

Onconova Therapeutics, Inc. (ONTX)

Overweight

Initiating with OW: Rigosertib, A PI3K On A Road Less Traveled

CONCLUSION

We are initiating coverage on Onconova with an Overweight rating and a 12-month price target of \$38 per share. We believe lead drug rigosertib offers a differentiated profile from the highly valued PI3K class of inhibitors (idelalisib and IPI-145) and similar drugs (ibrutinib), while targeting an alternative development strategy of MDS and pancreatic cancer versus leukemia/lymphoma, which should allow a fast route to market with limited competition. We believe the strong OS data from the Phase II in refractory higher risk MDS point to positive Phase III data in 1Q14, with launch by 2015. We estimate peak US sales of \$500mn (WW \$1bn) in this Orphan indication as refractory MDS patients have limited options and median survival measured in weeks. Upside expected from rigosertib (oral) moving to frontline low risk MDS (Phase II data at ASH Dec 7-10, 2013), and from positive Phase II/III frontline metastatic pancreatic cancer data (1Q14).

- **Severe unmet need in refractory higher MDS.** Onconova is evaluating rigosertib in higher-risk MDS patients who are refractory to hypomethylating agents Vidaza and Dacogen, a population with no treatment options and historical median survival of 17-22 weeks. We expect rigosertib to duplicate its Phase II median OS of 36 weeks in the Phase III, which would allow premium pricing over Vidaza (\$7K per month) and a peak US sales opportunity of \$500mn (WW \$1bn).
- **Rigosertib differentiated from other PI3Ks.** Rigoserib is a dual phosphatidylinositol 3-kinase (PI3K) and polo-like kinase (PLK) inhibitor. We believe the PI3K pathway is a validated target in cancers from PI3K inhibitors being developed by other biotechs including Gilead's idelalisib, Infinity's IPI-145, and indirectly Pharmacocyclics' ibrutinib (BTK inhibitor). Unlike Gilead's and Infinity's drugs, which inhibit the delta (both) and gamma (Infinity) isoforms, rigosertib selectively targets the alpha and beta forms of PI3K. In addition, overexpression of PLK enzymes is associated with cancer cells, with inhibition leading to reduction of pro-mitotic activity.
- **Upside from lower-risk MDS and pancreatic cancer.** The oral formulation of rigosertib had positive interim results from the Phase II study in lower-risk MDS. We are only assuming \$300mn 2026 US sales in non-5Qminus MDS, versus a potential \$1.0bn WW peak sales opportunity. Rigosertib is also in a Phase II/III pancreatic cancer study, which will have interim data in 1Q14. We estimate a \$2bn+ WW peak sales opportunity if positive.

RISKS TO ACHIEVEMENT OF PRICE TARGET

Principal risks include 1) failure of rigosertib to differentiate itself in clinical trials, 2) delay of rigosertib in reaching the market, 3) increased competition from similar drugs in development, including Celgene's oral Vidaza and Astex Pharmaceuticals' SGI-110.

COMPANY DESCRIPTION

Onconova focuses on cancer and radiation injury therapies

YEAR	REVENUE (US\$ m)						EARNINGS PER SHARE (US\$)					
	Mar	Jun	Sep	Dec	FY	FY RM	Mar	Jun	Sep	Dec	FY	FY P/E
2012A	—	—	—	—	46.2	11.6x	—	—	—	—	(2.44)	NM
2013E	1.1A	1.0	1.0	1.0	4.1	130.3x	(0.93)A	(0.98)	(0.76)	(0.78)	(3.40)	NM
2014E	—	—	—	—	104.0	5.1x	—	—	—	—	1.18	21.8x

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PRICE: US\$25.69

TARGET: US\$38.00

DCF of projected free cash flows for 2015-2026, with a 10% discount rate

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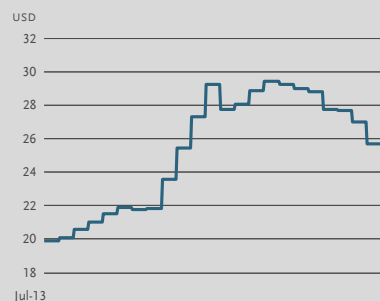
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Changes	Previous	Current
Rating		Overweight
Price Tgt		US\$38.00
FY13E Rev (mil)	—	US\$4.1
FY14E Rev (mil)	—	US\$104.0
FY13E EPS	—	US\$(3.40)
FY14E EPS	—	US\$1.18
52-Week High / Low	US\$30.00 / US\$15.00	
Shares Out (mil)		20.8
Market Cap. (mil)		US\$534.4
Book Value/Share		US\$0.85
Net Cash Per Share		US\$3.33
Debt to Total Capital		0%
Yield		0.00%
Fiscal Year End		Dec

Price Performance - 1 Year



Source: Bloomberg

Onconova Therapeutics (ONTX): Snapshot

- **Onconova Therapeutics is a clinical stage biotechnology company focused on discovery, development, and commercialization of cancer and radiation injury therapies.**
- **~\$105mn cash balance after IPO. Well funded by Baxter and SymBio agreements. Future milestone payments could avoid further capital needs.**
- **Lead drug: Rigosertib, a first in class, dual phosphatidylinositide 3-kinase (PI3K) and polo-like kinase (PLK) inhibitor**
 - **First indication: 2nd line Higher risk Myelodysplastic syndromes (MDS).** Phase III trial fully enrolled, top-line survival data expected 1Q14.
 - Estimate ~12k patients failing hypomethylating drugs annually in US; ~17k in EU; \$500mn peak US sales opportunity (\$1bn WW)
 - Severe, unmet medical need. No approved drugs for 2nd line higher risk MDS after failing Celgene's Vidaza and Eisai's Dacogen.
 - Phase II survival data points to positive Phase III results
 - **Upside from 1st line lower risk MDS (oral) and pancreatic cancer (IV):**
 - 1st line lower risk MDS, oral formulation Phase II: ~26K patients in the US (~18K non-5Qminus) and ~37K patients in Europe (~23K non-5Qminus). Peak WW sales opportunity of \$1bn.
 - 1st line metastatic pancreatic cancer Phase III: Combination with gemcitabine. 44,000 US annual incidence for pancreatic cancer, >80% metastatic disease and 95% with adenocarcinoma. \$1bn peak US sales opportunity; WW \$2bn+
- **Differentiated development strategy versus other PI3Ks (INFI's IPI-145 and GILD's idelalisib)**
 - **Tackling MDS first compared to CLL/NHL for other PI3K inhibitors**
 - **Targeting alpha and beta isoforms of PI3K versus delta and gamma**

Source: Piper Jaffray and Company reports

Onconova Therapeutics (ONTX): Investment Summary

What does the company do? Onconova is a clinical stage biotechnology company focused on the discovery, development, and commercialization of cancer and radiation injury therapies.

Key Pipeline Drug:

- **Rigosertib:** a first in class, dual phosphatidylinositide 3-kinase (PI3K) and polo-like kinase (PLK) inhibitor in Phase III for 2nd line higher risk myelodysplastic syndromes (MDS) and Phase II for 1st line lower risk MDS. We model peak sales of ~\$1.5bn in the US and EU. An additional potential indication includes pancreatic cancer.

INVESTMENT THESIS:

We believe Onconova's lead drug rigosertib offers a differentiated profile from the highly valued PI3K class of inhibitors (GILD's idelalisib and INFI's IPI-145) and similar drugs (PCYC's ibrutinib, BTK inhibitor), while targeting an alternative development strategy of MDS and pancreatic cancer versus CLL, MCL, and NHL, which should allow a fast route to market with limited competition. We believe the strong OS data from the Phase II study in refractory higher risk MDS point to positive Phase III data in 4Q13/1Q14, with approval and launch by 2015. We estimate peak US sales of \$500mn (WW \$1bn) in this Orphan indication as patients refractory to Vidaza and Dacogen have limited options and a median survival measured in weeks. Upside expected from rigosertib (oral) moving to frontline low risk MDS (Final Phase II data at ASH Dec 7-10, 2013), and positive data from the Phase II/III frontline metastatic pancreatic cancer study (1Q14).

Key Risks:

- Risks include 1) failure of rigosertib to differentiate itself in clinical trials, 2) delay of rigosertib in reaching the market, 3) increased competition from similar drugs in development, including Celgene's oral Vidaza and Astex Pharmaceuticals SGI-110.

Next Potential Catalysts:

- Phase II data in 1st line lower-risk MDS (ASH Dec 7-10, 2013)
- Phase III data in 2nd line higher-risk MDS (1Q14)
- Phase II/III interim futility/survival data in 1st line metastatic pancreatic cancer (1Q14)

Source: Piper Jaffray and Company reports

Onconova(ONTX): DCF Valuation – PT of \$38 per share

12-Month Price Target of \$38 per share based on DCF valuation

- Projected free cash flows for the period of FY2015-2026
- Discounted to the end of FY2014
- Assume terminal value of \$0, which is highly conservative given possible extensions to rigosertib patent estate beyond 2026 and no credit given to growing R&D spend
- Discount rate of 10%, in-line with calculated WACC of 10%

Onconova(ONTX): DCF Valuation – PT of \$38 per share

Onconova Discounted Cash Flow Valuation

Piper Jaffray Biotechnology Research

(\$ th, except per share amounts)

	2014E	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
Net FCFF	23,820	12,291	(11,820)	35,299	118,212	91,358	145,366	179,048	217,641	247,024	275,181	296,038	315,868
<i>Growth</i>		-48%	-196%	-399%	235%	-23%	59%	23%	22%	14%	11%	8%	7%
PV of Net FCFF	23,820	11,174	(9,769)	26,521	80,740	56,726	82,055	91,880	101,531	104,762	106,094	103,760	100,645

Discounted Cash Flow (DCF) and Equity Valuation (\$th, except per share amount):

<i>Assumed Discount Rate (%)</i>	10.0%
Discounted Net Cash Flow (2015-26)	\$856,120
<i>Terminal Growth Rate (%)</i>	No TV
<i>Implied Terminal Year FCF Multiple</i>	0.0x
Present Value of Terminal Value	\$0
<i>Terminal Value as % of total</i>	0.0%
Enterprise Value	\$856,120
Add: Net Cash	117,853
Equity Value	\$973,973
Shares Outstanding 2014E (million)	25,602
Equity Value per Share	\$38

Equity Value Sensitivity Analysis					
No Terminal Value	Discount Rate				
		9.0%	10.0%	11.0%	12.0%
	No TV	\$1,040,410	\$973,973	\$913,326	\$857,894
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Value per Share					
No Terminal Value	Discount Rate				
		9.0%	10.0%	11.0%	12.0%
	No TV	\$41	\$38	\$36	\$34
	No TV	\$41	\$38	\$36	\$34
	No TV	\$41	\$38	\$36	\$34
	No TV	\$41	\$38	\$36	\$34
	No TV	\$41	\$38	\$36	\$34

WACC Calculation

Predicted beta	1.4
10-year Bond yield (risk-free rate) US	2.70%
Market return rm	8.0%
Market premium	5.3%
Cost of equity	9.96%
Cost of debt (before tax)	5.0%
Cost of debt (after tax 35%)	3.3%
Market Equity 2013E (mn)	570
Total Debt 2013E (mn)	0
Debt + Equity	570
WACC	10.0%

Source: Factset and Piper Jaffray

Onconova Therapeutics (ONTX)

Principal Risks

➤ Failure of rigosertib to differentiate itself in clinical trials

- PI3K inhibition is a popular mechanism in the oncology space, with INFI and GILD leading most hematological indications. Onconova is differentiating rigosertib by tackling MDS first.

➤ Delay of rigosertib in reaching the market

- Missing projected timelines for data and regulatory filings would push out our revenue estimates for rigosertib, lowering our valuation

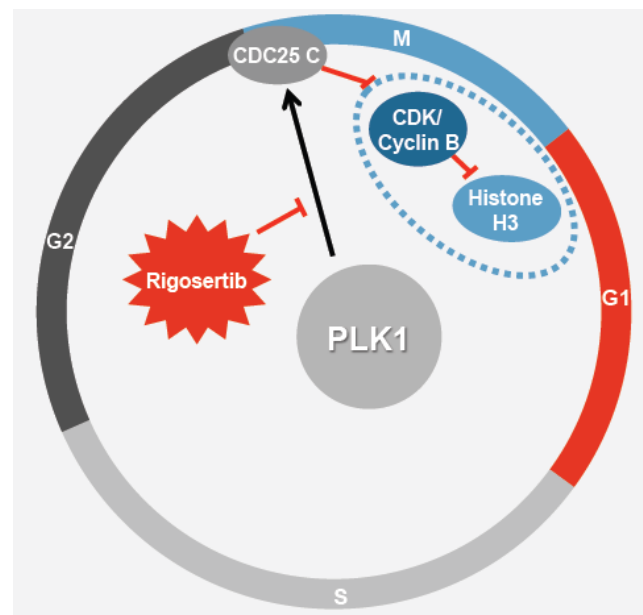
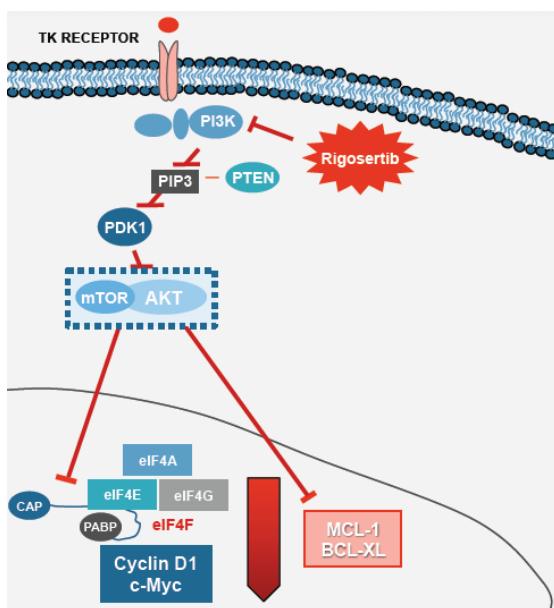
➤ Increased competition from similar drugs in development

- Celgene's oral azacitidine (CC-486) in Phase III
- Telik's Telintra in Phase II
- Astex's SGI-110 in Phase II
- Acceleron/Celgene's sotatercept (ACE-011) in Phase II
- GSK's eltrombopag in Phase II
- Merck's vorinostat in Phase II
- Array's ARRY-614 in Phase I

Onconova Therapeutics (ONTX): Rigosertib Background

- First-in-class dual inhibitor of phosphatidylinositol 3-kinase (PI3K) and polo-like kinase (PLK). In Phase III development for 2nd line higher-risk MDS
- Selective inhibition of alpha and beta isoforms of PI3K
- PLK is overexpressed in cancer cells
- Small molecule: IV and oral formulations
- Active in MDS and solid tumors
 - **850 patient safety database to date** – larger than PCYC, GILD, and INFI

Rigosertib Inhibits Both PI3K & PLK



Source: Company Reports & Piper Jaffray

Onconova Therapeutics (ONTX): Rigosertib Trials

Indication	Line of Therapy	Mono or Combo	Mode of Administration	Clinical Stage	Status	Milestones
Higher Risk MDS	Second Line	Monotherapy	IV	Phase 3	100% Enrolled	Top-line Survival results 1Q14
Lower Risk MDS	First Line	Monotherapy	Oral	Phase 2	Interim data presented at ASCO 2013	Response Data ASH 2013 (Dec 7-10)
Head & Neck Cancer	Second Line	Monotherapy	Oral	Phase 2	HPV +/-	Complete Enrollment 2H14
Pancreatic Metastatic Cancer	First Line	Combination with Gemcitabine	IV	Phase 2	100% Enrolled to Interim point	Interim Futility/Survival Analysis 1Q14

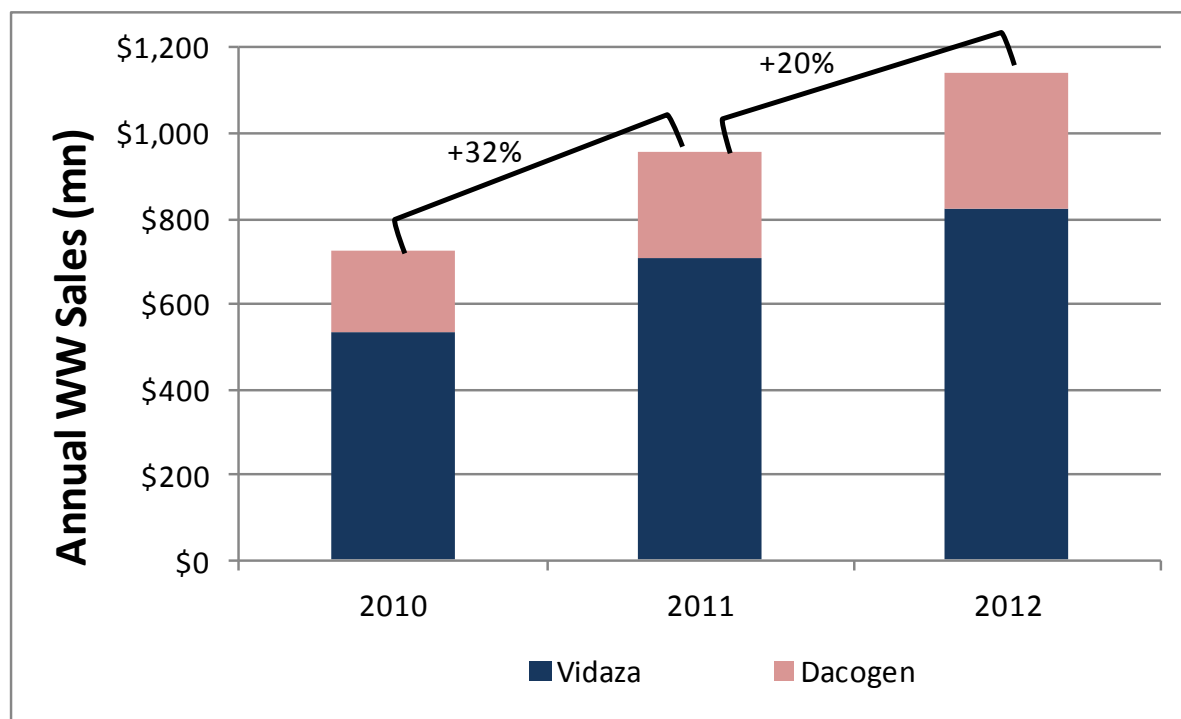
Source: Company Reports

Onconova Therapeutics (ONTX)

Market Opportunity – PRIMARY

- Targeting Second Line Higher-risk MDS
 - We estimate **12K MDS patients in the US and 17K in the EU fail Dacogen/Vidaza annually**
 - Peak US sales opportunity of **\$500mn**; WW \$1bn

Current Worldwide Higher Risk MDS Market – \$1.1bn Combined Dacogen/Vidaza Annual Sales



Vidaza/Dacogen avg treatment duration of 4.5 months vs an estimated 8 months for rigosertib

Source: Piper Jaffray and Company reports

Onconova Therapeutics (ONTX)

Market Opportunity – Upside and Partnerships

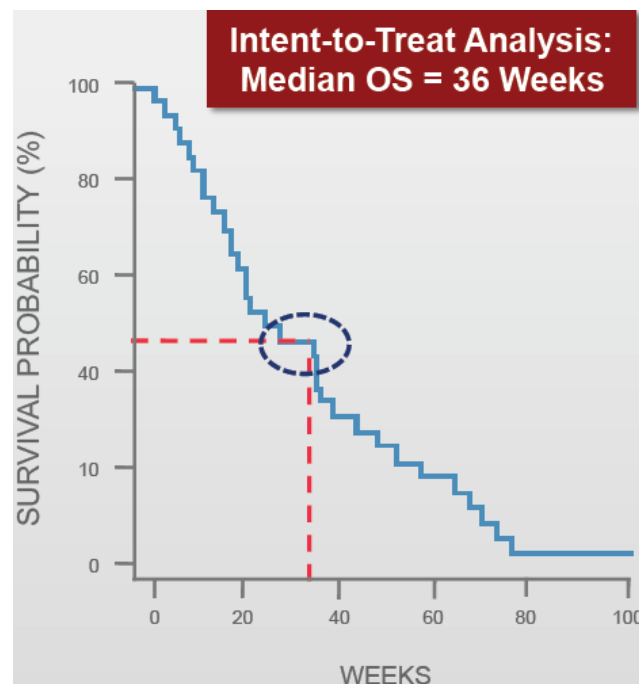
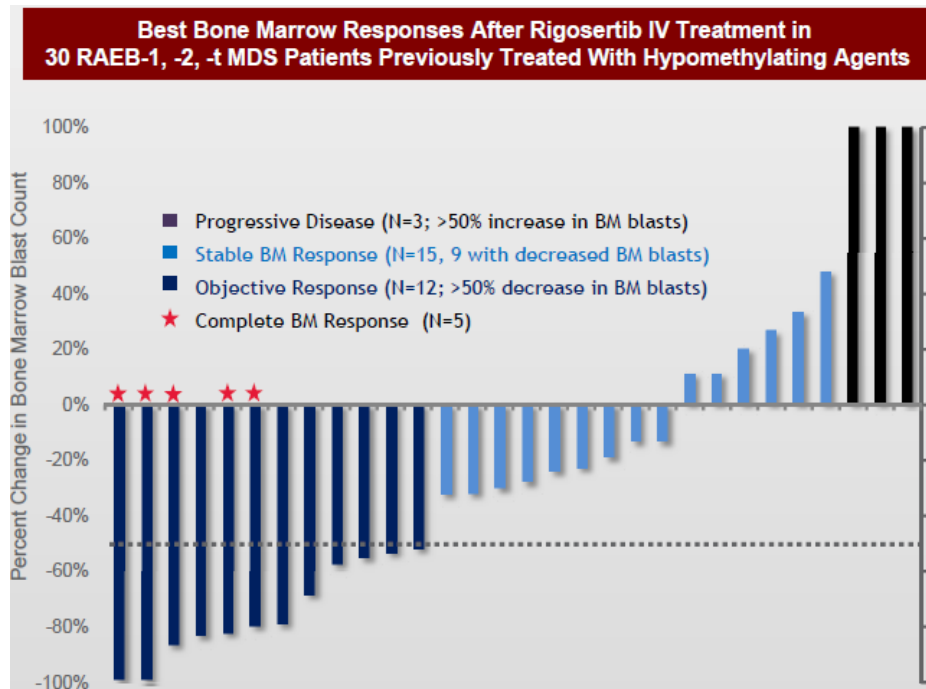
- **Conservative Lower risk MDS estimates**
 - **1st line lower risk MDS, oral formulation Phase II:** ~26K patients in the US (~18K non-5Qminus) and ~37K patients in Europe (~23K non-5Qminus). **Peak WW sales opportunity of \$1bn.**
 - **Our model assumes US sales in non-5Qminus and only reaches \$300mn by 2026**
- **Pancreatic cancer is upside**
 - **1st line metastatic pancreatic cancer Phase III:** Combination with gemcitabine. 44,000 US annual incidence for pancreatic cancer, >80% metastatic disease and 95% with adenocarcinoma. **\$1bn peak US sales opportunity; WW \$2bn+**
- **We assume US and EU sales only**
 - Partnership in EU with Baxter (signed Sept 2012)
 - \$50mn upfront, \$512.5mn R&D and regulatory milestones, \$250mn commercial milestones
 - Royalties of low teens to low twenties
 - Partnership in Japan/Korea with SymBio (signed July 2011) is upside
 - \$7.5mn upfront, \$33mn R&D and regulatory milestones, \$30mn commercial milestones
 - Royalties of mid-teens to 20%

Source: Piper Jaffray

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #1: How did Rigosertib fare in Phase II Higher Risk MDS?

- 17% Complete Bone Marrow Response (5/30pts)
- 40% Objective Response Rate (12/30pts)
- Patients reflective of Phase 3 enrollment
- 36 Weeks Median Overall Survival (ITT analysis)
- Historically 17-22 Weeks OS for this patient population found in literature
- Points to likely OS Benefit in Phase 3 study

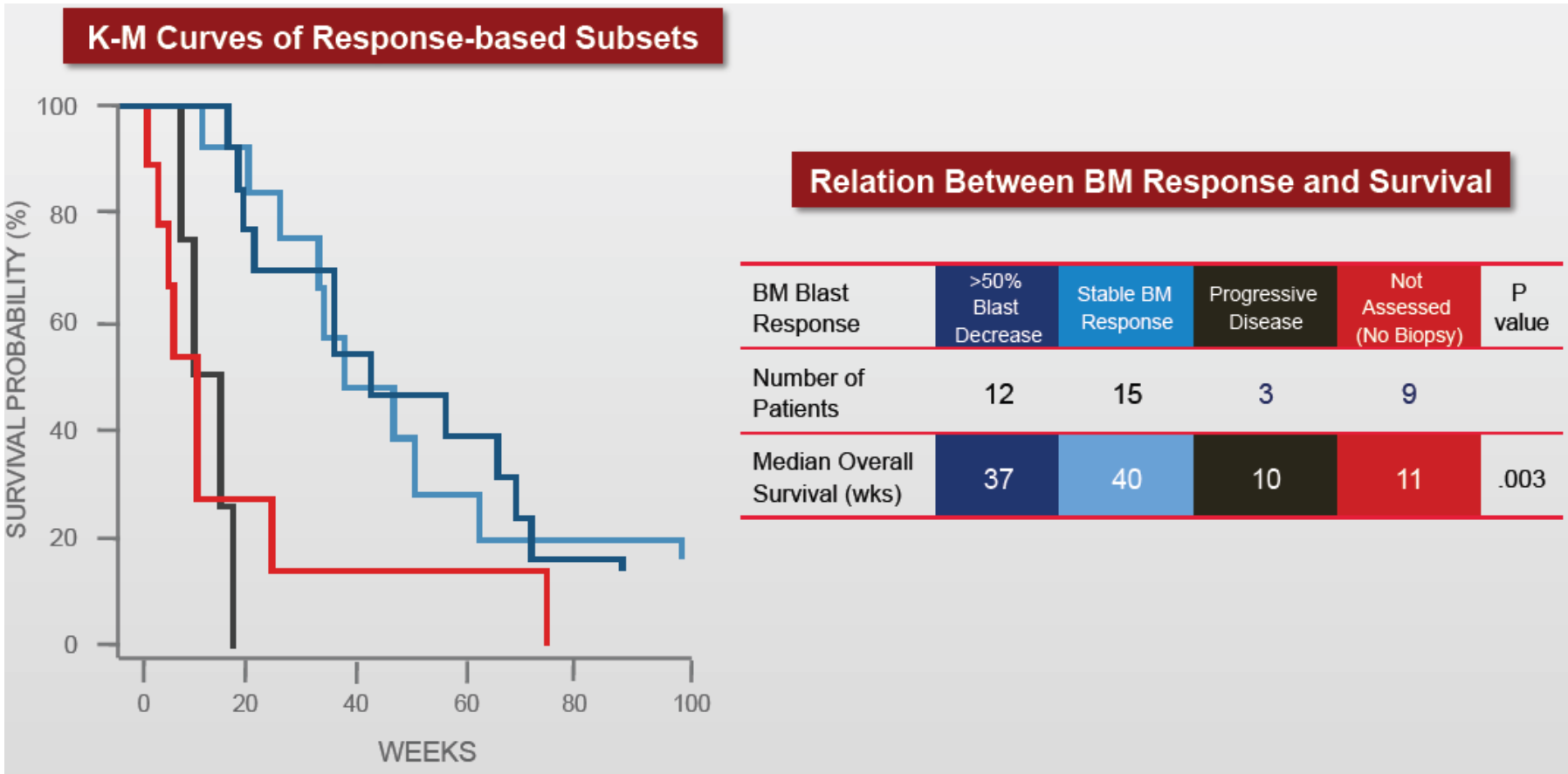


Source: Company Reports & Piper Jaffray

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #1: How did Rigosertib fare in Phase II Higher Risk MDS?

- **Clear Relationship** Between Bone Marrow Response and Survival
- Response Rate should be **predictive** of survival benefit



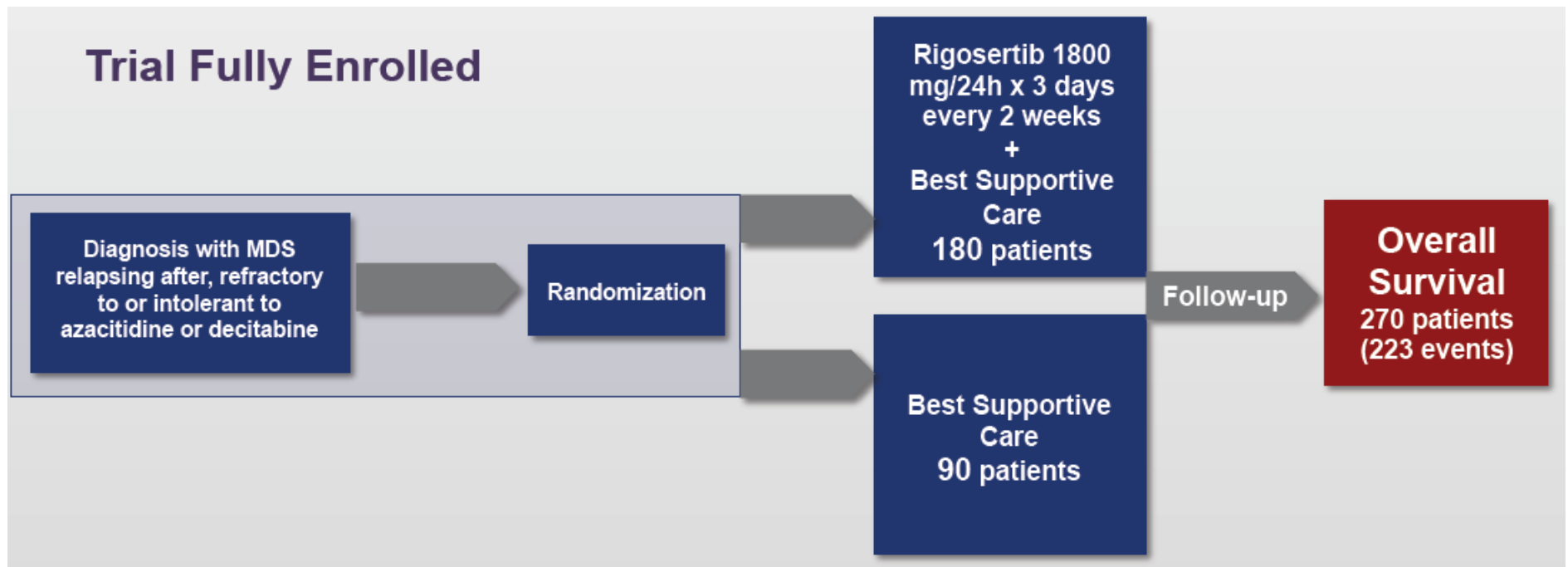
Source: Company Reports & Piper Jaffray

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #2: What does the Phase III Study Design Look Like?

Pivotal Phase III Study Under SPA:

- MDS patients who have failed prior Vidaza or Dacogen therapy
- No other Phase III trials in 2nd line MDS



- >90% powered to show 10-13 week difference in overall survival

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #3: What are the Regulatory Timelines?

Rigosertib could be approved and launched in the US by 2015 and EU by 2016

US FDA Regulatory Event	Expected Timing
CMC meeting	4Q 2013
Pre-NDA meeting	2Q 2014
File NDA	4Q 2014
Europe EMA Regulatory Event	Expected Timing
National Advice Non-clinic, CMC [MPA/BfArM]	4Q 2013
Informal Advice meeting (after 04-21 TLD)	2Q 2014
Submit LOI to EMA	2Q 2014
File MAA	4Q 14/ 1Q 15

Source: Company Reports & Piper Jaffray

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #4: How does the PI3K inhibition compare to IPI-145 and Idelalisib?

Rigosertib selectively inhibits **alpha** and **beta** isoforms of PI3K

- Cellular IC50 for alpha/beta are between 0.5 and 1 μ M, compared >100 μ M for delta/gamma
 - better safety profile
- Infinity’s IPI-145 and Gilead’s Idelalisib have similar IC50 for alpha/beta, but much more potent for delta (and gamma for IPI-145)
- Higher doses for Regosertib (IV: 1800mg/day for 3 days and oral: 560mg BID) compared to IPI-145’s 25-100mg BID in Phase 1 study compensates for difference in potency

		Rigosertib	IPI-145	Idelalisib
Cellular IC50 (μ M)	PI3K- α	0.5 - 1	1.5	5.4
	PI3K- β	0.5 - 1	0.2	0.5
	PI3K- δ	>100	0.001	0.007
	PI3K- γ	>100	0.043	1.7

Source: Company Reports & Piper Jaffray

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #5: What is the Opportunity in Lower-Risk MDS ?

- **1st Line Lower Risk MDS**

- ~26K patients in the US
 - ~18K non-5Q minus
 - ~8K 5Qminus (Revlimid approved)
- ~37K patients in Europe
 - ~23K non-5Q minus
 - ~14K 5Q minus
- Peak WW sales opportunity of \$1bn

- **Oral Formulation in Phase II**

- Interim results presented at ASCO 2013
- Final results at ASH 2013 (Dec 7-10)

- **~\$1bn peak WW sales potential**

- Assume 10-month average duration
- 25% peak penetration in non-5Q minus only

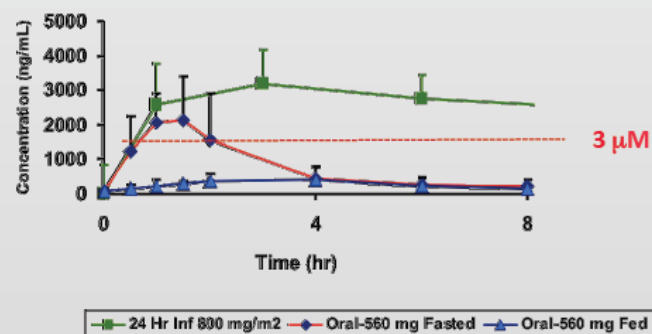
Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #5: What is the Opportunity in Lower-Risk MDS ?

Phase 1 Results For Oral Rigosertib

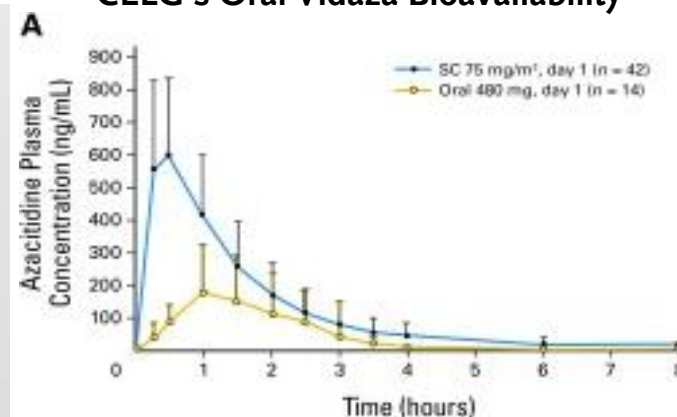
- 2 Bone Marrow CRs in High-risk patients
 - Also 1 platelet and 1 ANC response
- 4 Transfusion independence in Lower-risk transfusion dependent patients
 - Also 1 erythroid response
- 560mg BID recommended Phase II dose

Plasma Level of Rigosertib in Bioavailability Study



Absolute bioavailability of ~35%

CELG's Oral Vidaza Bioavailability

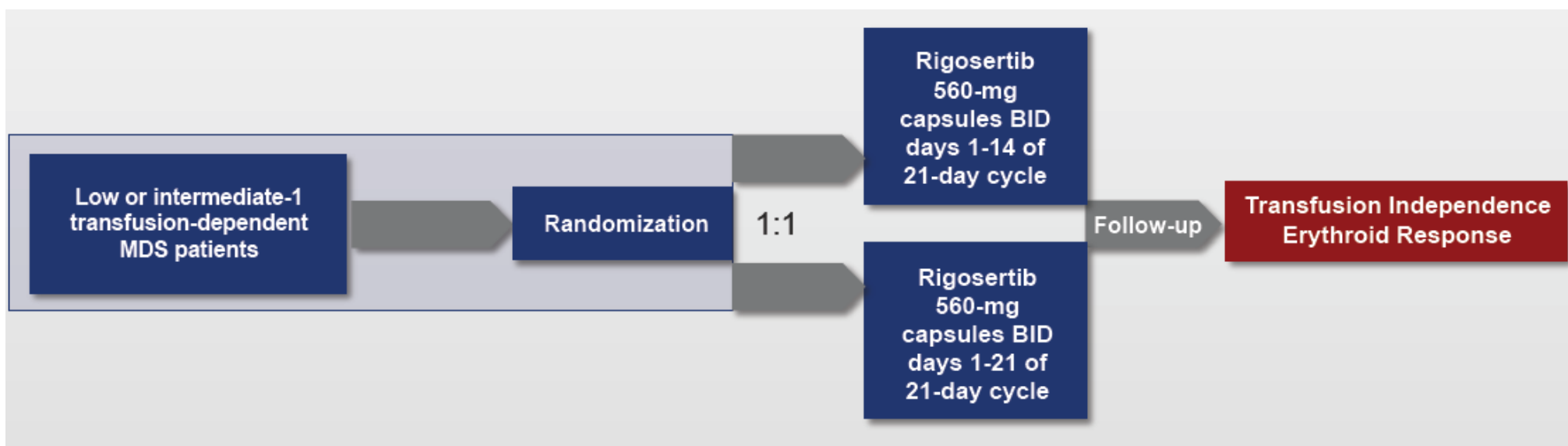


Source: Piper Jaffray and Company reports

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #5: What is the Opportunity in Lower-Risk MDS ?

Phase II Study Design – Final Results ASH 2013

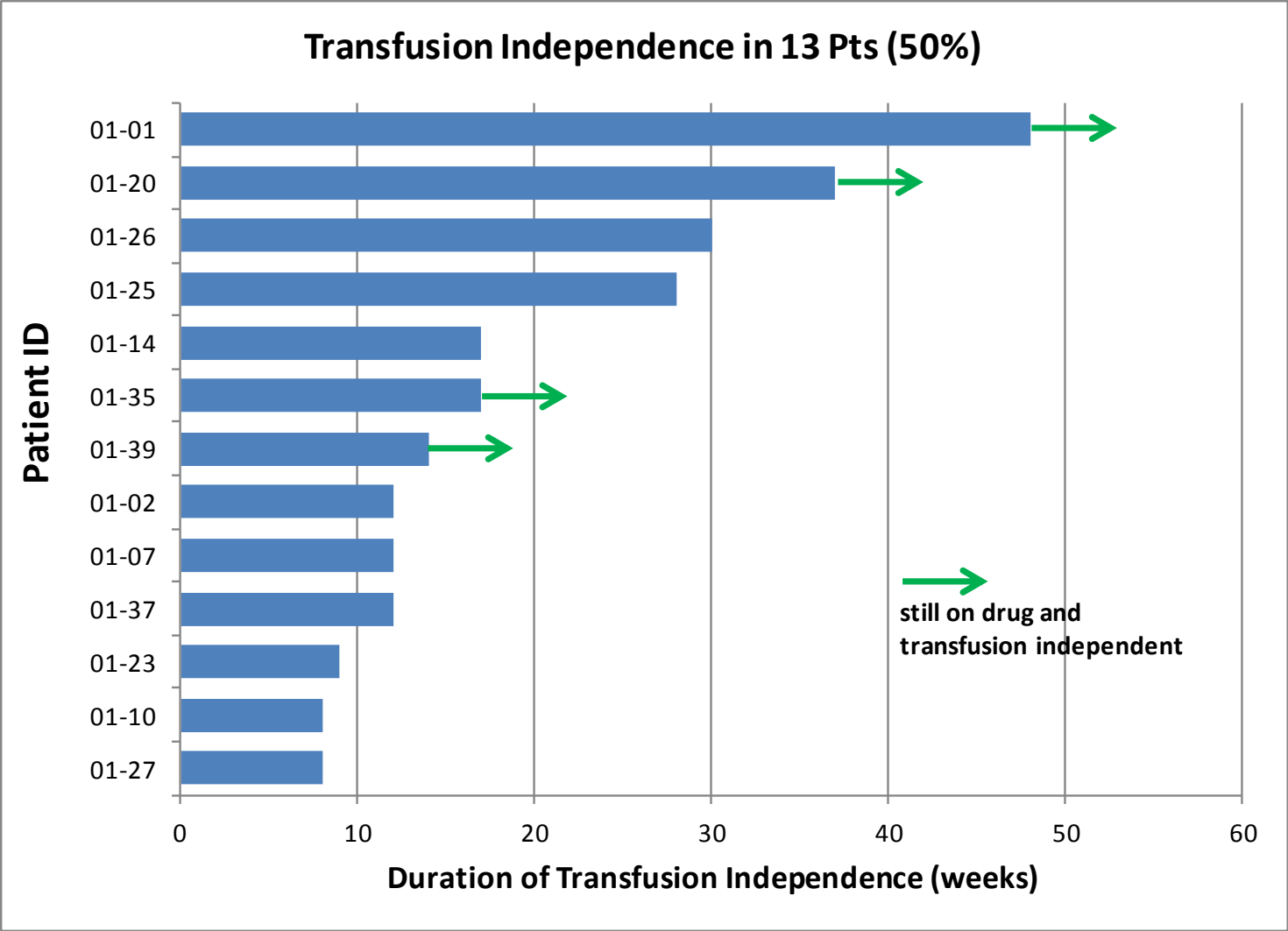


Source: Piper Jaffray and Company reports

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #5: What is the Opportunity in Lower-Risk MDS ?

Phase II Interim Results at ASCO 2013



Source: Company reports

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #5: What is the Opportunity in Lower-Risk MDS ?

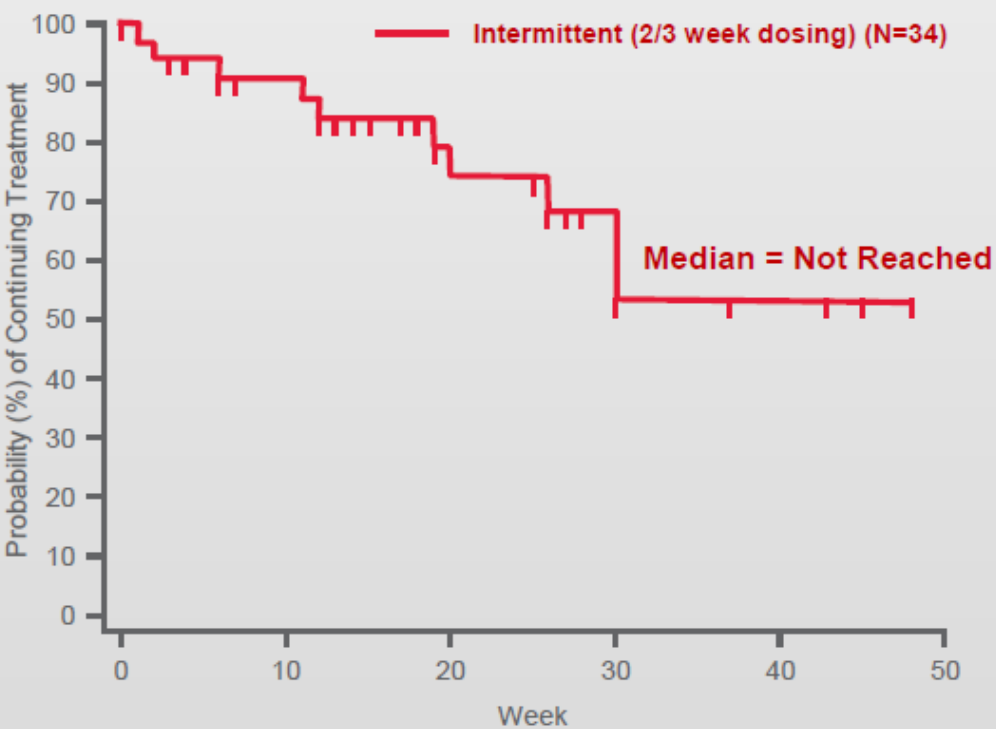
Phase II Interim Results at ASCO 2013

Interim results: 13/26 evaluable patients (ASCO 2013 presentation) achieved Transfusion Independence

Duration of Transfusion Independence

PID	Response, week	
	Onset	Duration
01-01	1	48+
01-02	4	12
01-07	19	12
01-10	13	8
01-14	1	17
01-20	1	37+
01-23	1	9
01-25	1	28
01-26	1	30
01-27	24	8
01-35	14	17+
01-37	1	12
01-39	1	14+

Duration of Treatment With Intermittent Dosing



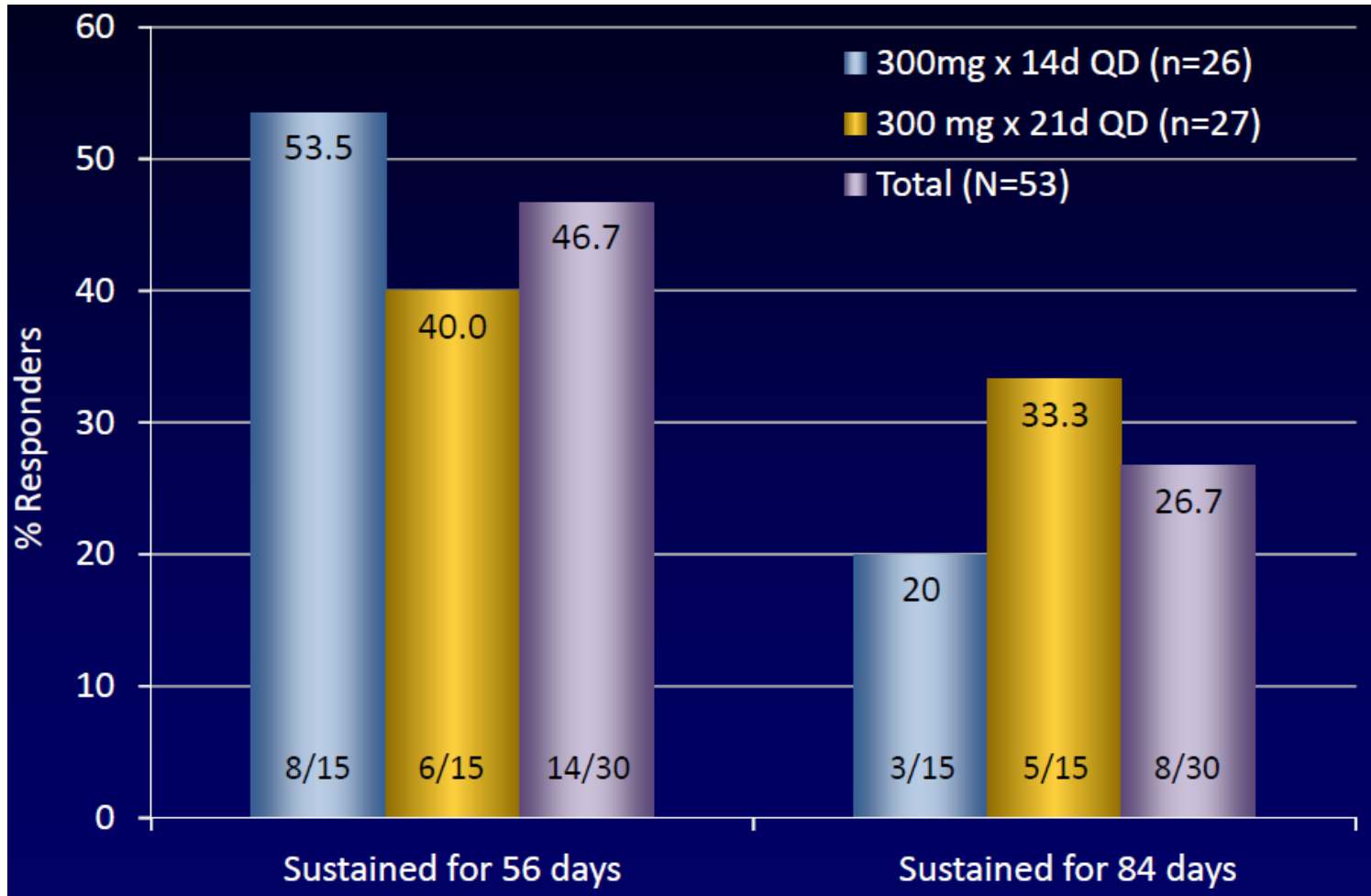
Source: Piper Jaffray and Company reports

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #5: What is the Opportunity in Lower-Risk MDS ?

Phase I Results For CELG’s Oral Vidaza CC-486 at ASH 2012

Percentage of Patients Achieving Transfusion Independence

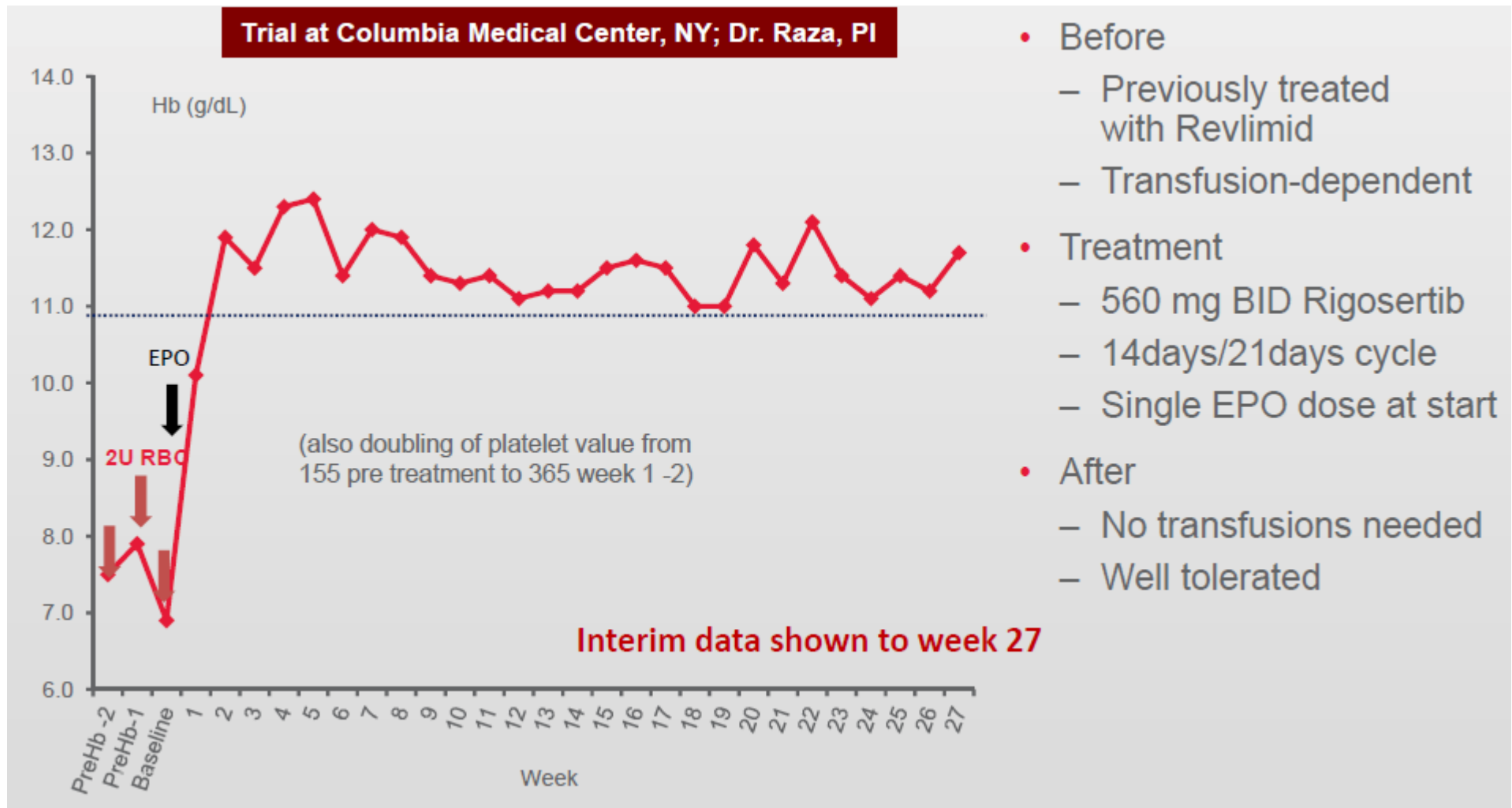


Source: Piper Jaffray and Company reports

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #5: What is the Opportunity in Lower-Risk MDS ?

One Patient Outcome From Phase II interim results



Source: Piper Jaffray and Company reports

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #6: What is the market opportunity for Rigosertib?

Lower-Risk MDS 2015-2026 US Revenue Model

	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
Low/Int-1 Risk												
Refractory Anemia (RA)	11,825	12,100	12,375	12,650	12,925	13,200	13,475	13,750	14,025	14,300	14,575	14,850
% RA	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%
Refractory Anemia With Ringed Sideroblasts (RARS)	4,838	4,950	5,063	5,175	5,288	5,400	5,513	5,625	5,738	5,850	5,963	6,075
% RARS	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Refractory Anemia With Excess Blasts In Transformation (RAEB-t)	11,288	11,550	11,813	12,075	12,338	12,600	12,863	13,125	13,388	13,650	13,913	14,175
% RAEB-t	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%
Total Low/Int-1 Risk	27,950	28,600	29,250	29,900	30,550	31,200	31,850	32,500	33,150	33,800	34,450	35,100
% Low/Int-1 Risk	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
MDS non-5Q-	19,565	20,020	20,475	20,930	21,385	21,840	22,295	22,750	23,205	23,660	24,115	24,570
% non-5Q-	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
non-5Q- Patients Prescribed Rigosertib	0	0	205	628	1,069	1,529	1,784	2,048	2,321	2,484	2,653	2,826
% Penetration	0.0%	0.0%	1.0%	3.0%	5.0%	7.0%	8.0%	9.0%	10.0%	10.5%	11.0%	11.5%
Price Per Patient/month (\$)	8,500	8,670	8,843	9,020	9,201	9,385	9,572	9,764	9,959	10,158	10,361	10,569
Duration of therapy (# of months)	0	0	5.0	7.0	9.0	9.5	10.0	10.0	10.0	10.0	10.0	10.0
Price Per Patient/Year (\$)	0	0	44,217	63,142	82,806	89,155	95,724	97,638	99,591	101,583	103,615	105,687
Rigosertib Sales in non-5Q- MDS	0	0	9,053	39,647	88,540	136,299	170,733	199,914	231,101	252,362	274,853	298,623
Growth %				338%	123%	54%	25%	17%	16%	9%	9%	9%
MDS 5Q-	8,385	8,580	8,775	8,970	9,165	9,360	9,555	9,750	9,945	10,140	10,335	10,530
% 5Q-	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
5Q- Patients Prescribed Rigosertib	0	0	0	0	0	0	0	0	0	0	0	0
% Penetration	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Price Per Patient/month (\$)	8,500	8,670	8,843	9,020	9,201	9,385	9,572	9,764	9,959	10,158	10,361	10,569
Duration of therapy (# of months)	0	0	0	0	0	0	0	0	0	0	0	0
Price Per Patient/Year (\$)	0	0	0	0	0	0	0	0	0	0	0	0
Rigosertib Sales in 5Q- MDS	0	0	0	0	0	0	0	0	0	0	0	0
Growth %				nm	nm	nm	nm	nm	nm	nm	nm	nm
Low/Int-1 Risk Patients Prescribed Rigosertib	0	0	205	628	1,069	1,529	1,784	2,048	2,321	2,484	2,653	2,826
% Penetration	0.0%	0.0%	0.7%	2.1%	3.5%	4.9%	5.6%	6.3%	7.0%	7.4%	7.7%	8.1%

Source: Piper Jaffray

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #6: What is the market opportunity for Rigosertib?

Higher-Risk MDS 2015-2026 US Revenue Model

	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
Int-2/High Risk												
Refractory Anemia With Excess Blasts (RAEB)	17,738	18,150	18,563	18,975	19,388	19,800	20,213	20,625	21,038	21,450	21,863	22,275
% RAEB	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Refractory Cytopenia With Multilineage Dyslasia (RCMD)	6,450	6,600	6,750	6,900	7,050	7,200	7,350	7,500	7,650	7,800	7,950	8,100
% RCMD	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
Unclassifiable	1,613	1,650	1,688	1,725	1,763	1,800	1,838	1,875	1,913	1,950	1,988	2,025
% Unclassifiable	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Total Int-2/High Risk	25,800	26,400	27,000	27,600	28,200	28,800	29,400	30,000	30,600	31,200	31,800	32,400
% Int-2/High Risk	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%
Frontline Int-2/High Risk Patients Prescribed Rigosertib	0	0	0	0	0	0	0	0	0	0	0	0
% Penetration	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Price Per Patient/month (\$)	8,500	8,670	8,843	9,020	9,201	9,385	9,572	9,764	9,959	10,158	10,361	10,569
Duration of therapy (# of months)	4	4	4	4	4	4	4	4	4	4	4	4
Price Per Patient/Year (\$)	34,000	34,680	35,374	36,081	36,803	37,539	38,290	39,055	39,836	40,633	41,446	42,275
Refractory/Relapsed Int-2/High Risk	12,900	13,200	13,500	13,800	14,100	14,400	14,700	15,000	15,300	15,600	15,900	16,200
% Int-2/High Risk	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Second line Int-2/High Risk Patients Prescribed Rigosertib	645	2,376	4,050	5,244	6,063	6,768	7,350	8,250	8,798	9,360	9,540	9,720
% Penetration	5.0%	18.0%	30.0%	38.0%	43.0%	47.0%	50.0%	55.0%	57.5%	60.0%	60.0%	60.0%
Price Per Patient/month (\$)	8,500	8,670	8,843	9,020	9,201	9,385	9,572	9,764	9,959	10,158	10,361	10,569
Duration of therapy (# of months)	4	4	4	4	4	4	4	4	4	4	4	4
Price Per Patient/Year (\$)	34,000	34,680	35,374	36,081	36,803	37,539	38,290	39,055	39,836	40,633	41,446	42,275
Rigosertib Sales in Int-2/High Risk MDS	21,930	82,400	143,263	189,209	223,135	254,062	281,428	322,206	350,461	380,326	395,393	410,910
Growth %		276%	74%	32%	18%	14%	11%	14%	9%	9%	4%	4%
Total Rigsertib MDS Revenues, U.S. (\$th)	\$21,930	\$82,400	\$152,317	\$228,856	\$311,675	\$390,362	\$452,161	\$522,121	\$581,562	\$632,689	\$670,246	\$709,534
% Annual Growth		275.7%	84.9%	50.3%	36.2%	25.2%	15.8%	15.5%	11.4%	8.8%	5.9%	5.9%

Source: Piper Jaffray

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #6: What is the market opportunity for Rigosertib?

Higher-Risk MDS 2015-2026 EU Revenue Model

	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
Int-2/High Risk												
Refractory Anemia With Excess Blasts (RAEB)	25,339	25,929	26,518	27,107	27,696	28,286	28,875	29,464	30,054	30,643	31,232	31,821
% RAEB	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Refractory Cytopenia With Multilineage Dyslasia (RCMD)	9,214	9,429	9,643	9,857	10,071	10,286	10,500	10,714	10,929	11,143	11,357	11,571
% RCMD	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
Unclassifiable	2,304	2,357	2,411	2,464	2,518	2,571	2,625	2,679	2,732	2,786	2,839	2,893
% Unclassifiable	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Total Int-2/High Risk	36,857	37,714	38,571	39,429	40,286	41,143	42,000	42,857	43,714	44,571	45,429	46,286
% Int-2/High Risk	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%
Frontline Int-2/High Risk Patients Prescribed Rigosertib	0	0	0	0	0	0	0	0	0	0	0	0
% Penetration	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Price Per Patient/month (\$)	7,225	7,370	7,517	7,667	7,821	7,977	8,137	8,299	8,465	8,635	8,807	8,983
Duration of therapy (# of months)	4	4	4	4	4	4	4	4	4	4	4	4
Price Per Patient/Year (\$)	28,900	29,478	30,068	30,669	31,282	31,908	32,546	33,197	33,861	34,538	35,229	35,934
Relapsed/Refractory Int-2/High Risk	18,429	18,857	19,286	19,714	20,143	20,571	21,000	21,429	21,857	22,286	22,714	23,143
% Int-2/High Risk	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Second line Int-2/High Risk Patients Prescribed Rigosertib	0	1,886	4,243	6,111	7,654	10,080	11,340	12,857	13,989	14,931	15,900	16,663
% Penetration	0.0%	5.0%	11.0%	15.5%	19.0%	24.5%	27.0%	30.0%	32.0%	33.5%	35.0%	36.0%
Price Per Patient/month (\$)	7,225	7,370	7,517	7,667	7,821	7,977	8,137	8,299	8,465	8,635	8,807	8,983
Duration of therapy (# of months)	4	4	4	4	4	4	4	4	4	4	4	4
Price Per Patient/Year (\$)	28,900	29,478	30,068	30,669	31,282	31,908	32,546	33,197	33,861	34,538	35,229	35,934
Sales in int-2/High Risk MDS	0	55,587	127,572	187,431	239,444	321,632	369,073	426,819	473,666	515,704	560,140	598,755
Growth %			130%	47%	28%	34%	15%	16%	11%	9%	9%	7%
Total Rigosertib MDS Revenues, Europe (\$th)	\$0	\$55,587	\$127,572	\$187,431	\$239,444	\$321,632	\$369,073	\$426,819	\$473,666	\$515,704	\$560,140	\$598,755
% Annual Growth			130%	47%	28%	34%	15%	16%	11%	9%	9%	7%
Total Rigosertib Royalty to Onconova (\$th)	\$0	\$7,782	\$22,963	\$37,486	\$52,678	\$77,192	\$95,959	\$110,973	\$123,153	\$134,083	\$145,636	\$155,676
Royalty rate	0.0%	14.0%	18.0%	20.0%	22.0%	24.0%	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%

Source: Piper Jaffray

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

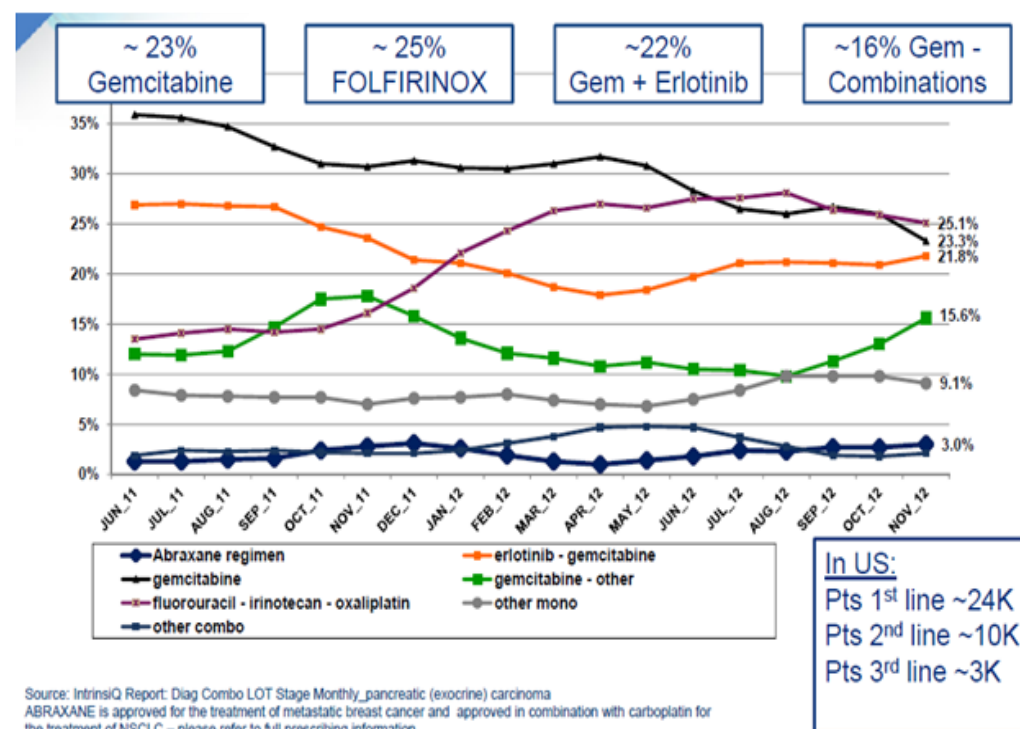
Question #7: What are Potential Sources for Upside? Pancreatic Cancer

• Metastatic pancreatic cancer

- 44,000 US annual incidence for pancreatic cancer
 - >80% metastatic disease
 - 95% with adenocarcinoma.
 - \$1bn peak US sales opportunity
- Combination with Gemcitabine
 - ~6 month typical survival historically
 - Abraxane+gem showed 6.37 months OS

• Phase III study has interim look in 4Q13/1Q14

- Go/No Go decision based on futility/survival analysis
- Potential launch in 2015



• ~\$1bn peak US sales potential (WW \$2bn+)– all upside, not included in current valuation

- Assuming 7 month average duration
- And 50% peak penetration in 1st line metastatic pancreatic cancer with adenocarcinoma

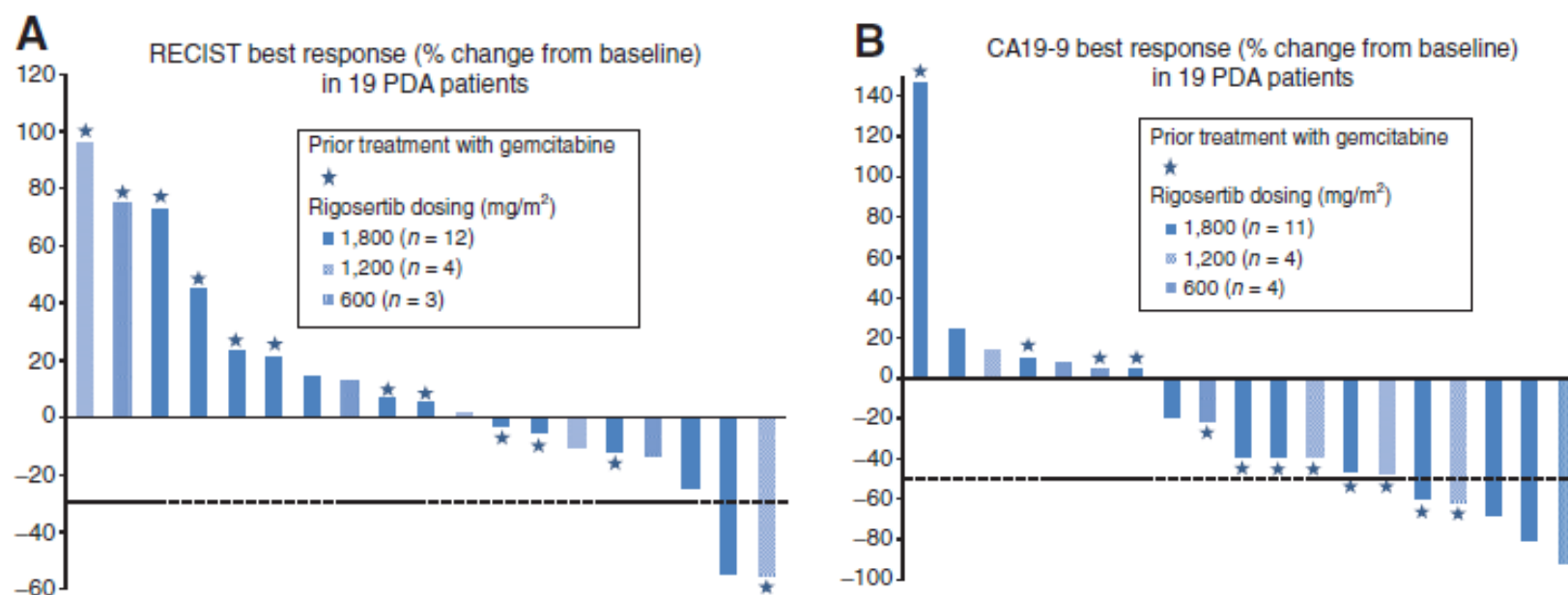
Source: Piper Jaffray and Company reports

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #7: What are Potential Sources for Upside? Pancreatic Cancer

Phase I study in Pancreatic Cancer (19 Evaluable Patients)

- 1 Partial Response by RECIST and 11 Stable Disease (5 Minor Responses)
- 10 (out of 16 evaluable) had $\geq 50\%$ decrease in CA19-9 (tumor marker)



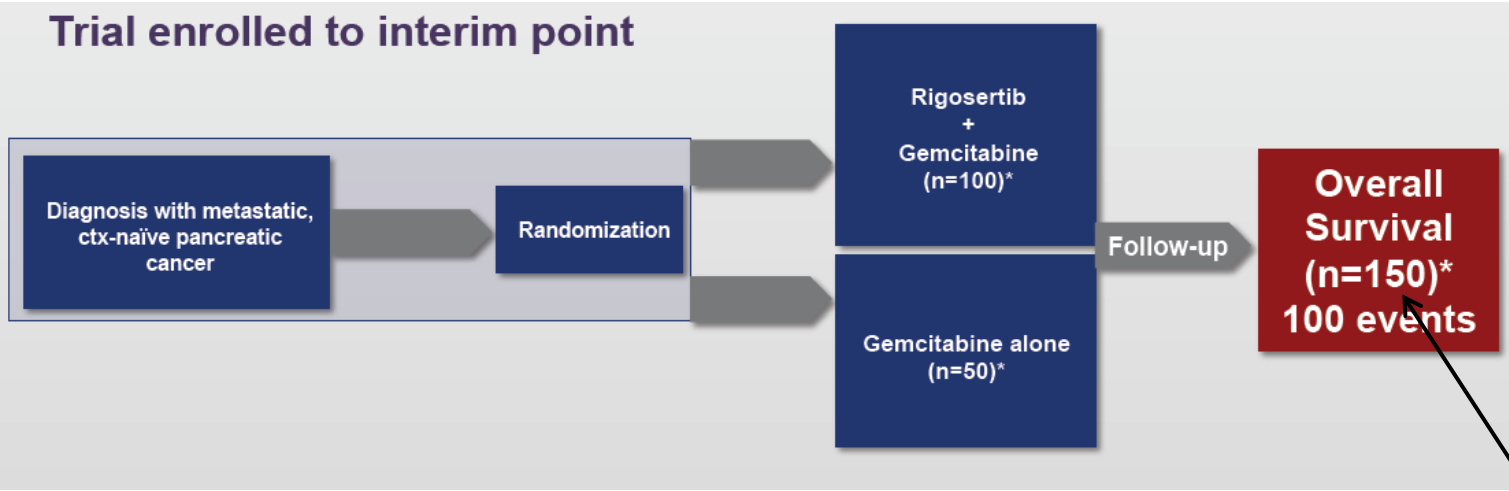
PDA: Pancreatic Ductal Adenocarcinoma

Source: Piper Jaffray and Company reports

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

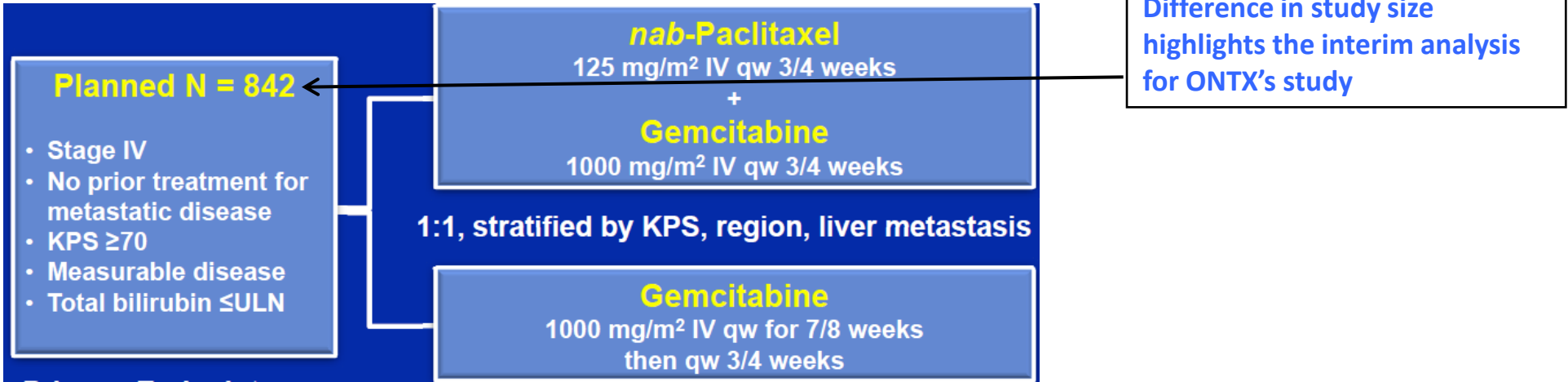
Question #7: What are Potential Sources for Upside? Pancreatic Cancer

Phase III Study Design – Interim Results 4Q13/1Q14



*n reflects interim analysis segment of study

Compare to Phase 3 Study Design for Abraxane + Gemcitabine



Source: Company reports

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #8: What are Potential Side Effects of Rigosertib?

Rigosertib Safety is fairly benign

Rigosertib Adverse Event	Grade 1/2	Grade 3+
Dysuria	7%	2%
Fatigue	7%	2%
Nausea	9%	0%
Diarrhea	6%	2%
Hematuria	6%	1%
Abdominal pain	6%	0%
Constipation	5%	0%
Decreased appetite	5%	0%
Pollakiuria	1%	3%

Compared to Revlimid, Vidaza, and Dacogen, which are much more toxic in MDS

Revlimid Adverse Event	Grade 3/4
Neutropenia	53.4%
Thrombocytopenia	50.0%
Pneumonia	7.4%
Rash	6.8%
Anemia	6.1%
Leukopenia	5.4%
Fatigue	4.7%
Dyspnea	4.7%
Back Pain	4.7%
Febrile Neutropenia	4.1%
Nausea	4.1%

Vidaza Adverse Event	Grade 3/4
Neutropenia	61.1%
Thrombocytopenia	58.3%
Leukopenia	14.9%
Anemia	13.7%
Febrile Neutropenia	12.6%
Pyrexia	4.6%
Abdominal pain	4.0%
Fatigue	3.4%
Dyspnea	3.4%
Hematuria	2.3%

Dacogen Adverse Event	Grade 3/4
Neutropenia	87.0%
Thrombocytopenia	85.0%
Febrile Neutropenia	23.0%
Leukopenia	22.0%

Source: Company reports and Product labels

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #8: What are Potential Side Effects of Rigosertib?

NO MYELOSUPPRESSION

Bone Marrow Cellularity Over Time in Rigosertib Treated MDS Patients		
Stage	Number of Patients	Bone Marrow Cellularity
Pre-Treatment	37	61%
Follow-Up 1	37	68%
Follow-Up 2	16	69%
Follow-Up 3	11	64%
No change from pre-treatment in BM cellularity over time		

Source: Piper Jaffray and Company reports

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #9: What is the Competitive Landscape?

➤ No other PI3K inhibitors being studied in MDS

Drug	Company	Indication	Mechanism of Action	IP	Stage
Vidaza (azacytidine)	Celgene/ Nippon-Shinyaku	MDS	Hypomethylating agent	Expired	Market
Dacogen (decitabine)	Eisai/J&J	MDS	Hypomethylating agent	2015	Market
Revlimid (lenalidomide)	Celgene	MDS del5q	IMiD	2026	Market
Oral Aza (CC-486)	Celgene	MDS	Hypomethylating agent		Phase 3
Sapcitabine	Cyclacel	AML, MDS	Nucleoside analog		Phase 3
Telintra	Telik	MDS	Glutathione modifier		Phase 2
SG-110	Astex	MDS	Hypomethylating agent		Phase 2
Sotatercept	Acceleron/Celgene	MDS	Activin inhibitor		Phase 2
Eltrombopag	GSK	MDS	Thrombopoietin receptor agonist		Phase 2
Vorinostat	Merck	MDS	HDAC inhibitor		Phase 2
ARRY-614	Array	MDS	MAP kinase inhibitor		Phase 1

Source: Piper Jaffray and Company reports

Onconova Therapeutics (ONTX): Our Thoughts on Key Issues

Question #9: What is the Competitive Landscape?

Competitive Advantages Over Other Drugs

	Rigosertib	Marketed Products	In Development
Mechanism of Action	PI3K/PLK inhibitor	Hypomethylating or Immunomodifier	Hypomethylating, TNF, Glutathione, MAPK, HDAC
IP expiration	2026	Vidaza and Dacogen patents expired/expiring	Varies
Safety Profile	Not myelosuppressive	Myelosuppressive	Myelosuppressive
Combination	Safety conducive to combining with other drugs	Myelosuppression limits combinations	Unknown

Source: Piper Jaffray and Company reports

Onconova Therapeutics (ONTX): Milestone Table

Program	Disorder	Type	Event	Expected Timing
Rigosertib	MDS Solid Tumors	Clinical Data	Final results for 1st line lower-risk MDS Phase 2 studies (oral) at ASH	Dec 7-10, 2013
		Clinical Data	Top-line survival results for 2nd line higher-risk MDS Phase 3 study (IV)	1Q14
		Clinical Data	Interim survival analysis for 1st line metastatic pancreatic cancer Phase 2 (IV combo with gemcitabine)	1Q14
		Clinical Trial	Complete enrollment of 2nd line Head & Neck cancer Phase 2 study (IV)	mid-2014

Source: Company Reports & Piper Jaffray

Onconova Therapeutics (ONTX): Pipeline

Product	Indication	Preclin	I	II	III	Reg	Launch	Est. Peak Yr.		Partners	Competitors	Comments
								Rev.				
Rigosertib	2nd line higher-risk MDS						2015	\$1bn		Baxter, SymBio	Gilead, Infinity, Pharmacyclics, Celgene, Roche, ONO	Dual PI3K and PLK inhibitor
	1st line lower-risk MDS							\$1bn				
	1st line metastatic pancreatic cancer							\$2bn				
	2nd line Head & Neck cancer											
Recilisib (EX-RAD)	Acute Radiation Syndrome (ARS)											
ON 013105	Refractory Lymphoma											

Source: Piper Jaffray and Company reports

Onconova Therapeutics (ONTX): Patent Estate

- **Composition of Matter**

- Expires 2026 (US)

- **Method of Treatment**

- Expires 2025 (US)

Source: Company reports

Onconova Therapeutics (ONTX): Management Team

- **Ramesh Kumar, PhD – President & CEO**

- Co-Founder in 1998
- Previously at Princeton, BMS, DNX, and Kimeragen

- **Thomas J. McKearn, MD, PhD – President, Research and Development**

- Over 30 years biotech and oncology industry veteran
- Previously VP, Medical Affairs and VP, Strategic Clinical Affairs at Agennix

- **Ajay Bansal – CFO**

- Leadership experience in finance, hedge fund management, equity research, M&A, and strategy
- Previously CFO of Complete Genomics

Source: Company reports

Onconova Earnings Model	2012A	1Q 13A	2Q 13E	3Q 13E	4Q 13E	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	20E-23E CAGR
(\$ in thousands, except per share amounts)																				
US Rigosertib Sales	0	0	0	0	0	0	0	21,930	82,400	152,317	228,856	311,675	390,362	452,161	522,121	581,562	632,689	670,246	709,534	56%
Intl Rigosertib Sales	0	0	0	0	0	0	0	0	55,587	127,572	187,431	239,444	321,632	369,073	426,819	473,666	515,704	560,140	598,755	
Total Rigosertib Sales	0	0	0	0	0	0	0	21,930	137,987	279,889	416,287	551,119	711,994	821,234	948,939	1,055,228	1,148,393	1,230,386	1,308,289	
US Rigosertib Sales	0	0	0	0	0	0	0	21,930	82,400	152,317	228,856	311,675	390,362	452,161	522,121	581,562	632,689	670,246	709,534	15%
Ex-US Royalty	0	0	0	0	0	0	0	0	7,782	22,963	37,486	52,678	77,192	95,959	110,973	123,153	134,083	145,636	155,676	
License and milestone revenues	0	0	0	0	0	0	100,000	100,000	50,000	50,000	100,000	0	0	0	0	0	0	0	0	
Collaboration R&D revenues	1,116	1,000	1,000	1,000	1,000	4,116	4,000	4,000	4,000	3,000	0	0	0	0	0	0	0	0	0	12%
Total Revenues	46,190	1,116	1,000	1,000	1,000	4,116	104,000	125,930	144,182	228,280	366,342	364,353	467,553	548,120	633,094	704,715	766,772	815,883	865,210	
Costs & Expenses:																				5%
Cost of Goods Sold	0	0	0	0	0	0	0	2,193	14,008	25,894	37,761	49,868	62,458	67,824	78,318	87,234	94,903	100,537	106,430	
R&D	52,762	12,756	13,394	14,063	14,767	54,980	61,852	80,408	92,469	101,716	110,362	115,880	121,674	127,758	134,146	140,853	147,896	155,291	163,055	
SG&A	15,707	3,346	3,413	3,481	3,551	13,791	15,170	32,979	46,171	55,406	63,716	71,362	78,499	84,778	89,865	94,358	99,076	104,030	109,232	6%
Total Operating Expenses	68,469	16,102	16,807	17,545	18,317	68,771	77,022	115,581	152,649	183,016	211,840	237,111	262,631	280,361	302,329	322,446	341,676	359,858	378,717	
Operating Income	(22,279)	(14,986)	(15,807)	(16,545)	(17,317)	(64,655)	26,978	10,349	(8,467)	45,264	154,502	127,242	204,923	267,759	330,764	382,269	424,896	456,025	486,493	
Interest and Other Income (Expense), net	(7,633)	141	101	77	158	478	635	943	1,338	1,262	1,655	2,882	3,649	5,362	7,221	9,481	12,053	14,928	18,034	7%
Pretax Income (Loss)	(29,912)	(14,845)	(15,706)	(16,468)	(17,159)	(64,177)	27,613	11,292	(7,129)	46,526	156,158	130,124	208,771	273,121	337,985	391,750	436,949	470,953	504,527	
Income Expense (Benefit)	0	0	0	0	0	0	0	565	(535)	6,979	31,232	32,531	62,631	95,582	118,295	137,113	152,932	164,833	176,585	
Tax Rate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	7.5%	15.0%	20.0%	25.0%	30.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	17%
Other (Accr of preferred stock)	(3,953)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Net Income (Loss) GAAP	(33,865)	(14,845)	(15,706)	(16,468)	(17,159)	(64,177)	27,613	10,728	(6,594)	39,547	124,926	97,593	146,140	177,529	219,690	254,638	284,017	306,119	327,943	
Stock option expense	0	600	600	600	600	2,400	2,640	2,759	2,955	2,987	3,092	3,189	3,274	3,344	3,678	4,046	4,451	4,896	5,386	2%
Other	2,978	(141)	0	0	0	(141)	0	0	0	0	0	0	0	0	0	0	0	0	0	
Net Income (Loss) Non-GAAP	(30,887)	(14,386)	(15,106)	(15,868)	(16,559)	(61,918)	30,253	13,486	(3,639)	42,533	128,018	100,781	149,414	177,529	219,690	254,638	284,017	306,119	327,943	
Diluted Earnings Per Share Non-GAAP	(\$2.44)	(\$0.93)	(\$0.98)	(\$0.76)	(\$0.78)	(\$3.40)	\$1.18	\$0.50	(\$0.15)	\$1.44	\$4.23	\$3.27	\$4.75	\$5.53	\$6.71	\$7.63	\$8.34	\$8.82	\$9.26	17%
Earnings Per Share, Diluted Fully Taxed	nm	nm	nm	nm	nm	nm	\$0.77	\$0.34	nm	\$1.09	\$3.42	\$2.81	\$4.38	\$5.60	\$6.79	\$7.71	\$8.43	\$8.91	\$9.36	
Basic Earnings Per Share Non-GAAP	(\$2.44)	(\$0.93)	(\$0.98)	(\$0.76)	(\$0.78)	(\$3.40)	\$1.36	\$0.58	(\$0.15)	\$1.65	\$4.90	\$3.80	\$5.55	\$6.50	\$7.93	\$9.05	\$9.95	\$10.56	\$11.15	
Diluted Earnings Per Share GAAP	(\$2.67)	(\$0.96)	(\$1.02)	(\$0.79)	(\$0.81)	(\$3.53)	\$1.08	\$0.40	(\$0.27)	\$1.33	\$4.13	\$3.17	\$4.65	\$5.53	\$6.71	\$7.63	\$8.34	\$8.82	\$9.26	2%
Basic Earnings Per Share GAAP	(\$2.67)	(\$0.96)	(\$1.02)	(\$0.79)	(\$0.81)	(\$3.53)	\$1.24	\$0.46	(\$0.27)	\$1.54	\$4.78	\$3.68	\$5.43	\$6.50	\$7.93	\$9.05	\$9.95	\$10.56	\$11.15	
Diluted Shares Outstanding (th)	12,669	15,448	15,448	20,755	21,164	18,204	25,602	26,882	24,500	29,638	30,230	30,835	31,452	32,081	32,722	33,377	34,044	34,725	35,420	
Basic Shares Outstanding (th)	12,669	15,448	15,448	20,755	21,164	18,204	22,223	23,334	24,500	25,725	26,111	26,503	27,304	27,714	28,129	28,551	28,979	29,414		
Margin Analysis																				
Gross margin (% of Rigosertib Rev.)	nm	nm	nm	nm	nm	nm	0.0%	90.0%	83.0%	83.0%	83.5%	84.0%	84.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	
R&D (% of Rev.)	114%	nm	nm	nm	nm	nm	59%	64%	64%	45%	30%	32%	26%	23%	21%	20%	19%	19%	19%	
SG&A (% of Rev.)	34%	nm	nm	nm	nm	nm	15%	26%	32%	24%	17%	20%	17%	15%	14%	13%	13%	13%	13%	
Operating Margin	nm	nm	nm	nm	nm	nm	26%	8%	nm	20%	42%	35%	44%	49%	52%	54%	55%	56%	56%	
Pre-tax income (% of Rev.)	nm	nm	nm	nm	nm	nm	27%	9%	nm	20%	43%	36%	45%	50%	53%	56%	57%	58%	58%	
Net income Non-GAAP (% of Rev.)	nm	nm	nm	nm	nm	nm	29%	11%	nm	19%	35%	28%	32%	32%	35%	36%	37%	38%	38%	
Growth % y/y																				
US Rigosertib Sales	nm	nm	nm	nm	nm	nm	nm	nm	276%	85%	50%	36%	25%	16%	15%	11%	9%	6%	6%	
Intl Rigosertib Sales	nm	nm	nm	nm	nm	nm	nm	nm	130%	47%	28%	28%	34%	15%	16%	11%	9%	9%	7%	
Total Rigosertib Sales	nm	nm	nm	nm	nm	nm	nm	nm	529%	103%	49%	32%	29%	15%	16%	11%	9%	7%	6%	
Total revenue	3006%					-91%	2427%	21%	14%	58%	60%	-1%	28%	17%	16%	11%	9%	6%	6%	
R&D	133.2%					4.2%	12.5%	30.0%	15.0%	10.0%	8.5%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
SG&A	144.0%					-12.2%	10.0%	35%	40%	20%	15%	12%	10%	8%	6%	5%	5%	5%	5%	
Pre-tax income	13.8%					114.6%	-143.0%	-59.1%	-163.1%	-752.6%	235.6%	-16.7%	60.4%	30.8%	23.7%	15.9%	11.5%	7.8%	7.1%	
Net Income Non-GAAP						nm	nm	-61%	nm	nm	216%	-22%	50%	21%	24%	16%	12%	8%	7%	
EPS, diluted Non-GAAP	nm					nm	nm	-58%	nm	nm	195%	-23%	45%	16%	21%	14%	9%	6%	5%	
Growth % q/q																				
Total revenue	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	
R&D	nm	0.0%	5.0%	5.0%	5.0%	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	
SG&A	nm	0.0%	2.0%	2.0%	2.0%	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	
Pre-tax income	nm		-6%	-5%	-4%	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	
Net Income Non-GAAP	nm		5.8%	4.9%	4.2%	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	
EPS, diluted Non-GAAP	nm		5.0%	-21.8%	2.3%	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	

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Onconova Balance Sheet (\$'thousands)	2012A	1Q 13E	2Q 13E	3Q 13E	4Q 13E	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
Current assets:																			
Cash and cash equivalents	81,527	67,307	51,295	105,522	90,632	90,632	117,728	133,673	126,046	165,404	288,033	384,741	536,075	721,952	947,965	1,205,197	1,492,663	1,803,301	2,136,277
Restricted cash	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Accounts receivables	0	0	0	0	0	0	0	2,193	8,240	15,232	22,886	31,168	31,229	27,130	26,106	29,078	31,634	33,512	35,477
Prepaid expenses and other current assets	1,725	2,666	2,666	2,666	2,666	2,666	2,666	1,259	2,884	4,566	7,327	7,287	9,351	10,962	12,662	14,094	15,335	16,318	17,304
Total current assets	83,252	69,973	53,961	108,188	93,298	93,298	120,394	137,126	137,169	185,202	318,245	423,196	576,655	760,044	986,733	1,248,369	1,539,633	1,853,131	2,189,058
Property and equipment, net	463	649	626	608	593	593	631	711	821	1,092	1,543	2,176	2,979	3,831	4,685	5,554	6,450	7,385	8,369
Long-term available for sale securities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Restricted cash	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
Other assets	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Total assets	83,852	70,759	54,724	108,933	94,028	94,028	121,161	137,974	138,127	186,430	319,925	425,508	579,771	764,012	991,555	1,254,061	1,546,220	1,860,652	2,197,564
Current liabilities:																			
Accounts payable	5,517	4,243	4,278	5,045	6,189	6,189	6,932	10,402	13,738	16,471	19,066	21,340	23,637	25,232	27,210	29,020	30,769	32,387	34,085
Accrued expenses	3,925	5,559	5,594	6,054	7,565	7,565	7,702	11,558	15,265	18,302	21,184	23,711	26,263	28,036	30,233	32,245	34,188	35,986	37,872
Other current liabilities	12,029	14,442	14,442	14,442	14,442	14,442	14,442	14,442	14,442	14,442	14,442	14,442	14,442	14,442	14,442	14,442	14,442	14,442	14,442
Long term debt, current portion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deferred revenue - current portion	3,907	3,986	3,986	3,986	3,986	3,986	3,986	3,986	3,986	3,986	3,986	3,986	3,986	3,986	3,986	3,986	3,986	3,986	3,986
Total current liabilities	25,378	28,230	28,301	29,528	32,182	32,182	33,062	40,388	47,431	53,201	58,678	63,479	68,328	71,697	75,871	79,693	83,384	86,801	90,384
Long term debt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deferred revenue	15,421	14,250	13,250	12,250	11,250	11,250	7,250	3,250	0	0	0	0	0	0	0	0	0	0	0
Other liabilities	44	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
Total liabilities	40,843	42,544	41,615	41,842	43,496	43,496	40,376	43,702	47,495	53,265	58,742	63,543	68,392	71,761	75,935	79,757	83,448	86,865	90,448
Stockholders' equity:																			
Common Stock (+preferred)	154	154	154	154	154	154	154	154	154	154	154	154	154	154	154	154	154	154	154
Additional paid in capital	211,208	211,252	211,252	281,101	281,101	281,101	281,101	281,101	281,101	281,101	281,101	281,101	281,101	281,101	281,101	281,101	281,101	281,101	281,101
Accumulated other comprehensive loss	0	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Accumulated Deficit	(168,353)	(183,198)	(198,304)	(214,171)	(230,730)	(230,730)	(200,477)	(186,991)	(190,630)	(148,097)	(20,079)	80,703	230,117	410,989	634,358	893,042	1,181,510	1,492,525	1,825,853
Total stockholders' equity	43,009	28,215	13,109	67,091	50,532	50,532	80,785	94,271	90,632	133,165	261,184	361,965	511,379	692,252	915,620	1,174,304	1,462,772	1,773,787	2,107,116
Total liabilities and stockholders' equity	83,852	70,759	54,724	108,933	94,028	94,028	121,161	137,974	138,127	186,430	319,925	425,508	579,771	764,012	991,555	1,254,061	1,546,220	1,860,652	2,197,564

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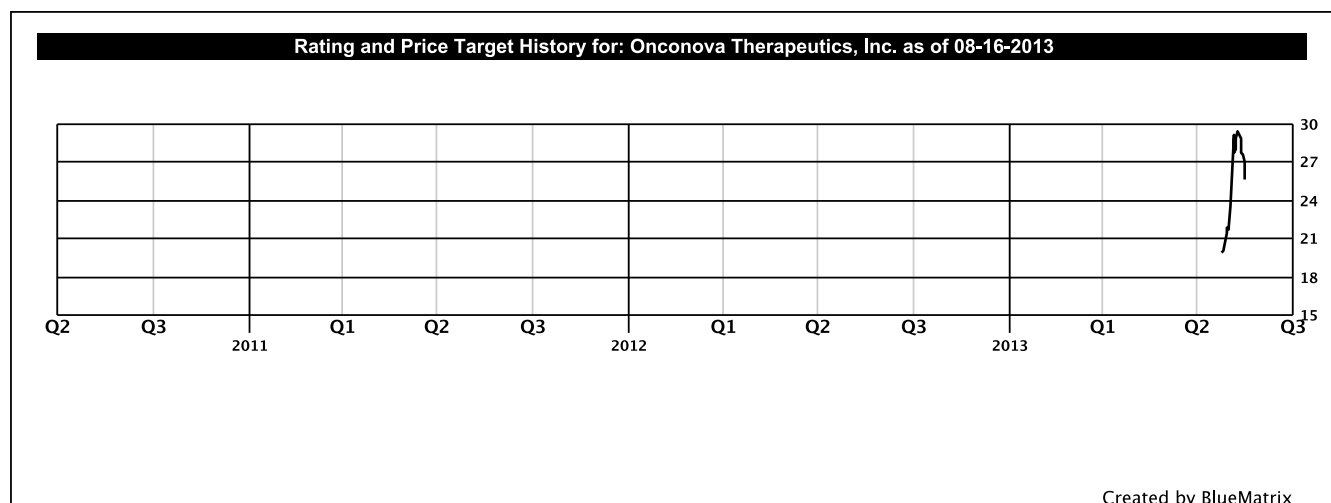
Onconova Statement of Cash Flows	2012A	1Q 13E	2Q 13E	3Q 13E	4Q 13E	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
(\$ in thousands)																			
CASH FLOWS FROM OPERATING ACTIVITIES																			
Net Income (Loss)		(14,845)	(15,706)	(16,468)	(17,159)	(64,177)	27,613	10,728	(6,594)	39,547	124,926	97,593	146,140	177,529	219,690	254,638	284,017	306,119	327,943
Adjustments																			
Depreciation		46	65	63	61	235	178	189	213	246	273	309	326	447	575	703	833	968	1,108
Stock based compensation		600	600	600	600	2,400	2,640	2,759	2,955	2,987	3,092	3,189	3,274	3,344	3,678	4,046	4,451	4,896	5,386
Other		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Change in assets and liabilities:																			
Account receivables		0	0	0	0	0	0	(2,193)	(6,047)	(6,992)	(7,654)	(8,282)	(61)	4,099	1,024	(2,972)	(2,556)	(1,878)	(1,964)
Prepaid expenses & other assets		(941)	0	0	0	(941)	0	1,407	(1,624)	(1,682)	(2,761)	40	(2,064)	(1,611)	(1,699)	(1,432)	(1,241)	(982)	(987)
Accounts payable, accrued expenses & other liabilities		360	71	1,227	2,654	4,312	880	7,326	7,043	5,770	5,477	4,801	4,849	3,369	4,174	3,822	3,692	3,417	3,583
Deferred Revenues		(1,092)	(1,000)	(1,000)	(1,000)	(4,092)	(4,000)	(4,000)	(3,250)	0	0	0	0	0	0	0	0	0	0
Net cash provided by (used in) operating activities		(15,872)	(15,970)	(15,578)	(14,844)	(62,263)	27,311	16,215	(7,304)	39,876	123,353	97,649	152,463	187,176	227,442	258,804	289,195	312,539	335,068
CASH FLOWS FROM INVESTING ACTIVITIES																			
Purchases of property and equipment		(40)	(42)	(44)	(46)	(172)	(216)	(269)	(323)	(517)	(724)	(941)	(1,130)	(1,299)	(1,429)	(1,572)	(1,729)	(1,902)	(2,092)
Investments, net		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net cash used in investing activities		(40)	(42)	(44)	(46)	(172)	(216)	(269)	(323)	(517)	(724)	(941)	(1,130)	(1,299)	(1,429)	(1,572)	(1,729)	(1,902)	(2,092)
CASH FLOWS FROM FINANCING ACTIVITIES																			
Proceeds from issuance of shares, net cost		0	0	69,849	0	69,849	0	0	0	0	0	0	0	0	0	0	0	0	0
Exercise of options		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proceeds from debt, net		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repurchase of common stock		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net cash provided by financing activities	0	0	0	69,849	0	69,849	0	0	0	0	0	0	0	0	0	0	0	0	0
Net increase in cash and cash equivalents	78,814	(15,912)	(16,012)	54,227	(14,890)	7,413	27,095	15,946	(7,628)	39,359	122,628	96,708	151,334	185,877	226,013	257,232	287,466	310,637	332,976
Cash and cash equivalents at beginning of period	2,713	81,527	67,307	51,295	105,522	81,527	90,632	117,728	133,673	126,046	165,404	288,033	384,741	536,075	721,952	947,965	1,205,197	1,492,663	1,803,301
Cash and cash equivalents at end of period	81,527	65,615	51,295	105,522	90,632	88,940	117,728	133,673	126,046	165,404	288,033	384,741	536,075	721,952	947,965	1,205,197	1,492,663	1,803,301	2,136,277

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IMPORTANT RESEARCH DISCLOSURES



Notes: The boxes on the Rating and Price Target History chart above indicate the date of the Research Note, the rating, and the price target. Each box represents a date on which an analyst made a change to a rating or price target, except for the first box, which may only represent the first Note written during the past three years.

Legend:

I: Initiating Coverage
 R: Resuming Coverage
 T: Transferring Coverage
 D: Discontinuing Coverage
 S: Suspending Coverage
 OW: Overweight
 N: Neutral
 UW: Underweight
 NA: Not Available
 UR: Under Review

Distribution of Ratings/IB Services Piper Jaffray				
Rating	Count	Percent	IB Serv./Past 12 Mos.	
			Count	Percent
BUY [OW]	341	57.12	68	19.94
HOLD [N]	226	37.86	15	6.64
SELL [UW]	30	5.03	0	0.00

Note: Distribution of Ratings/IB Services shows the number of companies currently in each rating category from which Piper Jaffray and its affiliates received compensation for investment banking services within the past 12 months. FINRA rules require disclosure of which ratings most closely correspond with "buy," "hold," and "sell" recommendations. Piper Jaffray ratings are not the equivalent of buy, hold or sell, but instead represent recommended relative weightings. Nevertheless, Overweight corresponds most closely with buy, Neutral with hold and Underweight with sell. See Stock Rating definitions below.

Analyst Certification — M Ian Somaiya, Sr. Research Analyst
— Do G. Kim, Research Analyst
— Matthew W. Luchini, Research Analyst

The views expressed in this report accurately reflect my personal views about the subject company and the subject security. In addition, no part of my compensation was, is, or will be directly or indirectly related to the specific recommendations or views contained in this report.

Research Disclosures

Piper Jaffray expects to receive or intends to seek compensation for investment banking services from Onconova Therapeutics, Inc. in the next 3 months.

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Stock Ratings: Piper Jaffray ratings are indicators of expected total return (price appreciation plus dividend) within the next 12 months. At times analysts may specify a different investment horizon or may include additional investment time horizons for specific stocks. Stock performance is measured relative to the group of stocks covered by each analyst. Lists of the stocks covered by each are available at www.piperjaffray.com/researchdisclosures. Stock ratings and/or stock coverage may be suspended from time to time in the event that there is no active analyst opinion or analyst coverage, but the opinion or coverage is expected to resume. Research reports and ratings should not be relied upon as individual investment advice. As always, an investor's decision to buy or sell a security must depend on individual circumstances, including existing holdings, time horizons and risk tolerance. Piper Jaffray sales and trading personnel may provide written or oral commentary, trade ideas, or other information about a particular stock to clients or internal trading desks reflecting different opinions than those expressed by the research analyst. In addition, Piper Jaffray technical research products are based on different methodologies and may contradict the opinions contained in fundamental research reports.

- **Overweight (OW):** Anticipated to outperform relative to the median of the group of stocks covered by the analyst.
- **Neutral (N):** Anticipated to perform in line relative to the median of the group of stocks covered by the analyst.
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