Evaluation and Management of Pancreatic Cystic Lesions

Thomas Zikos, MD, and Walter G. Park, MD, MS

ABSTRACT

• **Objective:** To review the diagnosis and management of pancreatic cystic lesions.
• **Methods:** Narrative review of the literature.
• **Results:** Pancreatic cystic lesions are clinically relevant as some are precursor lesions to pancreatic adenocarcinoma. Mucinous cystic neoplasms and intraductal papillary mucinous neoplasms are 2 commonly encountered pre-cancerous pancreatic cysts. Many cysts are identified incidentally due to frequent use of high-resolution CT and MRI imaging technology. Proposed diagnostic and management algorithms exist to guide clinical practice but are limited by a lack of evidence and discordance among various guidelines. New cyst fluid biomarkers are under development to diagnose cyst types and risk of cancer.
• **Conclusion:** Pancreatic cysts are increasingly encountered in clinical practice and represent a growing problem. Diagnostic and management algorithms are available to assist practice but are limited by the available evidence. A multidisciplinary approach is recommended.

In the United States there were an estimated 46,420 new cases of pancreatic cancer in 2014 [1]. Of all major cancers, pancreatic cancer had the lowest 5-year survival rate at 6% [1]. Of the 3 known precursor lesions to pancreas adenocarcinoma, 2 are pancreatic cysts [2]. Correctly identifying those with cancer, those with cancer potential (premalignant), and those that are benign (harboring no malignant potential) can be difficult.

The estimated prevalence of pancreatic cysts is approximately 2.6% [3]. In some case series using magnetic resonance imaging (MRI), higher rates of detection of approximately 13.5% have been observed [4]. The prevalence increases with age reaching nearly 10% by the 8th decade of life [3,4]. Mucinous cystic neoplasms (MCNs) and intraductal papillary mucinous neoplasms (IPMNs) account for about 30% of pancreatic cysts [5]. These cysts are defined as mucinous cysts and are known precursor lesions to pancreatic adenocarcinoma [6]. The other most common types of cysts are serous cystic neoplasms (SCNs), comprising 20% of pancreatic cysts, and pseudocysts, comprising 30% [5]. These cysts are considered nonmucinous cysts and are almost always benign [7,8]. There are multiple other pancreatic cyst types to consider, which are summarized in Table 1 [9,10,11]. In this review, we will cover the diagnosis and management of the most common pancreatic cysts in a case-based format.

**CASE 1**

A 57-year-old male had a 1.5-cm pancreatic cyst located in the head that was found on computed tomography (CT) imaging for suspected renal colic. He had no history or complaints suspicious for pancreatic disease. A CT pancreas protocol scan was obtained, which demonstrated a simple appearing cyst with no mural nodules. The pancreatic and biliary ducts were normal. His laboratory evaluations including liver function testing and lipase were normal.

**What is the approach to incidentally discovered pancreatic cysts?**

While many pancreatic cysts are first discovered by cross sectional imaging (CT or MRI), the diagnostic accuracy of defining cyst type and the presence of malignancy is imperfect. The area under the curve (AUC) for differentiating malignant from benign pancreatic cysts ranges from 0.64 to 0.82 for CT and 0.73 to 0.91 for MRI, and no difference between the 2 were observed.
Several guidelines are currently available to offer guidance on management [6,14,15,16,17]. Much of the current evidence includes retrospective case series with no randomized control trials. The guidelines, therefore, mostly represent consensus-based expert extrapolation of available data.

The second iteration of guidelines put forth by an international panel of experts is perhaps the most widely accepted among pancreatologists. Published in 2012, the panel narrowed the criteria from their first guidelines (2006) regarding surgical resection of a pancreatic cyst [6,17]. Patients with a pancreatic cyst who have any of the following 3 features (or “high-risk stigmata”) warrant immediate consideration of surgical resection. These features are (1) obstructive jaundice in the setting of a head cyst, (2) presence of an enhancing solid component within the cyst, and (3) main pancreatic ductal dilation of 10 or more mm [6]. The presence of other “worrisome” features should prompt further investigation with endoscopic ultrasound (EUS) and these include (1) presentation of a cyst with pancreatitis, (2) cysts 3 cm or greater in size, (3) thickened or enhancing cyst walls, (4) non-enhancing mural nodules, and (5) tapering of the pancreatic duct with distal pancreatic atrophy (Table 2) [6].

The American Gastroenterological Association (AGA) recently produced guidelines in 2015 [14]. In comparison to the international consensus guidelines, there are a few key differences, which have now become a point of vigorous debate and disagreement among pancreatologists and confusion among general gastroenterologists and surgeons in the community. Where the international consensus guidelines have stricter criteria to define the appropriateness of surgery, the AGA guidelines are more liberal. AGA defined cysts appropriate for surgery as having 2 out of 3 of the following features: (1) cyst size ≥ 3 cm, (2) presence of a solid component in the cyst, and (3) dilation of the main pancreatic duct. Those having 1 out of 3 criteria were defined as needing further investigation with EUS [14]. These criteria are more relaxed and will likely lead to more surgical resections.

Another difference involves surveillance recommendations. The international consensus guidelines do not define a period when surveillance can be safely stopped. The AGA guidelines define 5 years as the period where if there is no significant change in the cyst from surveillance MRIs performed every 1 to 2 years, then surveillance can be stopped [14]. As the natural history of these cysts remain substantially uncertain, with evidence that malignant transformation occurs after 5 years, this particular recommendation by the AGA remains highly controversial [18,19]. Other differences between these 2 guidelines are summarized in Table 2 [6,14].

Until the surveillance recommendations by the AGA are validated with further studies, we generally follow the 2012 international consensus guidelines. We generally prefer MRI for initial and surveillance evaluations of pancreatic cysts. Besides the lack of radiation exposure, some studies show MRI to have better inter-reader variability [20], better resolution to show cyst communication with the main pancreatic duct [21], and better characterization of peripheral pancreatic cysts [22]. At our center, when a solid mass is suspected, a CT pancreas protocol is preferred in lieu of an MRI by our surgical team.

Case 1 Continued

Given the smaller size and absence of high-risk stigmata or worrisome features, surveillance of his cyst was recommended. He unfortunately did not follow up
Pancreatic cystic lesions
and presented 7 years later with several months of abdominal pain and esophageal reflux symptoms. A CT scan was repeated which showed that the cyst had grown to 10.7 x 8.8 x 8.9 cm with an adjacent smaller cyst (Figure 1). The cyst was surrounded by a thick rind of enhancing tissue and had occluded the splenic and superior mesenteric veins, and was encasing the splenic artery. The main pancreatic duct was dilated at 7 mm with pancreatic body and tail atrophy. There was no evidence of metastatic disease or pathological lymph nodes. An EUS was performed and showed a large complex cyst with thick walls of up to 2 cm. Fine-needle aspiration (FNA) yielded a carcinoembryonic antigen (CEA) value of 2.3 ng/mL and cytology showed “bland epithelial cells.”

Despite the reassuring CEA and cytology results, a high concern for a malignant cystic lesion remained based on cyst size, main pancreatic duct dilation, and atrophy noted in the distal pancreas. The patient underwent surgical resection including subtotal pancreatectomy, splenectomy, subtotal gastrectomy, and superior mesenteric and portal vein resection with reconstruction. Pathology revealed the cyst to be a benign pseudocyst.

This case reflects some of the critical challenges in current management of pancreatic cysts. By history, this patient had no suspicion for pancreatitis, making a pseudocyst less likely in a differential diagnosis. When the patient presented 7 years later, again with no reported history of pancreatitis, there was clinical concern

Table 2. Comparison of Guidelines for Management of Pancreatic Cysts

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Pancreatic protocol CT OR</td>
<td>• MRI with MRCP</td>
</tr>
<tr>
<td>Consider surgery if the following high-risk features are present:</td>
<td>• Obstructive jaundice in the setting of a pancreatic head cyst</td>
<td>• 2 of 3 risk factors: cyst ≥ 3 cm, presence of a solid component in the cyst, dilation of the main pancreatic duct</td>
</tr>
<tr>
<td>Consider EUS with FNA if the following concerning features are present: Surgery if EUS/FNA concerning*</td>
<td>• Presentation with pancreatitis</td>
<td>• 1 of 3 risk factors: cyst ≥ 3 cm, presence of a solid component in the cyst, dilation of the main pancreatic duct</td>
</tr>
<tr>
<td>if surgery is not undertaken, surveillance is recommended if the patient is a surgical candidate:</td>
<td>• Cyst ≥ 3 cm or inconclusive EUS: alternating EUS and MRI every 3–6 months</td>
<td>• Surveillance with MRI every 1–2 years. Stop after 5 years if no change.</td>
</tr>
<tr>
<td>Surveillance after operation:</td>
<td>• Surveillance identical to pancreatic adenocarcinoma if invasive disease present</td>
<td>• If dysplasia or invasive disease is present recommend yearly MRI. No definitive stop date.</td>
</tr>
</tbody>
</table>

*The 2012 International Consensus Guidelines define concerning EUS/FNA findings as mural nodules, main pancreatic duct involvement, or positive cytology. The American Gastroenterological Association does not specifically comment on this in their review.
for a branch duct IPMN. Although the cyst fluid CEA and cytology were reassuring, the patient met surgical criteria by the 2006 international consensus criteria and the more recent AGA guidelines. Interestingly, the narrowed 2012 international consensus guidelines for surgical resection would have recommended observation. This case highlights the need for better diagnostic tests.

**What is the epidemiology of pancreatic fluid collections and how do they present?**

Pancreatic fluid collections are not true cysts as they lack an epithelial cell lining. They often occur in the context of either acute or chronic pancreatitis, and are considered benign or nonmucinous cysts [7,8]. Duct disruption occurs causing pancreatic fluid accumulation, initially defined as an acute peri-pancreatic fluid collection, or an acute necrotic collection if necrosis is present. Over about 4 weeks a more defined cyst wall forms and the cyst is now classified as either a pseudocyst or walled-off pancreatic necrosis [23]. In one review, the median age at presentation was 49 with a male:female ratio of 2:1. Only 52% of fluid collections were discovered following an acute attack of pancreatitis [24]. The risk factors for pancreatic fluid collections are similar to the risk factors for pancreatitis, with the most common being alcohol use and gallstones [24]. Potential symptoms include abdominal pain, weight loss, gastrointestinal bleeding from pseudoaneurysms, obstructive symptoms, sepsis from super infection, and obstructive jaundice [8,24,25,26,27].

**How are pancreatic fluid collections diagnosed and managed?**

Clinical suspicion for pancreatic fluid collections should increase if a cyst is diagnosed in the context of acute or chronic pancreatitis [28]. However, other types of cysts can cause ductal obstruction and pancreatitis, so further investigation may be needed, including review of prior imaging if available. The presence of internal debris, the presence of imaging findings of acute or chronic pancreatitis, and fluid extension beyond the pancreas and taking the shape of the retroperitoneum are often characteristics found in pancreatic fluid collections [29,28,30]. If needed, FNA with assay of amylase may be helpful. An amylase value of 5680 IU/L or greater was 84% sensitive and 64% specific (AUC 0.69) for pseudocysts in one study [31].

Management of pancreatic fluid collections is largely based on surgical series. Drainage procedures for pancreatic fluid collections are often undertaken for intractable symptoms or concerns of infection [8,24,25,26]. Asymptomatic pseudocysts can be safely followed. Specific techniques used for pancreatic fluid collection management vary by institutional expertise. Endoscopic drainage can be done by transpapillary stenting if main duct communication is present, or transgastric/transduodenal stenting if the cyst wall is mature and accessible by these approaches [32]. If necrosis is present this can be debrided endoscopically [33]. Laparoscopic surgical options are preferred to open approaches, and can be performed in 1 procedure where endoscopic approaches may require multiple procedures. The most common approach is to drain the cyst by creating a cyst-gastrostomy, or when not feasible a cyst-duodenostomy or cyst-jejunostomy [26,34]. Percutaneous drainage is less commonly performed and used for unstable patients as it can lead to cutaneous fistulas [34]. The best technique for intervention should be decided in the context of a multidisciplinary team. The option for conservative management should be considered as well because about 60% of those managed conservatively will have resolution in 1 year [35].
Pancreatic Cystic Lesions

Case 2

A 65-year-old male had a CT scan of the abdomen and pelvis for hematuria. While no clear source of hematuria was identified, a pancreatic cyst was described prompting a dedicated CT pancreas protocol scan. This showed a 3.4 x 4.0 x 5.5 cm multicystic lesion in the head of the pancreas with mural nodules but no dilation of the main pancreatic duct or biliary ducts (Figure 2). He had no correlating symptoms and lab test results were normal.

• What is the role of endoscopic ultrasound with FNA in the diagnosis of pancreatic cysts?

While more invasive than CT or MRI, EUS provides detailed imaging to characterize relevant clinical features and allows fine needle aspiration of the cyst fluid and tissue of intra-cystic masses (Table 2) [6,14]. While MRI imaging resolution is continuing to improve [22,36,37], EUS is generally considered superior [38] for diagnosing high-risk lesions. A limitation of EUS, however, is significant inter-observer variability when compared with MRI [37,39,40].

EUS enables FNA of the cyst, which offers unique oppor-tunities for diagnosis. Cyst fluid cytology unfortunately has limited diagnostic yield, with a recent meta-analysis showing sensitivity 63%, specificity 88%, and AUC of 0.89 in differentiating mucinous from non-mucinous cysts [41]. The low sensitivity is likely because cyst fluid is paucicellular. Techniques that include targeting the cyst wall are under investigation and may improve the diagnostic yield of cytological analysis [42]. Tumor markers such as CEA have been widely used in the cyst fluid, with a value > 192 ng/mL having 63% sensitivity and 88% specificity (AUC of 0.79) for mucinous pancreatic cysts [43]. Other cyst fluid markers have been or are being developed including mutated KRAS DNA [44], mutated GNAS DNA [45,46], micro RNA [47,48], glucose [49], proteomic analysis [50], and multiple other molecules [51]. At this time, many of these markers are under investigation.

Case 2 Continued

An endoscopic ultrasound was performed and showed normal main pancreatic and common bile ducts. No intra-cystic mural nodules were observed. FNA was performed. Cytology showed “paucicellular fluid” and the cyst fluid CEA was 319 ng/mL. Having met the original consensus criteria for surgical resection [17] based on size, the presence of mural nodules, and due to suspicion for a mucinous cyst based on the CEA level, the patient underwent a Whipple procedure. The final pathology was a branch-duct IPMN with moderate dysplasia.

• What interventions exist for treating pancreatic cysts?

Surgery is the mainstay of treatment for pancreatic cysts. The most common surgical procedure for worrisome cysts in the head of the pancreas is a pancreato-duodenectomy (Whipple procedure). For cysts in the distal pancreas, a laparoscopic distal pancreatectomy can be performed [52,53]. Middle pancreatectomy, total pancreatectomy, and enucleation are less commonly performed and remain under investigation. The most common complications after surgery are surgical site and nonsurgical site infection, bleeding, pancreatic fistula, and delayed gastric emptying [52,53]. Overall complication rate for pancreatic cyst surgery is 27% to 39%, and perioperative mortality is 0.5% to 4% at high-volume centers [52,53].

An area of active investigation involves EUS-directed chemical cyst ablation. Prior studies using ethanol intra-cystic injection alone showed cyst resolution in 33% of patients [54]. A combination of ethanol and paclitaxel showed cyst resolution in 62% of patients [55]. Though these techniques offer a less invasive alternative to sur-
gergy, the complete eradication of dysplastic cystic epithelium remains uncertain and long-term efficacy is unclear. Thus, these techniques should only be considered in the context of a clinical trial or perhaps in patients who are not surgical candidates [56].

CASE 3

A 72-year-old male with a history of pancreatitis 23 years ago complicated by a pseudocyst, who is status post cyst jejunostomy and cholecystectomy presented for evaluation. He was having colicky abdominal pain consistent with prior episodes of nephrolithiasis, and a non-contrast CT scan was obtained that showed a cystic mass in the head of the pancreas. His laboratory test results including liver function tests and lipase were normal. A CT pancreas protocol was obtained and showed a 2.4 x 4.6 cm cystic lesion without mural nodules in the head of pancreas (Figure 3). The cyst was continuous with the main duct, which was dilated to 0.9 cm and the common bile duct was dilated to 1.4 cm. There was severe atrophy of the pancreas upstream of the cyst, and small mesenteric lymph nodes. An endoscopic ultrasound with FNA showed similar findings to the CT, but a CEA was measured at 2298 ng/mL (Figure 3). Given the concerning imaging findings and an elevated CEA, a Whipple procedure was performed and final pathology showed a main-duct IPMN with in situ carcinoma.

• What is the epidemiology of IPMNs and how do they present?

IPMNs are mucin-producing lesions (mucinous cysts) of the exocrine pancreas involving either the main or branch ducts that have the potential to develop into pancreatic adenocarcinoma [57]. The mean age at presentation for both branch duct IPMNs (BD-IPMNs) and main duct IPMNs (MD-IPMNs) is around 65 years [58,59]. In the United States, the male to female prevalence ratio is equal, though there is some geographic variation among different countries [58]. Risk factors for IPMN formation include diabetes, chronic pancreatitis, and a family history of pancreatic adenocarcinoma [60]. Presentation is often asymptomatic but may present with pancreatitis, abdominal pain, weight loss, jaundice, and pancreatic exocrine insufficiency [61]. They tend to occur in the pancreatic head [29]. IPMNs involve either the main pancreatic duct or branch duct or both [62], but this is not always visible by imaging [21]. MRI with MRCP is considered superior to CT in characterizing these lesions, specifically in identifying a connection with the pancreatic ducts [21].

• How are IPMNs diagnosed and managed?

MD-IPMNs harbor a higher risk of malignancy than BD-IPMNs. In one series, 64% of MD-IPMN resected specimens contained cancer [63]. Because of the high cancer risk, all guidelines recommend surgical resection for appropriate patients [6,14,15,16,17]. BD-IPMNs have a lower risk of cancer at diagnosis, present in 19.5% of resected specimens in one study [63]. As a surgical series, this may overstate the true prevalence, which is supported by another study. A cohort of 103 suspected BD-IPMNs patients were observed and those with high-risk features were resected. The overall rate of cancer at 5 years was 2.6%, and only 1 of 103 patients developed non-resectable disease [64]. For these reasons, suspected BD-IPMNs can often be safely monitored if they do not harbor any high risk stigmata as defined by the international consensus criteria (Table 2)[6]. Otherwise, suspected BD-IPMNs are managed in a similar manner to other pancreatic cysts (Table 2) [6,14].

Prognosis after resection is more favorable for IPMNs than for pancreatic adenocarcinoma, possibly due to earlier stage of detection. The 5-year survival for BD-IPMN
Pancreatic cystic lesions

Revised International Consensus Guidelines recommend surveillance 6 months after resection with CT or MRI for all IPMNs, but with no recommendation given on how long to continue surveillance [6]. For patients with invasive disease, the same follow-up is recommended as for standard invasive adenocarcinoma [6]. The AGA recommends yearly MRI only for only patients with high-grade dysplasia or invasive disease, with consideration for lifelong surveillance [14].

CASE 4

A 44-year-old previously healthy female presents with 2 months of epigastric pain. Her laboratory test results, including liver function testing, were normal. A CT of the abdomen and pelvis showed an 11-cm unilocular cyst in the tail of the pancreas (Figure 4). Since the imaging findings were highly suggestive of a MCN, no further workup was done and a laparoscopic spleen preserving distal pancreatectomy was performed. Pathology confirmed a mucinous cystic neoplasm with low-grade dysplasia.

Figure 4. Arterial phase pancreas protocol CT of a mucinous cystic neoplasm.

What is the epidemiology of MCNs and how do they present?

MCNs are mucin-producing lesions (mucinous cysts) of the exocrine pancreas histologically defined by the presence of ovarian stroma [67]. They have the potential to develop into pancreatic adenocarcinoma. Unlike IPMNs, MCNs occur almost exclusively in women, and patients are generally younger. In one series, 99.7% of MCNs occurred in females, with a mean age of 47 [67]. Presenting symptoms, as with other cysts, are often vague. These include abdominal pain, fatigue, weight loss, pancreatitis, and a palpable mass. Only 25% of patients are asymptomatic [68].

How are MCNs diagnosed and managed?

Approximately 95% of MCNs are located in the body or tail of the pancreas [67]. These lesions do not communicate with the pancreatic ducts unlike IPMNs, though they may still cause ductal obstruction and dilation [29]. They are often one large unilocular cyst with a thick cyst wall, but in 20% of cases they can have multiple septations [29]. Peripheral eggshell calcification on CT is present in roughly 25% of cases, which is sometimes helpful in differentiating these lesions from serous cystic neoplasms, which often have central calcification [69].

When diagnosed, MCNs are surgically removed [6,14]. A recent surgical series found that the rate of high-grade dysplasia in resected specimens was 5.5%, and the risk of invasive disease was 4.4% [70]. This data suggests that a more conservative approach of observation rather than immediate resection may be reasonable for some patients [70]. The prognosis is very good after MCN resection, with a 5-year survival of 97% to 100% for all comers [68,70]. However, invasive MCNs have a lower 5-year survival rate ranging from 15% to 75% [70,71]. Per the AGA guidelines, patients with invasive disease or dysplasia should undergo yearly surveillance with MRI [14]. This recommendation is based on a potential field defect described with IPMNs. However, the international consensus guidelines only recommends surveillance if invasive disease is present [6,68,71,72].
CASE 5

A 59-year-old male presents for evaluation of sudden onset abdominal pain and an 8-pound weight loss over the past few months. Seven years ago a pancreatic cyst was diagnosed and has since been observed by serial imaging. His lipase was 400 U/L (normal < 82) with normal liver function tests. A CT scan of the abdomen and pelvis showed peri-pancreatic stranding consistent with pancreatitis and a large complex cyst in the head of the pancreas.

After the acute pancreatitis resolved, a CT pancreas protocol was performed for better characterization of the cyst. This showed a 5.9 x 5.3 x 1.5 cm, multiloculated cystic lesion without mural nodules, with multiple additional subcentimeter lesions. He underwent an EUS, which confirmed the CT findings (Figure 5). FNA was performed and the cytology showed “paucicellular fluid” and the CEA was 0.9 ng/mL. Due to his weight loss and presentation with pancreatitis, a Whipple procedure was performed and pathology showed a serous cystic neoplasm.

What is the epidemiology of SCNs and how do they present?

SCNs are benign non–mucin-producing cystic lesions that are characterized by a glycogen-rich epithelium on histology [73]. Of patients with SCNs, 74% are female, with a median age 58 [10]. When diagnosed, most patients are usually asymptomatic (61%), but 27% present with abdominal pain. Other symptoms include jaundice, pancreatitis, nausea, and presence of a palpable abdominal mass. SCNs are more common in patients with von Hippel-Lindau syndrome [74].

How are SCNs diagnosed and managed?

These cysts have fairly even distribution when discovered in the pancreas [53]. About 74% of lesions have smaller micro-cystic components [75]. About 20% of lesions have a characteristic honeycomb appearance, which is highly suggestive of an SCN [76]. About 30% of patients have a characteristic central stellate scar on CT which is also highly suggestive of an SCN [76]. Unlike mucinous neoplasms, peripheral calcification is usually not seen [69].

Malignancy associated with these cysts is very rare, with the largest cohort study reporting a rate of 0.1% [10]. The diagnosis can commonly be made by its unique imaging appearance [10]. Diagnostic biomarkers that may identify such cysts with more certainty are under active investigation [77]. Resection is reasonable and often performed for SCNs when they cause debilitating symptoms including refractory abdominal pain or pancreatitis. When resected and confirmed by pathology, no surveillance is required [14,78].

Conclusion

Pancreatic cysts are common incidental findings in clinical practice today. Many cause anxiety due to their association with pancreas cancer, but most are indolent and safe to observe. Even those cysts with malignant potential grow slowly and immediate surgery is often unnecessary. Several guidelines have been developed, and while there are similarities between them, there are enough critical differences unfortunately to cause some confusion among practitioners today. Further robust research is needed to help address and reconcile these differences. In the meantime, a multidisciplinary approach is highly recommended at dedicated centers of excellence for pancreatic diseases.

Corresponding author: Walter G. Park, MD, MS, 300 Pasteur Drive, MC: 5187, Stanford, CA 94305, wgpark@stanford.edu.

Funding/support: Dr. Park is funded by an American College of Gastroenterology Junior Faculty Development Award and is a subcontinent for the National Cancer Institute’s Early Detection Research Network.
Financial disclosures: None.

Author contributions: conception and design, TZ, WGP; analysis and interpretation of data, WGP; drafting of article, TZ, WGP; critical revision of the article, TZ, WGP.

References

Pancreatic cystic lesions


Copyright 2015 by Turner White Communications Inc., Wayne, PA. All rights reserved.