Original Investigation

# Does Second Reader Opinion Affect Patient Management in Pancreatic Ductal Adenocarcinoma?

Giuseppe Corrias, MD, Sandra Huicochea Castellanos, MD, Ryan Merkow, MD, Russel Langan, MD, Vinod Balachandran, MD, Monica Ragucci, PhD, Gabriella Carollo, Marcello Mancini, MD, Luca Saba, MD, Lorenzo Mannelli, MD, PhD

**Rationale and Objectives:** To determine the impact of second-opinion assessment on cancer staging and patient management in patients with pancreatic ductal adenocarcinoma.

**Methods and Materials:** This retrospective study was approved by our institutional review board with a waiver of informed consent. Second-opinion reports between January 1, 2009 and December 31, 2013, alongside outside reports for 65 consecutive cases of biopsy-proven pancreatic adenocarcinomas, were presented in random order to two experienced abdominal surgeons who independently reviewed them blinded to the origin of the report, images of the examinations, and patient identifier. Each surgeon filled in a questionnaire for each report recommending cancer staging and patient management. Recommended patient management and staging were evaluated against reference standards (actual patient management at 6 months following second-opinion assessment, and pathology or other clinical and imaging reference standards at 6 months or longer, respectively) using Cohen kappa.

**Results:** Cancer staging differed in 13% (9 of 65) of cases for surgeon 1 and in 18.4% (12 of 65) for surgeon 2. Patient management changed in 38.4% (25 of 65) of cases for surgeon 1 and in 20% (13 of 65) for surgeon 2. When compared to the pathologic staging gold standard, second opinion was correct in 85.7% (six of seven) of the time for both surgeons. Recommended patient management from second-opinion reports showed good agreement with the reference standard (weighted $\kappa = 0.6467$ [0.4014–0.892] and weighted $\kappa = 0.6262$ [0.3954–0.857] for surgeon 2).

**Conclusion:** Second-opinion review by subspecialized oncologic radiologists can impact patient care, specifically in terms of management decision.

**Key Words:** Pancreatic ductal adenocarcinoma; second opinion report; cancer staging; MRI; CT; subspecialization.

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## INTRODUCTION

The increasing complexity of medical imaging has led to organ or disease subspecialization within the subfields of radiology. One of the latest subspecialties to emerge is oncologic imaging (1). The discrepancy between two radiologists reporting on the same images is a phenomenon that has been known since 1949 (2). Different studies have reported clear clinical benefits in introducing second-opinion imaging review in abdominal radiology, gynecolocical imaging and neuroradiology (3–6). In most clinical practices, it is not possible for every imaging study to be interpreted by a radiologist with subspecialty training. In this setting, general radiologists often fill the gap of subspecialty radiologists. However, it is common practice at many tertiary referral institutions for clinicians and surgeons to request second-opinion review of images by subspecialty radiologists, most of the time without writing a new formal report. This is possible because no new imaging is needed, but only new image interpretation (7). This informal radiologic opinion is often reported in the patients' chart by the clinicians and surgeons, but without the chance for the second-opinion interpreting radiologist to review it. Furthermore, there is no reimbursement for this type of subspecialty second opinion to the interpreting radiologist. Another type of second opinion is asked for during or before multidisciplinary disease management team (DMT) meetings. Nowadays, many tertiary referral centers rely on DMTs for

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From the Department of Radiology, Memorial Sloan Kettering Cancer Center, 1275 York Avenue, New York, NY (G.C., S.H., L.M.); Department of Radiology, University of Cagliari, Cagliari, Italy (G.C., L.S.); Department of Surgery, Memorial Sloan Kettering Cancer Center, New York, NY (R.M., R.L., V.B.); IRCCS SDN, Naples, Italy (M.R.); St. John's University, Queens, NY (G.C.); Istituto di Biostrutture e Bioimmagini, CNR, Naples, Italy (M.M.). Received November 2, 2017; revised December 11, 2017; accepted December 13, 2017. This study was conducted at Memorial Sloan-Kettering Cancer Center, Department of Radiology, 1275 York Avenue, New York, NY 10065, USA. Grant support was provided by Memorial Sloan-Kettering Cancer Center Support Grant/Core Grant P30 CA008748. Work by Giuseppe Corrias was partially supported by a scholarships awarded by ISSNAF Imaging Science Chapter. The authors were equally involved in acquisition of data, analysis and interpretation of data, drafting of the manuscript, critical revision of the manuscript for important intellectual content, statistical analysis, technical, and material support of this study. **Address correspondence to:** L.M. e-mail: mannellilorenzo@yahoo.it

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discussion of management of different types of cancers. During these meetings, outside radiologic examinations are reviewed by a subspecialty-trained radiologist without the issue of a formal report, often changing the management of the disease. In case of other specialties such as surgery or clinical specialties, a second-opinion practice is commonly accepted and reimbursed, whereas the rationale for reimbursing radiologic reassessments and for new reports issuing is still under debate (5). Multiple studies have reported a 1%–20% discrepancy in image interpretation (6). A disease-based formal study is needed to assess the benefits of such second-opinion reads in terms of changes in patient management.

Our study focused on biologically proven pancreatic ductal adenocarcinoma (PDAC), one of the most lethal cancers with an overall survival at 5 years as low as 5% in the United States (8). We focused on a single type of cancer because of the lack of literature regarding second-opinion imaging review of this cancer and because pancreatic cancer treatment is heavily dependent on staging, which has a pivotal role in deciding the management of patients with PDAC. Additionally, a significant difference in short- and long-term outcomes has been noted when a pancreatectomy is performed at high-volume PDAC treatment centers (9,10). Many reasons can account for this better long-term outcome, it might be related to better surgeon skills as well as to the fact that subspecialized radiologists might provide better assessment of tumors in high-volume cancer centers. Lastly, general radiologists who often stage this type of cancer may not have the adequate expertise for interpreting all the different imaging patterns that pancreatic cancer can present on cross-sectional imaging, particularly when related with vascular involvement by the tumor (abutment, encasement, vessel deformity, and venous teardrop deformity) (11–13). Pancreatic cancers are approached by surgeons with a three-way decision model: resectable, borderline resectable, unresectable (14). According to TNM stage, stages I and II are resectable by definition because the tumor is confined within the pancreas. Stage IV is unresectable because it is characterized by distal metastases. Stage III is the most susceptible to radiologic interpretation mistakes, and it is defined as localized tumor with involvement of a major artery: celiac trunk, common hepatic artery, and superior mesenteric artery. It is further divided into two categories—locally advanced unresectable and borderline resectable. A borderline resectable tumor is defined by a contact between the tumor and the arterial circumference of no more than 180°. However, this definition of borderline resectable is not universally accepted and it might change among institutions, depending on the vessel involved, surgical skills and experience, and on patient status (15). When the tumor surrounds the arterial circumference for more than 180°, the vessel is considered encased and the tumor unresectable (16).

The aim of our study was to determine the clinical impact of second-opinion assessment of outside magnetic resonance imaging (MRI) and computed tomography (CT) scans performed by oncologic imaging subspecialized radiologists at our institution, in a population with biopsy-proven PDAC. We compared differences in disease local staging and recommendations in patient management because of the different radiology reports.

## MATERIALS AND METHODS

This single-institution, retrospective study was eligible for a waiver of informed consent according to our institutional review board policy. In this study, we will refer to the outside institution radiologist reports as outside reports, and to our institution's radiologist reports as second-opinion reports. Two junior radiologists (G.C.; S.H.C.) both with 4 years of experience and who did not participate in the second-opinion assessments independently re-reviewed all outside and second-opinion reports, unblinded to the origin of each report, images of the examinations, and patient identifier. They organized the data collection and the database, coordinated the questionnaire filling, and kept track of clinical data and follow-ups.

### Inclusion Criteria

A retrospective search of our institutional database was performed between January 1, 2009 and December 31, 2015. Our institutional Picture Archiving and Communication System (PACS, GE Centricity PACS, GE Healthcare, Chicago, IL) was used to search the radiology reports of all examinations submitted for second-opinion reports. The results of this query were combined with the results of a query in the pathology department database, giving as results all the biopsy-proven PDACs found in the aforementioned time frame. The inclusion criteria included the following: biopsy-proven diagnosis of PDAC; abdominal MRI or contrast-enhanced CT performed and interpreted at an outside institution specifically for pancreatic cancer local staging; second-opinion interpretation documented in an official report issued by an oncologic imaging subspecialized board-certified radiologist; second-opinion report assessment performed between January 1, 2009 and December 31, 2015; and histopathology or ≥6 months of follow-up imaging after the second -opinion report. Exclusion criteria were patients who were referred to our hospital for a second-opinion consultation but were treated at another institution; and patients who started chemotherapy before the second-opinion reports. A total of 307 patients had either MRI or CT studies performed at an outside institution and reinterpreted at our institution in the time frame selected (Fig 1). For this study, we considered only second-opinion report assessments performed between January 1, 2009 and December 31, 2013. Thus, a total of 86 patients were included. To ensure that the second-opinion reports did not benefit from extra clinical information, we excluded 15 patients with extra examinations (biopsy, surgery, or additional diagnostic imaging tests) obtained in between the outside report and the second-opinion interpretation. An additional six patients were excluded for lack of follow-up information. The final study population consisted of 65 patients (Table 1).

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