedation. The left upper lobe and right upper lobe orifices were both partially obstructed with white necrotic debris, which was easily removed with forceps. One year post-treatment, mature scar with some discoloration was observed, but biopsies were negative for malignancy (Figure 5).

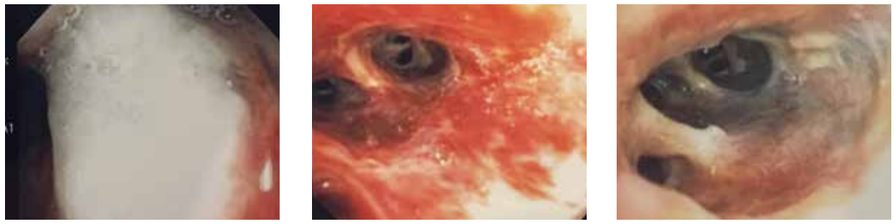

Figure 5 – Post-treatment debris is shown in the left upper lobe orifice (left image), which was debrided to expose the erythematous orifice (center image). Mature scar shown 1 year post-treatment (right image).

Clinical Outcomes

PHOTOFRIN® (porfimer sodium) for Injection treatment resulted in a complete pathological response in both the right upper lobe and left upper lobe orifices. Repeat bronchoscopy 1 and 2 years later revealed no evidence of tumor in the airways of either lobes. PHOTOFRIN® treatment, in concert with SBRT, was well tolerated in this patient with severe lung disease, and resulted in a complete pathologic response of the microinvasive squamous cell carcinoma in situ that was durable.

See important prescribing and safety information for PHOTOFRIN® (porfimer sodium) for Injection on pages 3 and 4.

Discussion

PDT with PHOTOFRIN® (porfimer sodium) for Injection is an established endobronchial therapy for superficial spreading, microinvasive, non–small cell lung cancer, which is typically of squamous cell carcinoma cell types. These lesions may be multifocal, and are frequently metachronous. Advantages of PDT over other endobronchial techniques include the selective photochemical mechanism of action combined with the targeted application of light within the field of cancerization.[1] Squamous cell carcinoma in situ and microinvasive squamous cell carcinoma are important precursors to squamous cell endobronchial lung cancers, and may be detected with advanced bronchoscopy techniques (autofluorescence or narrow-band imaging) in high-risk patients.[2,3] PDT is one of the most studied endobronchial treatment modalities, and we consider it a good option for microinvasive superficial non-small cell carcinoma.[4]

The information contained in this case study has been supplied by the medical professional whose name appears here. The advice, opinion, statements, materials and other information expressed and contained in this case study are from the authors and reflect their personal experience with the specific patient. Results may vary. Pinnacle Biologics, Inc. makes no claim that similar treatment will result in a similar outcome.

PHOTOFRIN® (porfimer sodium) for Injection Indications

Palliation of patients with completely obstructing esophageal cancer, or of patients with partially obstructing esophageal cancer who, in the opinion of their physician, cannot be satisfactorily treated with Nd:YAG laser therapy.

Treatment of microinvasive endobronchial non–small cell lung cancer (NSCLC) in patients for whom surgery and radiotherapy are not indicated.

Reduction of obstruction and palliation of symptoms in patients with completely or partially obstructing endobronchial NSCLC.

Ablation of high-grade dysplasia (HGD) in Barrett's esophagus (BE) patients who do not undergo esophagectomy.

Important Safety Information About PHOTOFRIN® (porfimer sodium) for Injection

PHOTOFRIN® should not be used in patients with porphyria, existing tracheoesophageal or bronchoesophageal fistula, tumors eroding into a major blood vessel, emergency treatment of patients with severe acute respiratory distress caused by an obstructing endobronchial lesion because 40 to 50 hours are required between injection of PHOTOFRIN® and laser light treatment, and esophageal or gastric varices or esophageal ulcers >1 cm in diameter.

IMPORTANT WARNINGS AND PRECAUTIONS USING PHOTOFRIN® INCLUDE:

Gastroesophageal Fistula and Perforation: Do not initiate PHOTOFRIN with photodynamic therapy (PDT) in patients with esophageal tumors eroding into the trachea or bronchial tree or bronchial wall.

Pulmonary and Gastroesophageal Hemorrhage: Assess patients for tumors eroding into a pulmonary blood vessel and esophageal varices. Do not administer light directly to an area with esophageal varices.

High-Grade Dysplasia (HGD) in Barrett's Esophagus (BE): After treatment of HGD in BE, conduct endoscopic biopsy surveillance every 3 months, until 4 consecutive negative evaluations for HGD have been recorded.

Photosensitivity and Ocular Photosensitivity: Observe precautions to avoid exposure of skin and eyes to direct sunlight or bright indoor light for at least 30 days. Instruct patients when outdoors to wear dark sunglasses which have an average light transmittance of <4% for at least 30 days and until ocular sensitivity resolves.