

Progression-free interval in ovarian cancer and predictive value of an *ex vivo* chemoresponse assay

H. GALLION*, W.A. CHRISTOPHERSON†, R.L. COLEMAN‡, L. DEMARSS§, T. HERZOG||, S. HOSFORD¶, H. SCHELLHAS#, A. WELLS** & B.-U. SEVIN††

*Precision Therapeutics, Pittsburgh, Pennsylvania; †Mercy Hospital, Pittsburgh, Pennsylvania; ‡University of Texas, Southwestern Medical Center, Dallas, Texas; §Dartmouth-Hitchcock Medical Center, Lebanon, New Hampshire; ||Washington University, St. Louis, Missouri; ¶North Lake Medical Center, Women's Cancer Alliance, Tucker, Georgia; #Tri-Health and Alliance Hospitals of Cincinnati, Cincinnati, Ohio, and St. Elizabeth Medical Center, Edgewood, Kentucky; **University of Pittsburgh and Pittsburgh VAMC, Pittsburgh, Pennsylvania; and ††Mayo Medical College, Jacksonville, Florida

Abstract. Gallion H, Christopherson WA, Coleman RL, DeMars L, Herzog T, Hosford S, Schellhas H, Wells A, Sevin B-U. Progression-free interval in ovarian cancer and predictive value of an *ex vivo* chemoresponse assay. *Int J Gynecol Cancer* 2006;16:194–201.

The study objective was to determine the effectiveness of a phenotypic chemoresponse assay in predicting response to chemotherapy measured by progression-free interval (PFI) in a retrospective series of ovarian cancer patients whose tumor specimens had been tested with the ChemoFx[®] assay. A statistically significant correlation between assay prediction of response and PFI was observed in 256 cases with an exact or partial match between drug(s) assayed and received. In 135 cases with an exact match, the hazard ratio for progression of the resistant group was 2.9 (confidence interval [CI]: 1.4–6.3; $P < 0.01$) compared to the sensitive group and 1.7 (CI: 1.2–2.5) for the intermediate compared to the sensitive group. The median PFI for patients treated with drugs assayed as resistant was 9 months, 14 months for those with drugs assayed as intermediately sensitive, and PFI had not been achieved for those with drugs assayed as sensitive. These data indicate that the ChemoFx[®] assay is predictive of PFI in ovarian cancer. As the majority of ovarian cancers display different degrees of response to different chemotherapy agents *ex vivo*, the incorporation of assay information into treatment selection has the potential to improve clinical outcomes in ovarian cancer patients.

KEYWORDS: chemoresponse assay, ovarian cancer, response to chemotherapy.

The majority of women with advanced ovarian cancer are treated with platinum- and taxane-based combination chemotherapy. Although 60–80% of women initially have a complete clinical response to therapy, the majority suffer relapse within 3 years and ultimately die of their disease^(1–6). To improve the outcome of women with ovarian cancer, the Gynecologic Oncol-

ogy Group is currently evaluating the effectiveness of adding a third drug to standard chemotherapy, incorporating gemcitabine, topotecan, or doxorubicin with carboplatin/paclitaxel as sequential doublets or three drug regimens⁽⁷⁾. Alternatively, other investigators are exploring a strategy of sequential treatment with single-agent carboplatin followed by dose-intensive paclitaxel followed by paclitaxel maintenance chemotherapy⁽⁸⁾. For patients with recurrent disease, the selection of subsequent chemotherapeutic agents is empiric, taking into consideration population-based response rates, as well as patient-specific factors including platinum-free interval, previous chemotherapy, toxicity, and convenience of schedule.

In view of the poor long-term outcome in ovarian cancer, it is imperative that alternative approaches to the management of this disease are thoroughly

Address correspondence and reprint requests to: Dr Holly Gallion, Precision Therapeutics Inc., 2516 Jane Street, Pittsburgh, PA 15203, USA. Email: hgallion@ptilabs.com

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investigated. The administration of ineffective therapy is associated with needless cost, toxicity, delay of potentially effective therapy, and the added risk of the development of resistant clones. The ability to predict response to specific chemotherapeutic agents prior to therapy could be used to develop individualized treatment plans. Chemotherapy sensitivity and resistance assays, which determine whether a sample of a patient's tumor tissue shows response when exposed to empirically selected chemotherapy agents *ex vivo*, may provide clinically relevant tumor-specific information. Because of the availability of sufficient tumor tissue for assays and the large number of potentially effective agents, ovarian cancer is particularly well suited for the incorporation of predictive assay information into traditional empiric treatment selection⁽⁹⁻¹³⁾. The present investigation was undertaken to determine the effectiveness of a phenotypic chemoresponse assay (ChemoFx[®]) in predicting response to chemotherapy as measured by progression-free interval (PFI) in a series of ovarian cancer patients.

Materials and methods

Patients

This was an Institutional Review Board (IRB)-approved retrospective study of 317 consecutive ovarian and peritoneal tumor tissue specimens from 304 patients with ovarian or peritoneal carcinoma who had tumor submitted to Precision Therapeutics for therapeutic testing between April 30, 1997, and April 30, 2002, and who met the following eligibility criteria: (1) a tumor sample had been obtained at their primary or secondary surgery and was submitted for testing in the ChemoFx[®] assay, (2) they were diagnosed with epithelial ovarian cancer (primary or recurrent) or histologically confirmed peritoneal carcinoma (primary or recurrent), (3) assay results were available, and (4) they completed at least one cycle of the treatment administered following surgery. Cases were collected from 10 medical institutions: University of Pittsburgh Medical Center (Pittsburgh, PA), Mercy Hospital (Pittsburgh, PA), Dartmouth-Hitchcock Medical Center (Lebanon, NH), Atlanta Medical Center (Atlanta, GA), Greenville Hospital (Greenville, SC), Christ Hospital (Columbus, OH), St Elizabeth Medical Center (Edgewood, KY), Good Samaritan Hospital (Cincinnati, OH), Mayo Medical College (Jacksonville, FL), and the Cooper Health System (Camden, NJ). All patients included in this study had provided written informed consent to allow research on their tumor specimens. Selection of treatment was at the discretion of the treating physician. In

some cases, the physician may have used the results of the assay to help determine the best therapy. The patients' medical records were reviewed by an independent Clinical Research Organization for evidence of clinical progression. PFI was calculated from the date of the administration of chemotherapy following surgery to documented progression. Clinical outcome data was collected up to April 1, 2003, at which time the follow-up portion of the study ended. The median follow-up period was 14.6 months (range: 1-48 months) for patients without progression.

Of the original 317 specimens, 256 (81%) were evaluable for response and are the basis of this investigation. Reasons for exclusion were as follows: the patient did not receive chemotherapy (24 cases), disease progressed prior to administration of chemotherapy (17 cases), treatment was with agents that were not tested (15 cases), and incomplete data (5 cases). Thirteen patients had multiple specimens submitted for testing. While the majority of these cases had consistent assay results across multiple specimens, in two cases the primary tumor was scored as resistant while the metastatic site was deemed sensitive or intermediate. To test the predictive accuracy of the assay, each specimen was included as an independent data point; however, adjudication to a single average data point did not alter the statistical significance of the findings reported below (data not shown). The mean number of drugs tested per patient was 8 (range, 2-12).

Assay

Specimens from surgically excised ovarian carcinomas were submitted for testing via the ChemoFx[®] assay as described previously⁽¹⁴⁻¹⁸⁾. Briefly, explant specimens were cultured to produce sufficient cell numbers for testing in the assay. Primary cultures were grown in McCoy's medium (Mediatech, Inc., Herndon, VA) and monitored until sufficient cells were available to plate into 60-well microtiter plates at a density of 300-350 cells per well. Cells were incubated in the wells for 24 h prior to a 2-h exposure to a battery of chemotherapeutic agents selected by the submitting oncologist. The agents were tested at six concentration levels, which represented the range of blood levels expected during typical therapy, as well as subclinical and supraclinical levels. In the assay system, Doxorubicin was used as a surrogate for Doxil. Each concentration of each agent was tested in 6 replicate wells, while 12 wells of untreated cells on each plate served as controls. At the end of incubation, the plates were washed three times to remove nonadherent cells. The

remaining cells were fixed with 95% ethanol and stained with 4'-6-diamidino-2-phenylindole (DAPI). Following exposure to these agents the percentage of cells killed in the treated wells was compared to untreated control wells and a complete dose-response curve was generated. Assay validation and reproducibility, including comparison to the adenosine 5'-triphosphate (ATP) and the National Cancer Institute panel of 60 cell lines derived from several different cancer types (NCI-60) assays have been previously published^(15,18). On average, assay results were available about 3 weeks after receipt of the specimen. Of note, as the assay is meant to be a stand-alone laboratory test, previous response to chemotherapy is not a part of the scoring algorithm but is to be incorporated as an independent piece of information by the ordering physician in the overall treatment plan.

Because this assay is designed to determine the degree of sensitivity as well as resistance, the dose-response curve was reviewed and grouped into three categories depicted as follows: (1) resistant (no response), (2) intermediate (minimum of 35% cell kill at the highest dose), and (3) sensitive (minimum of 35% cell kill at the intermediate dose).

Statistical considerations

The study purpose was to determine whether patients' PFI differed based on their *ex vivo* chemoresponse classification. The following covariates were examined to determine if they were predictive in univariate analysis without adjusting for ChemoFx[®] results: primary vs recurrent disease, debulking status, histology, disease stage, tumor grade, patient age, investigational site, and drug treatment. Only primary vs recurrent

disease, debulking status, and stage (I–IIIA vs IIIC–IV) were significant at the 0.01 level and therefore were included in multivariate models. All covariates not included had univariate *P* values exceeding 0.25. The data were not sufficiently complete to evaluate Eastern Cooperative Oncology Group (ECOG) performance status, number of previous treatments, time since diagnosis, or platinum-sensitive vs platinum-resistant status.

Descriptive views of the PFI functions for the *ex vivo* chemoresponse classifications were graphed using stratified Kaplan–Meier⁽¹⁹⁾ curves. Because there were imbalances in other covariates between the *ex vivo* chemoresponse categories, we included the additional prognostic factors as covariates in the Kaplan–Meier calculations, producing curves that represent a patient whose other covariates had the mean value of the covariate across all patients. Cox proportional hazards multivariate analysis⁽²⁰⁾ was used to determine the independent prognostic ability of the assay. Two-tailed $P \leq 0.05$ was considered statistically significant, and 95% confidence intervals (CIs) were calculated. Statistical analysis was performed using SYSTAT (Version 10.2, SPSS Inc., Chicago, IL).

Results

Categorization as sensitive, intermediate, and resistant tumors when chemoresponse-assayed drug(s) and treatment regimens matched exactly ($n = 135$)

Of the original 317 tumor specimens assayed, 135 were tested *ex vivo* with the ChemoFx[®] assay for the exact single or combination regimen that was used

Table 1. Characteristics of patients with ovarian cancer who received chemotherapy regimens that exactly matched drug(s) tested in an *ex vivo* chemoresponse assay^a ($n = 135$)

	No. of patients					
	Primary ($n = 84$)			Recurrent ($n = 51$)		
	Resistant ($n = 29$)	Intermediate ($n = 41$)	Sensitive ($n = 14$)	Resistant ($n = 6$)	Intermediate ($n = 35$)	Sensitive ($n = 10$)
Debulking						
Optimal	9	22	7	2	13	3
Suboptimal	20	19	7	4	22	7
Unknown	0	0	0	0	0	0
FIGO stage						
I	1	6	3	2	3	0
II	0	3	0	0	4	1
III	25	25	8	3	23	7
IV	2	7	2	1	4	1
Unknown	1	0	1	0	1	1

^a*Ex vivo* chemoresponse testing using the ChemoFx[®] assay. Patients are categorized according to the ChemoFx[®] assay score: 0, resistant; score of 1–3, intermediate; score of 4–5, sensitive.

to treat the patient clinically (Table 1). Of these 135 cases, 84 (62%) were chemotherapy naïve. The most common chemotherapy regimen in cases with primary disease was the combination of carboplatin and paclitaxel; doxorubicin monotherapy was the most common regimen for recurrent cases (Table 2). The median PFI of the intermediate group (14 months) fell between that of the resistant (9 months) and the sensitive groups (not achieved) (Fig. 1). The hazard ratio (HR) for progression of the resistant compared to the sensitive group was 2.9 (CI: 1.4–6.3; $P < 0.01$), and the PFI of the intermediate group separated from those identified as resistant with a HR of 1.7 (CI: 1.2 to 2.5), demonstrating a statistically significant correlation between the assay results and the clinical outcome. The complete results of the multivariate analysis are presented in Table 3 and present ChemoFx[®]-defined HRs in excess to those found by accepted variables such as primary/recurrent and optimal/suboptimal debulking.

Categorization as sensitive, intermediate, and resistant tumors when chemoresponse-assayed drug(s) and treatment regimens only partially matched (n = 256)

As both the testing menu and chemotherapy choice were physician directed, a substantial number of patients were treated with combination chemotherapy despite the fact that only individual agents were tested. To determine the predictive value of the *ex vivo* chemoresponse assay as used in this cohort, we expanded our population of 135 exact matches to include an additional 121 tumors in which the patient

Table 2. Chemotherapy regimens of patients who received chemotherapy regimens that exactly matched drug(s) tested in an *ex vivo* chemoresponse assay (n = 135)

Chemotherapy regimen	No. (%)	
	Primary (n = 84)	Recurrent (n = 51)
Monotherapy	6 (7%)	42 (82%)
Carboplatin	3	8
Cisplatin	1	0
Cyclophosphamide	0	1
Doxil ^a	0	19
Paclitaxel	2	8
Topotecan	0	6
Double-combination therapy	78 (93%)	9 (18%)
Paclitaxel/carboplatin	74	7
Paclitaxel/cisplatin	4	0
Other	0	2

^aDoxorubicin was used in the assay system as a surrogate for Doxil.

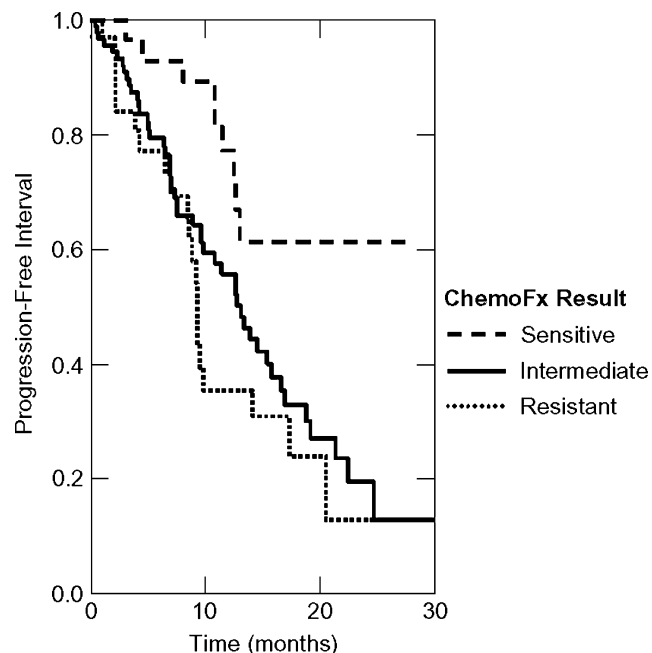


Figure 1. PFI for patients with ovarian cancer who received chemotherapy regimens that exactly matched drug(s) assayed (n = 135). Twenty-four cases were in the sensitive group, 76 in the intermediate, and 35 in the resistant.

was treated with combination chemotherapy but had undergone *ex vivo* testing only for single agents. One hundred and ninety-five (76%) of these 256 cases were chemotherapy naïve. To score tests in which an exact match was absent, the single-agent score was used in the following hierarchy: platinum, taxane, cyclophosphamide, doxorubicin, and then fluorouracil (5FU). In other words, if a patient received carboplatin/taxol combination chemotherapy but did not have this combination tested in the ChemoFx[®] assay, the score for

Table 3. Cox multivariate analysis of prognostic factors in relation to progression-free interval in patients with ovarian cancer who received chemotherapy regimens that exactly matched drug(s) assayed (n = 135)

Variable	HR	95% CI	P
Primary vs recurrent cancer	2.39	1.45–3.93	0.001
Optimally vs suboptimally debulked	1.94	1.21–3.12	0.006
FIGO stage I–IIIA vs IIIC–IV	1.42	0.80–2.51	0.232
ChemoFx [®] prediction, three classifications ^a			0.006
Resistant vs intermediate	1.71	1.17–2.51	
Resistant vs sensitive	2.93	1.36–6.31	

HR, hazard ratio estimated from Cox proportional hazard regression model; 95% CI, confidence interval of the estimated HR.

^aPatients are categorized according to ChemoFx[®] assay score: 0, resistant; score of 1–3, intermediate; score of 4–5, sensitive.

carboplatin was used if performed, and if carboplatin was not tested, the taxane score was used. Utilizing this expanded criteria for drug matching, a total of 256 tumor specimens were evaluable. In these cases, the HR of those identified as resistant *ex vivo* vs sensitive *ex vivo* was a significant 2.1 (CI: 1.2–3.6; $P = 0.01$). The Kaplan–Meier curve of PFI demonstrates a graded separation of the three groups (Fig. 2). That this clinical correlation was weaker than that of the exact matched specimens supports the intuitive assumption that test accuracy is optimal when *ex vivo* chemoresponse drug choice exactly reflects *in vivo* usage.

Chemoresponse testing for the recurrent ovarian carcinoma subset

Evaluating only specimens from recurrent cancers with at least a partial match between chemoresponse-assayed drug(s) and treatment regimens ($N = 77$), we found a HR of 2.6 (CI: 1.1–6.5; $P < 0.05$) for those identified as *ex vivo* resistant vs *ex vivo* sensitive. The intermediate group was distinct from the resistant group with a HR of 1.6 (CI: 1.03–2.55). This graded discrimination is noted in the PFI plot (Fig. 3). The discriminatory ability of the assay for recurrent cancers tested in exact matches was even more compelling, with a HR of 4.1 (CI: 1.2–14.5; $P = 0.03$; $N = 51$) between resistant and sensitive groups. As data

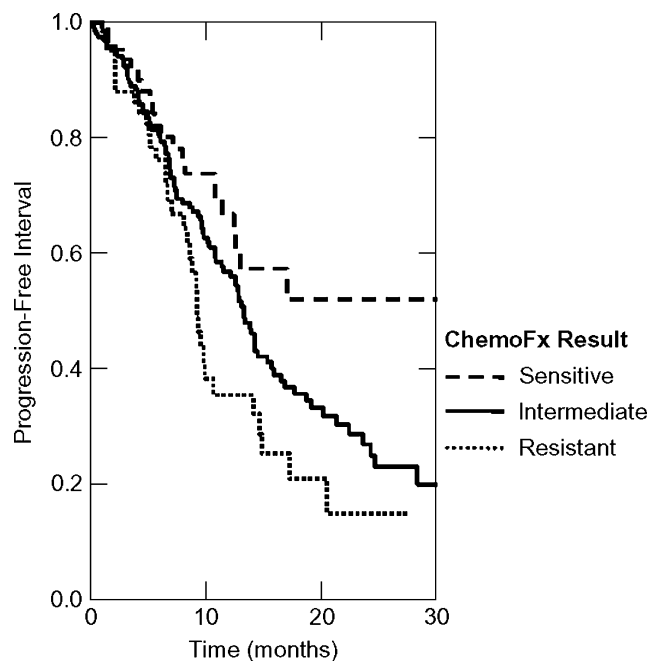


Figure 2. PFI for patients with ovarian cancer when treatment regimens and assayed drug(s) only partially matched ($n = 256$). Forty-four cases were in the sensitive group, 158 in the intermediate, and 54 in the resistant.

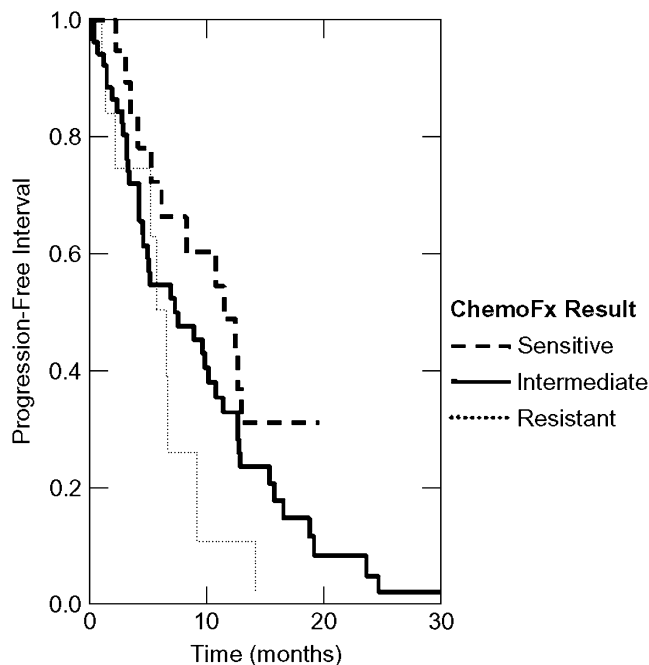


Figure 3. PFI for patients with recurrent ovarian cancer when treatment regimens and assayed drug(s) only partially matched ($N = 77$). Sixteen cases were in the sensitive group, 50 in the intermediate, and 11 in the resistant.

regarding platinum-free interval and previous chemotherapy were not available in these patients, analysis according to these variables was not performed.

General pattern of chemotherapy response and prognosis

In the current cohort of tumors ($N = 256$), 20% could be considered pan sensitive (>83% of the different drugs or combinations assayed were scored as sensitive) and 13% pan resistant (>83% of the drugs or combinations were scored as resistant), with the remaining 67% tumors ($N = 171$) exhibiting considerably different degrees of response to the drug(s) tested. The median PFI was directly correlated to the general pattern of chemotherapy response, with a median PFI of 17.1 months for those with pan-sensitive tumors compared to 8.6 months for those with pan-resistant tumors. To indirectly assess the potential value of *ex vivo* assay-assisted therapy, the PFI for the 171 patients with varied patterns of response to different chemotherapeutic agents was analyzed. Within this group, there was a trend toward improved PFI when the patient was treated with a regimen that tested sensitive compared to those who were treated with a regimen deemed resistant *ex vivo* (Fig. 4). The HR comparing the sensitive to resistant group was 1.7, with the intermediate regimens residing in the middle (CI: 0.9 to 3.3; $P = 0.12$).

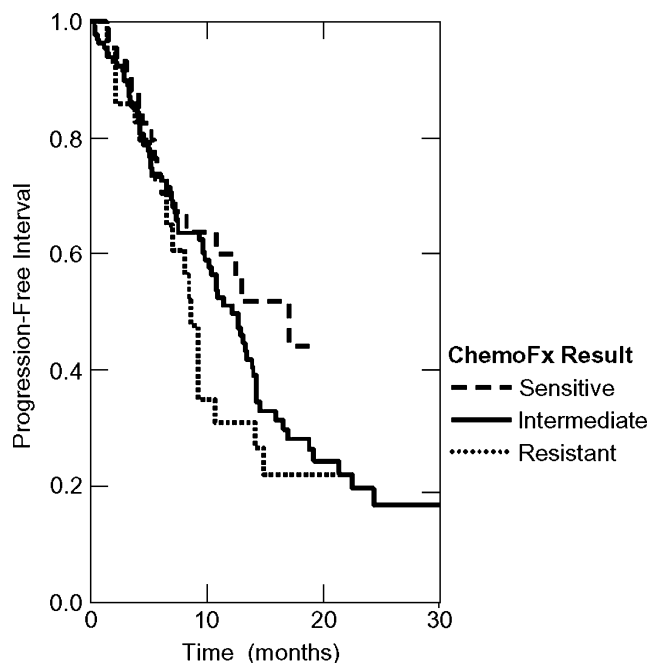


Figure 4. PFI for patients with ovarian cancer displaying chemoresponse heterogeneity across all tested treatments ($N = 171$). Twenty-eight cases tested sensitive to the treatment received clinically, 111 intermediate, and 32 resistant.

Discussion

Several chemoresponse assays have been evaluated in clinical trials in ovarian cancer. Overall, these studies have demonstrated an improved response rate with assay-assisted therapy compared to empiric therapy and in some studies, improved progression-free survival as well^(10,21–27). Moreover, a study by Orr *et al.*⁽²⁸⁾ suggests that assay-assisted therapy may be more cost-effective when compared to empiric therapy in ovarian cancer. The current study was designed to evaluate the effectiveness of the ChemoFx[®] assay in predicting outcome following chemotherapy in women with ovarian cancer. This assay is designed to select the relevant epithelial ovarian carcinoma cells for testing, to determine the relative cell survival at a range of doses from below to above peak plasma level, to test combinations of drugs, and to determine the degree of response, that is, sensitivity as well as resistance^(14–18). As such, this assay is designed to identify chemotherapeutic agents to which the patient is likely to be resistant and to identify agents to which the patient's tumor is most likely to be sensitive.

In the current series, the PFI was nearly three times longer in ovarian cancer patients who were treated with a drug or combination of drugs to which their tumor was assayed to be sensitive when compared to patients who received a drug(s) to which their tumor

was assayed to be resistant. Moreover, there was a statistically significant direct correlation between graded assay prediction of response and PFI. This correlation between assay prediction of response (resistant, intermediate, sensitive) was strongest in those cases in which the drug or drugs tested exactly matched the chemotherapeutic regimen received by the patient. In fact, in cases with an exact match between the drug or combinations assayed and received, the median PFI for patients treated with drugs assayed to be resistant was 9 months compared to 14 months for those who received drugs assayed as intermediately sensitive. Significantly, the median PFI had not yet been achieved in those patients who received a drug or combination to which they were assayed to be sensitive. This graded prediction of response was also present in the larger cohort of patients in whom the chemoresponse-assayed drug(s) and treatment regimens only partially matched, strongly suggesting that by assaying tumor cell kill at multiple drug concentrations the degree of tumor response to chemotherapy can be graded. The observation that the correlation between median PFI and assay result was strongest in those patients whose chemotherapeutic regimens exactly matched that tested provides indirect evidence that treating with a drug deemed sensitive by the assay has an impact on patient outcome.

As clinical response to chemotherapy is variable along a spectrum from clearly resistance to extremely sensitive, it is not altogether surprising that approximately two thirds of patients had *ex vivo* intermediate responses to chemotherapy in the assay system. The direct correlation between assay assessment of chemoresponse (sensitive, intermediate, and resistance) and PFI indicates the assay results reflect the *in vivo* behavior of the tumor. By performing a retrospective analysis such as this, promising data compels larger, well-controlled prospective studies in which the scoring systems can be better calibrated to match clinical response and enhance clinical utility. Such studies are being instituted but obviously lie beyond the scope of the current communication.

A possible critique of *ex vivo* assay-assisted therapy is that it might simply define those tumors that are inherently more likely to be sensitive or resistant to chemotherapy in general, implying that assay-assisted chemotherapy would have no impact on patient outcome. Certainly, previous reports have shown that patients display different degrees of response *ex vivo* to various chemotherapy agent(s), with a subset being predominantly sensitive or resistant to most agents^(9,10,12–18). In the current series, 20% of cases could be considered generally sensitive to chemotherapy

and 13% generally resistant while the remaining two thirds of tumor specimens demonstrated considerable heterogeneity of response to the different drug(s) tested. As expected, the general pattern of chemotherapy response was predictive of outcome, with a median PFI of 17 months for those with pan-sensitive tumors compared to only 8 months for those with pan-resistant tumors. To assess the potential impact of *ex vivo* assay-assisted therapy on outcome, the PFI for nearly two thirds of cases that displayed varying patterns of response to chemotherapy was analyzed. Within this group, there was a clear trend toward improved PFI when the patient was treated with a regimen that tested sensitive compared to those who were treated with a regimen deemed resistant *ex vivo*, thus providing additional evidence that incorporation of chemotherapy response assay information into treatment selection has the clear potential to improve clinical outcome for women with ovarian cancer (Fig. 4).

The twofold to threefold increase in PFI in patients who received a drug(s) to which their tumor was assayed to be sensitive compared to those who were treated with agents deemed to be resistant observed in this study strongly suggests that the ChemoFx[®] assay is predictive of PFI in ovarian cancer. Moreover, the finding that two thirds of cases demonstrated considerable heterogeneity of response to different drug(s) *ex vivo* suggests that the majority of ovarian cancer patients could benefit from the incorporation of chemotherapy response assay results into traditional empiric treatment planning. Due to the ever-increasing number and cost of potentially effective chemotherapy agents for ovarian cancer, such an individualized approach to chemotherapy has tremendous potential to improve patient outcome at the same time avoiding needless cost and toxicity.

It should be noted that chemoresponse assays are not intended to be an alternative to the traditional empiric method of selecting chemotherapy based on population response rates and physician judgment. Rather they are simply tests that can be used to enhance the probability of selecting the most effective treatment for the individual patient when a number of equivalent options are available, similar to the use of estrogen receptor expression and antiestrogen therapy in breast cancer. Similarly, in the case of recurrent ovarian cancer, chemoresponse assay results may be used to select between clinically equivalent agents, such as topotecan or Doxil. In primary ovarian cancer, patients who are sensitive to platinum compounds should benefit from platinum-based chemotherapy with or without the addition of a taxane. Patients with

intermediate responses to platinum and other empiric ovarian cancer agents may benefit from multiple drug therapy in an attempt to overcome various mechanisms for drug resistance. Patients with platinum resistance who demonstrate *in vivo* sensitivity to other nonplatinum agents may be better treated with these assay-selected agents; and patients resistant to all drugs tested are good candidates for experimental treatment regimens given their documented poor response to conventional strategies. However, elimination of platinum chemotherapy altogether for a subset of platinum-resistant primary ovarian cancer patients would need to be based on well-controlled prospective assay clinical trials.

A further issue is that the assay itself could have affected treatment regimens. Due to the study design, it is not possible to discern to what extent the assay affected patient management. Clearly, investigators used the data for clinical intent; however, without blinding or a reference control group, the magnitude of the effect is not measurable. It is possible that some patients were treated on clinical trial; however, the overwhelming majority of patients were treated with empiric therapy as evidenced by the fact that 98% of exact-match primary patients were treated with platinum-based chemotherapy and 94% of the recurrent patients received platinum, Doxil, paclitaxel, or topotecan (Table 2). Furthermore, in the current investigation, as detailed records regarding response to prior chemotherapy were not generally available, the efficacy of the assay could not be assessed according to platinum sensitivity in patients with recurrent disease. However, this information is being collected for a large series of recurrent ovarian cancer patients from an ongoing prospective clinical trial. However, as the assay is tumor cell dependent and is meant to provide independent information, previous response to chemotherapy is not a part of the scoring algorithm but is rather an independent data point that the treating oncologist is to factor into the overall treatment plan.

A recent American Society for Clinical Oncology publication has recommended that randomized trials showing a survival benefit for assay-assisted therapy serve as the basis for clinical adoption of chemosensitivity and resistance assays. We believe that such trials represent an unprecedented level of evidence for a diagnostic assay⁽²⁹⁾. Based on the promising trends observed in this retrospective evaluation, a large prospective clinical trial designed to determine the accuracy of the ChemoFx[®] assay in patients with ovarian cancer has been initiated. The sensitivity and specificity measures for the ChemoFx[®] assay from this trial in combination with published data from randomized

therapy trials using the same drugs can be used to estimate the impact of the assay on outcome in ovarian cancer. We expect that this approach will demonstrate the accuracy of the ChemoFx[®] assay in predicting response to therapy in ovarian cancer.

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