

## Strategic Advisory Analytics



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# The MTS US Biotech IPO Monitor

**“Back to School” Edition: Early-Stage IPO Performance, Phase I is the New Phase II**

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September 6<sup>th</sup>, 2018

# Phase I is the New Phase II

## Key Messages

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As a “Back to School” prequel of the next edition of the MTS IPO monitor (Q3:2018 edition due in October), we have conducted a further level of analysis on the observation we made in previous IPO Monitor editions ([here](#)) that garnered the most debate with companies and investors. The observation was that “early-stage” companies (defined as companies with Preclinical or Phase I lead assets at the time of IPO) had become a significant proportion of IPOs in the current window and somewhat counterintuitively had the highest IPO valuations and raises (relative to later-stage companies). Of all 276 biotech IPOs from 2012 through 2018 (YTD), 74 (27%) were early-stage with an average IPO valuation/raise of \$457mm/\$113mm vs. mid-stage (Phase II) of \$343mm/\$84mm and late-stage (Phase III or later) of \$394mm/\$88mm. YTD 2018 represented a high-tide mark with 16 of 44 (36%) companies IPO’ed being early-stage companies, beating both mid-stage 15 of 44 (34%) and late-stage companies 13 of 44 (30%). This surprisingly high number and proportion along with the valuations of early-stage IPOs confounds the old mantra that Phase II is the main stage of entry level for IPOs and that earlier stage companies are higher risk and therefore should have lower valuations. Within this report we conducted new and more detailed analyses (Exhibits 1-8) of 2012–2018 (YTD) IPOs focusing on early-stage companies, which demonstrate some fascinating new data points (with the normal caveat that we are taking averages of a very heterogeneous set of companies).

### Key Messages:

#### > Phase I Companies Now Represent the Biotech IPO Sweet Spot

- As shown in Exhibits 1-3, early-stage Biotech IPOs have become a larger and more notable component of the Biotech IPO ecosystem over the last 7 years. Interestingly, Phase I companies have become the sweet spot when balancing the amount raised at IPO (#1 spot at an average/mean \$127mm), valuation (average/mean of \$452mm, with Preclinical companies holding the #1 spot at very slightly higher valuation of an average/mean \$467mm), number/proportion of companies (a reasonable 19% over the 7 year period) and post-IPO stock performance (#1 at an average/mean +133%).

# Phase I is the New Phase II

## Key Messages (cont'd)

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### > Early-Stage Stock Price Performance – Go Big or Go Home

- As shown in Exhibits 2, 7 and 8 there is a plethora of interesting observations around IPO to date performance of the early stage companies. As we previously noted, Phase I companies have the accolade of the strongest average/mean performance of +133%, not far followed by Preclinical companies at an average/mean +61%. Together, the combined Early-Stage companies have an average/mean performance of 111% vs. 36% for Mid-Stage and 62% for Late-Stage companies. Whilst we all love mathematical means, they tend to not tell the complete story (hint look at the medians in Exhibit 2). Thus in Exhibits 7 and 8 we show the granular performance distribution for Preclinical and Phase I companies, which reveals a further level of interesting artifacts: (1) the distribution of Outperformers to Underperformers is ballpark 1:1 for both Preclinical (accurately 57% : 43%) and Phase I companies (accurately 51% : 49%), (2) The average Outperformer is much bigger than the average Underperformer: Preclinical (+133% : -55%) and Phase I (+296% : -38%)
- The observation around the bigger magnitude of the average outperformance vs. the average underperformance is of course logical – you can not lose more than 100% of a stock price (and failure often results in a set towards cash levels), but you can outperform multiples of your investment, especially in biotech. The stronger average outperformance of the Phase I over Preclinical companies is also intuitive; the Phase I IPO class has had more chance to mature to late stage/commercial stage companies (e.g. Sage and Loxo) and concomitant M&A exits (e.g. Kite, Juno) than the Preclinical IPO class for which the outperformance is still being driven by relatively early-stage “fundamental platform” companies (e.g. Editas, Crispr and Wave). A notable example of performance success by a Preclinical company is Agios as it hits the commercial life cycle stage (que “Welcome back Jackie and congrats David” call out). What is most perplexing to us is: Why is there the near 1:1 ratio of Outperformers/Underperformers? Who said that investing in biotech is like flipping a coin?

# Phase I is the New Phase II

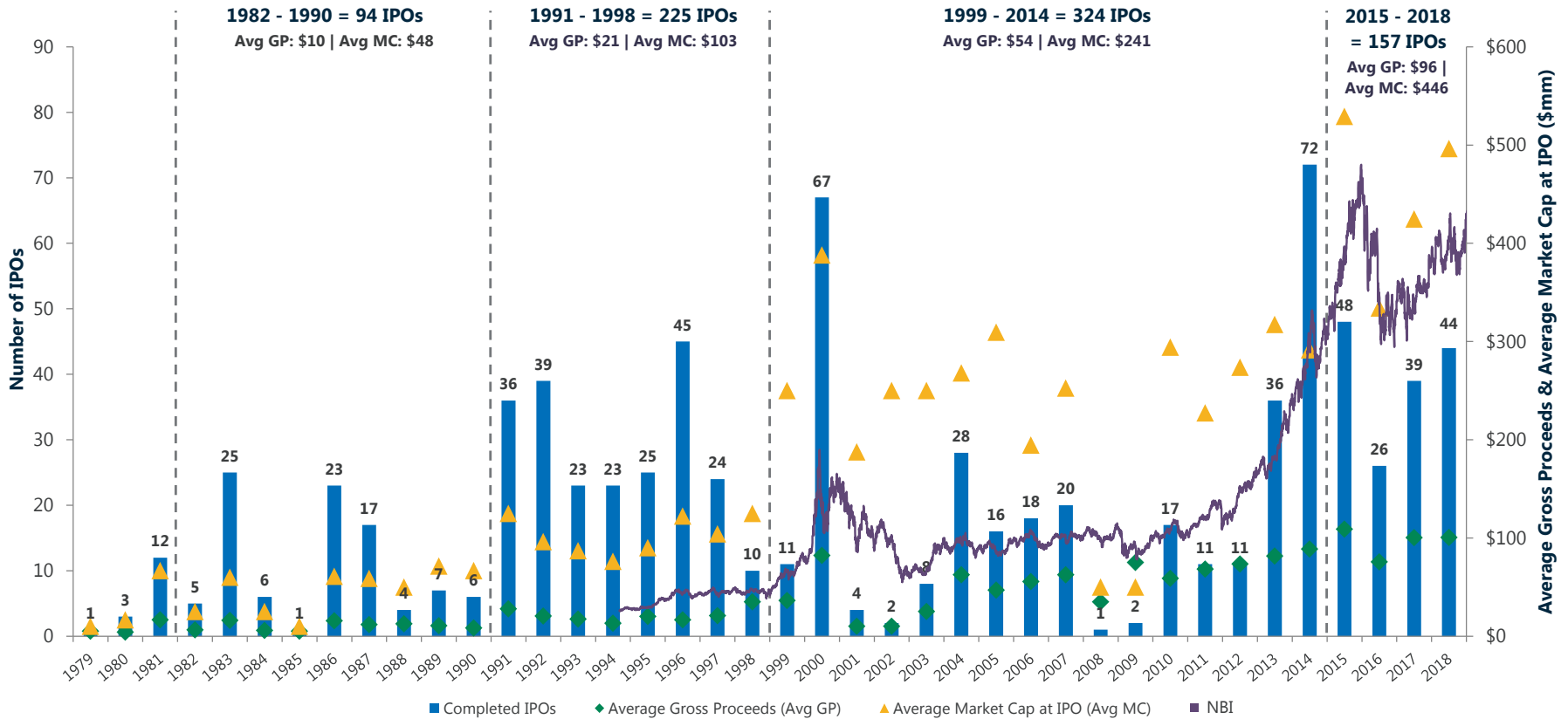
## Key Messages (cont'd)

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- > **Early-stage IPO Companies are Largely “Platform” Companies with Clinical Triggers Less than 1 year Out from IPO**
  - As shown in Exhibit 4, the vast majority of early-stage IPO companies are “Platform” vs. “Asset(s)” based, with essentially all Preclinical companies being platform (we understand there is some subjectivity to assigning platform vs. asset-based label, a debate in and of itself). The dominance of platform-based companies is not surprising for early-stage companies. A more interesting debate is what allowed the few asset-based Phase I companies to IPO. The macro answer is that they were largely oncology assets. Notwithstanding the platform nature of these companies, it is interesting to note that the median (more relevant than the mean in our view) time to the clinical trigger was less than one year: 0.63 years for Preclinical companies launching clinical trials and 0.68 years for Phase I companies reading out Phase I data (Appendix). This clearly illustrates that public markets still require a clear (and relatively quick) pathway to value inflection.
  
- > **Gene Therapy Companies Dominate the Modality Type for Early-Stage Companies**
  - As shown in Exhibit 5, Gene Therapy companies, somewhat understandably, have dominated the early-stage company space. 57% of Preclinical and 31% of Phase I companies’ lead asset utilized gene therapy.
  
- > **MTS will publish the Q3:2018 edition of our “MTS US Biotech IPO Monitor” in October (the previous version can be accessed [here](#)), where we use our proprietary database\* to generate and discuss thought-provoking statistics and observations on the US Biotech IPO market.**

# The 40 Years of US Biotech IPOs

There Have Been 4 Era's of Biotech IPO Valuations – With Average Gross Proceeds and Market Capitalizations Roughly Doubling In Each Subsequent Period



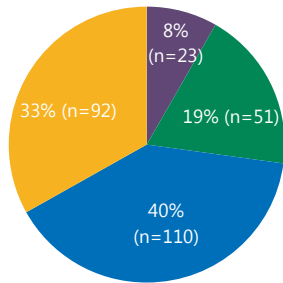
Special thanks to Stelios “The Godfather” Papadopoulos for the historic data

Source: MTS, Dealogic and Factset Research Systems as of 09/04/18, and Stelios “The Godfather” Papadopoulos.

# Detailed Analysis of Early-Stage IPOs

2012 – H2:2018 (YTD)

**Exhibit 1: MTS IPO Database (n=276) Split By Stages [2012 – H2:2018 YTD]**

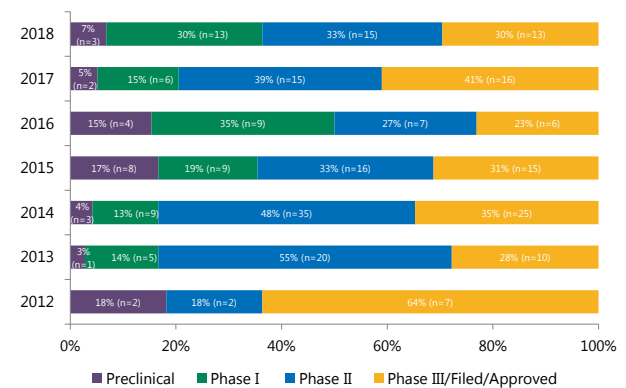


■ Preclinical at IPO      ■ Phase I at IPO  
■ Phase II at IPO      ■ Phase III/Filed/Approved at IPO

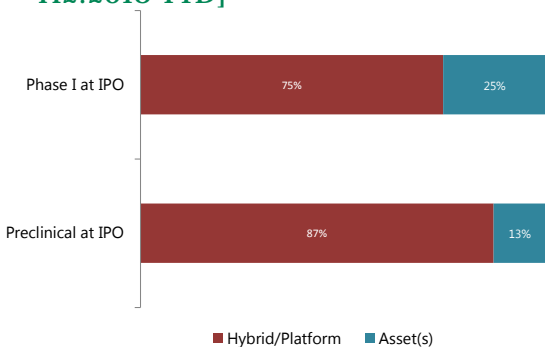
**Exhibit 2: Average PM Valuations and Raises [2012 – H2:2018 YTD]**

|                                      | Implied Value (\$mm) | Amount Raised (\$mm) | Avg Change from IPO to Current Stock Price | Median Change from IPO to Current Stock Price |
|--------------------------------------|----------------------|----------------------|--|---|
| Early-Stage (27%, n=74)              | \$457                | \$113                | 111%                                       | 8%  |
| Preclinical (8%, n=23)               | 467                  | 100                  | 61%  | 9%  |
| Phase I (19%, n=51)                  | 452                  | 127                  | 133%                                       | 8%  |
| Mid-Stage                            |                      |                      |  |   |
| Phase II (40%, n=110)                | 343                  | 84                   | 36%  | (20%)   |
| Late-Stage                           |                      |                      |  |   |
| Phase III/Filed/Approved (33%, n=92) | 394                  | 88                   | 62%  | 8%  |

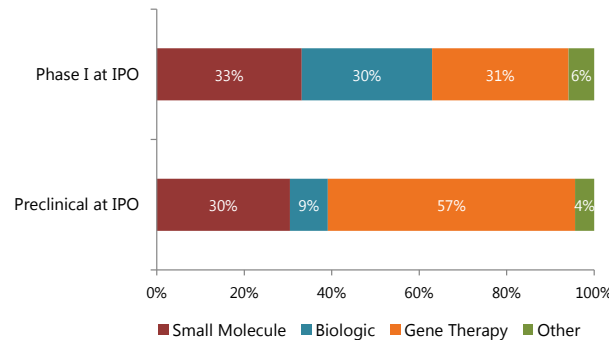
**Exhibit 3: Early-Stage Assets vs. Total [2012 – H2:2018 YTD]**



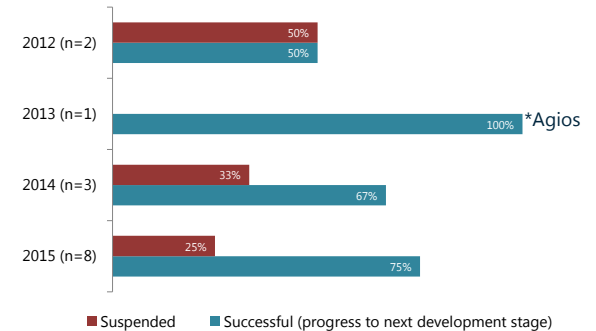
**Exhibit 4: Primary Source of Value [2012 – H2:2018 YTD]**



**Exhibit 5: Modality [2012 – H2:2018 YTD]**

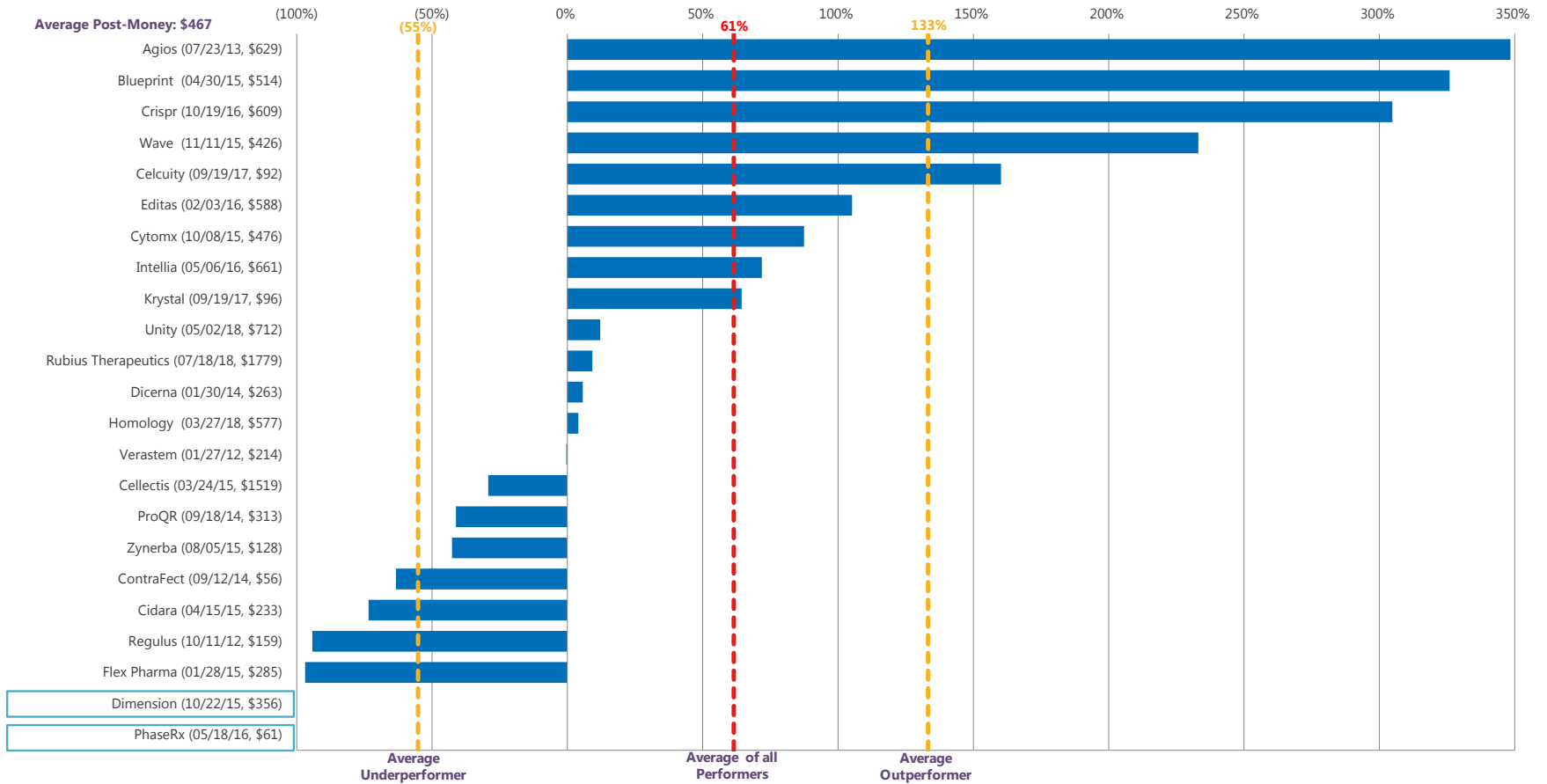


**Exhibit 6: Success of Preclinical Assets [2012 – 2015]**



# Exhibit 7: Post-IPO Performance Based on Stock Price Change

Preclinical Companies (n=23) Sorted by Performance and Showing Post-Money Valuation at IPO Pricing



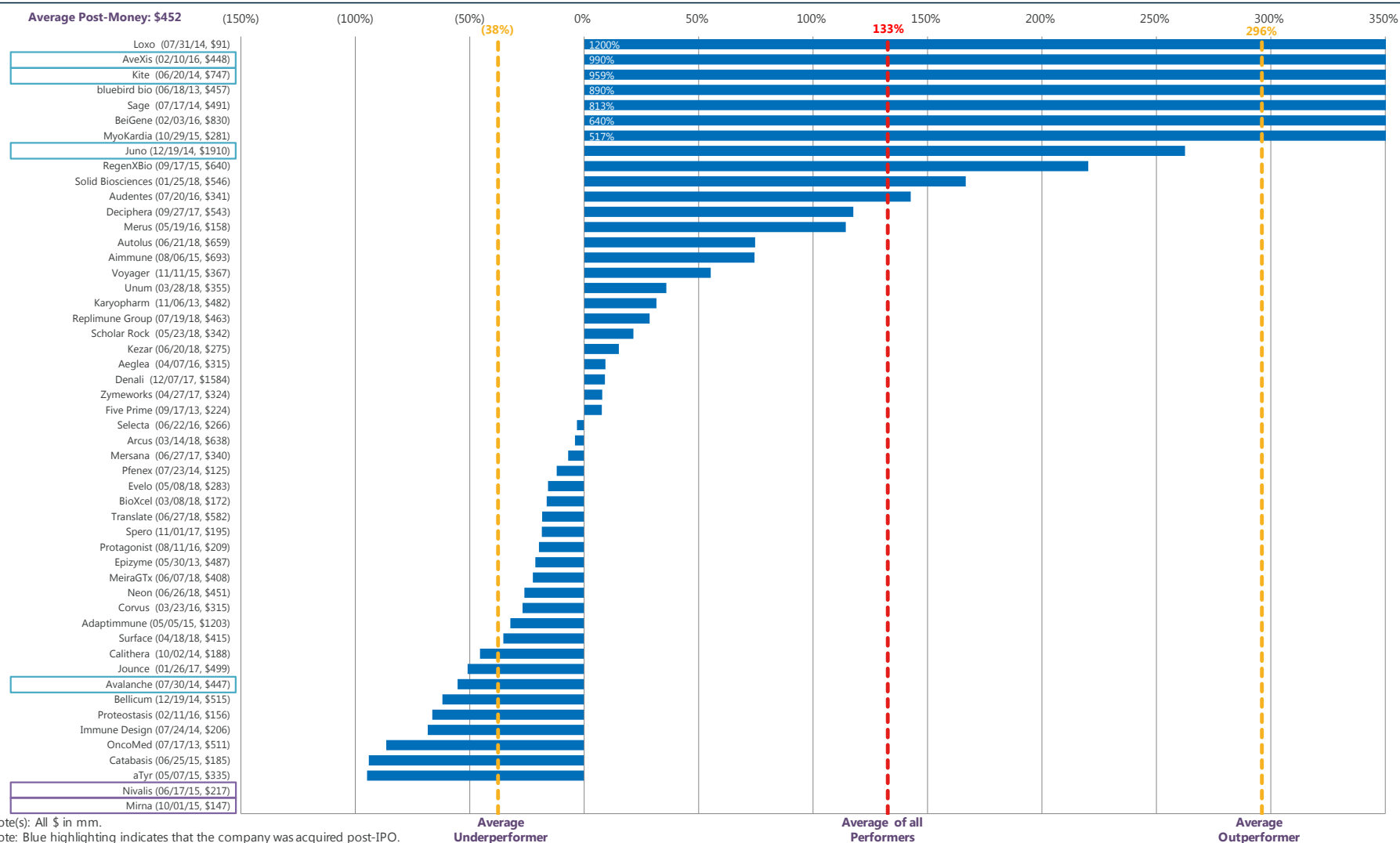
Note(s): All \$ in mm.

Note: Blue highlighting indicates that the company was acquired post-IPO.

Source(s): MTS, Dealogic and CapitalIQ, as of 09/04/2018.

# Exhibit 8: Post-IPO Performance Based on Stock Price Change

Phase I Companies (n=51) Sorted by Performance and Showing Post-Money Valuation at IPO Pricing



Note(s): All \$ in mm.  
 Note: Blue highlighting indicates that the company was acquired post-IPO.  
 Note: Purple highlighting indicates that the company went through a reverse merger.  
 Source(s): MTS, Dealogic and CapitalIQ, as of 09/04/2018.





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# Appendix

# IPOs 2012 – H2:2018 (YTD)

Preclinical Companies Have Higher Valuations And Raises On Average Than All IPOs From 2012 – H2:2018 (YTD)

| Company                    | Therapeutic Area | Modality       | Primary Source of Value | IPO Pricing Date | IPO Price     | Implied Value (\$mm) | Amount Raised (\$mm) | Return Since IPO |            |            | Current Price | Change from IPO to Current Stock Price | Current Market Cap (\$mm) | Clinical Trial Launch | Time from Pricing to Clinical Launch | Current Phase of Lead Asset at IPO |
|----------------------------|------------------|----------------|-------------------------|------------------|---------------|----------------------|----------------------|------------------|------------|------------|---------------|--|---------------------------|-----------------------|--------------------------------------|------------------------------------|
|                            |                  |                |                         |                  |               |                      |                      | 1 Month          | 6 Months   | 1 Year     |               |  |                           |                       |                                      |                                    |
| Rubius Therapeutics        | Rare Disease     | Gene Therapy   | Platform                | 07/18/18         | \$23          | \$1,779              | \$246                | (7%)             | NM         | NM         | \$25          | 9%                                     | \$1,986                   | N/A                   | N/A                                  | Preclinical                        |
| Unity                      | Miscellaneous    | Small Molecule | Platform                | 05/02/18         | 17            | 712                  | 208                  | (11%)            | NM         | NM         | 19            | 12%                                    | 807                       | 06/25/18              | 0.15 years                           | Phase I                            |
| Homology                   | Rare Disease     | Gene Therapy   | Platform                | 03/27/18         | 16            | 577                  | 150                  | 29%              | NM         | NM         | 17            | 4%                                     | 620                       | 05/17/18              | 0.14 years                           | Preclinical                        |
| Krystal                    | Dermatology      | Gene Therapy   | Hybrid                  | 09/19/17         | 10            | 96                   | 14                   | 7%               | 17%        | NM         | 16            | 64%                                    | 180                       | 05/07/18              | 0.63 years                           | Phase I/II                         |
| Celcuity                   | Oncology         | Other          | Platform                | 09/19/17         | 10            | 92                   | 21                   | 71%              | 55%        | NM         | 25            | 160%                                   | 250                       | Pending               | N/A                                  | Preclinical                        |
| Crispr                     | Platform         | Gene Therapy   | Platform                | 10/19/16         | 14            | 609                  | 48                   | 46%              | 42%        | 32%        | 57            | 305%                                   | 2,697                     | Pending               | N/A                                  | IND                                |
| PhaseRx <sup>(1)</sup>     | Metabolic        | Gene Therapy   | Platform                | 05/18/16         | 5             | 61                   | 46                   | 4%               | (77%)      | (75%)      | NM            | NM                                     | N/A                       | N/A                   | N/A                                  | Preclinical                        |
| Intellia                   | Platform         | Gene Therapy   | Platform                | 05/06/16         | 18            | 661                  | 85                   | 60%              | (28%)      | (15%)      | 31            | 72%                                    | 1,336                     | Pending               | N/A                                  | Preclinical                        |
| Editas                     | Oncology         | Gene Therapy   | Platform                | 02/03/16         | 16            | 588                  | 163                  | 122%             | 61%        | 15%        | 33            | 105%                                   | 1,555                     | Pending               | N/A                                  | Preclinical                        |
| Wave                       | CNS              | Gene Therapy   | Platform                | 11/11/15         | 16            | 426                  | 105                  | (14%)            | (3%)       | 113%       | 53            | 233%                                   | 1,563                     | 07/17/17              | 1.68 years                           | Phase II                           |
| Dimension                  | Rare Disease     | Gene Therapy   | Platform                | 10/22/15         | 13            | 356                  | 118                  | 3%               | (36%)      | (52%)      | 6             | NM                                     | N/A                       | 10/22/10              | N/A                                  | Suspended                          |
| Cytomx                     | Oncology         | Biologic       | Platform                | 10/08/15         | 12            | 476                  | 74                   | (5%)             | 10%        | 31%        | 22            | 87%                                    | 1,011                     | 02/02/17              | 1.32 years                           | Phase I/II                         |
| Zynerba                    | CNS              | Small Molecule | Hybrid                  | 08/05/15         | 14            | 128                  | 15                   | 106%             | (54%)      | (37%)      | 8             | (43%)                                  | 142                       | 10/20/15              | 0.21 years                           | Phase III                          |
| Blueprint                  | Oncology         | Small Molecule | Hybrid                  | 04/30/15         | 18            | 514                  | 125                  | 59%              | 14%        | 4%         | 77            | 326%                                   | 3,365                     | 07/13/15              | 0.20 years                           | Phase III                          |
| Cidara                     | Anti-infectives  | Small Molecule | Asset(s)                | 04/15/15         | 16            | 233                  | 32                   | 2%               | (16%)      | (16%)      | 4             | (73%)                                  | 118                       | 08/03/15              | 0.30 years                           | Phase II                           |
| Collectis                  | Oncology         | Gene Therapy   | Platform                | 03/24/15         | 42            | 1,519                | ND                   | (23%)            | (20%)      | (34%)      | 29            | (29%)                                  | 1,071                     | 06/20/16              | 1.24 years                           | Phase I                            |
| Flex Pharma <sup>(2)</sup> | Neuromuscular    | Small Molecule | Asset(s)                | 01/28/15         | 16            | 285                  | 41                   | 9%               | 2%         | (41%)      | 0             | (97%)                                  | 9                         | 04/27/15              | 0.24 years                           | Suspended                          |
| ProQR                      | Respiratory      | Gene Therapy   | Platform                | 09/18/14         | 13            | 313                  | 62                   | (4%)             | 86%        | 21%        | 8             | (41%)                                  | 244                       | 06/15/17              | 2.74 years                           | Phase II                           |
| ContraFect <sup>(3)</sup>  | Anti-Infectives  | Biologic       | Asset(s)                | 09/12/14         | 6             | 56                   | 59                   | (43%)            | (9%)       | (16%)      | 2             | (63%)                                  | 175                       | 04/29/15              | 0.63 years                           | Phase II                           |
| Dicerna                    | Liver            | Gene Therapy   | Platform                | 01/30/14         | 15            | 263                  | 141                  | 145%             | 1%         | 31%        | 16            | 6%                                     | 839                       | 12/21/15              | 1.89 years                           | Suspended                          |
| Agios                      | Oncology         | Small Molecule | Platform                | 07/23/13         | 18            | 629                  | 261                  | 42%              | 100%       | 106%       | 81            | 348%                                   | 4,681                     | 08/09/13              | 0.05 years                           | Approved                           |
| Regulus                    | Broad Platform   | Gene Therapy   | Platform                | 10/11/12         | 4             | 159                  | 117                  | 23%              | 70%        | 138%       | 0             | (94%)                                  | 24                        | 06/04/15              | 2.65 years                           | Phase II                           |
| Verastem                   | Oncology         | Small Molecule | Platform                | 01/27/12         | 10            | 214                  | 68                   | 9%               | (3%)       | (0%)       | 10            | (0%)                                   | 733                       | 12/10/13              | 1.87 years                           | Suspended                          |
|                            |                  |                |                         |                  | <b>Mean</b>   | <b>\$467</b>         | <b>\$100</b>         | <b>27%</b>       | <b>10%</b> | <b>11%</b> |               | <b>61%</b>                             | <b>\$1,115</b>            |                       | <b>1.00 years</b>                    |                                    |
|                            |                  |                |                         |                  | <b>Median</b> | <b>356</b>           | <b>79</b>            | <b>9%</b>        | <b>1%</b>  | <b>2%</b>  |               | <b>9%</b>                              | <b>807</b>                |                       | <b>0.63 years</b>                    |                                    |

|   |                          |              |              |
|---|--------------------------|--------------|--------------|
| <b>Detailed Analysis of 276 IPO's from 2012 - H2:2018 (YTD)</b> | <b>Early-Stage (27%)</b> | <b>\$457</b> | <b>\$113</b> |
|   | <b>Mid-Stage (40%)</b>   | <b>343</b>   | <b>84</b>    |
|   | <b>Late-Stage (33%)</b>  | <b>394</b>   | <b>88</b>    |
|   | <b>All Stages</b>        | <b>398</b>   | <b>95</b>    |

(1) Following bankruptcy, PhaseRx was sold to Roivant in February 2018 prior to reaching the clinic.

(2) Prior to IPO, Flex Pharma completed studies for the development of its lead asset as a dietary supplement; these were not IND-enabling studies.

(3) IPO pricing date for ContraFect is 07/29/14 but the stock began trading on 09/12/14.

Note: Blue highlighting indicates that the company was acquired post-IPO.

Source: Capital IQ, FactSet Research Systems, EvaluatePharma, BiomedTracker, Company Websites and Company Filings as of 09/04/18.

# IPOs 2012 – H2:2018 (YTD)

Phase I Companies Have The Highest Valuations and Raises Than All Other IPOs

| Company              | Therapeutic Area       | Modality       | Primary Source of Value | IPO Pricing Date | IPO Price | Implied Value (\$mm) | Amount Raised (\$mm) | Return Since IPO |          |        | Current Price | Change from IPO to Current Stock Price | Current Market Cap (\$mm) | Phase I Data Readout | Time from Pricing to Phase I Readout | Current Phase of Lead Asset at IPO |
|----------------------|------------------------|----------------|-------------------------|------------------|-----------|----------------------|----------------------|------------------|----------|--------|---------------|--|---------------------------|----------------------|--------------------------------------|------------------------------------|
|                      |                        |                |                         |                  |           |                      |                      | 1 Month          | 6 Months | 1 Year |               |  |                           |                      |                                      |                                    |
| Replimune Group      | Oncology               | Biologic       | Platform                | 07/19/18         | \$15      | \$463                | ND                   | 16%              | NM       | NM     | \$19          | 29%                                    | \$609                     | Pending              | N/A                                  | Phase I/II                         |
| Translate            | Respiratory/Hepatology | Gene Therapy   | Platform                | 06/27/18         | 13        | 582                  | 136                  | 11%              | NM       | NM     | 11            | (18%)                                  | 479                       | Pending              | N/A                                  | Phase I                            |
| Neon                 | Oncology               | Other          | Platform                | 06/26/18         | 16        | 451                  | 161                  | (23%)            | NM       | NM     | 12            | (26%)                                  | 335                       | Pending              | N/A                                  | Phase I                            |
| Autolus              | Oncology               | Gene Therapy   | Platform                | 06/21/18         | 17        | 659                  | ND                   | 48%              | NM       | NM     | 30            | 75%                                    | 1,152                     | Pending              | N/A                                  | Phase I/II                         |
| Kezar                | Autoimmune             | Small Molecule | Asset(s)                | 06/20/18         | 15        | 275                  | 78                   | 8%               | NM       | NM     | 17            | 15%                                    | 330                       | Pending              | N/A                                  | Phase I/II                         |
| MeiraGTx             | Gene Therapy           | Gene Therapy   | Platform                | 06/07/18         | 15        | 408                  | ND                   | (14%)            | NM       | NM     | 12            | (22%)                                  | 316                       | Pending              | N/A                                  | Phase I/II                         |
| Scholar Rock         | Musculoskeletal        | Biologic       | Hybrid                  | 05/23/18         | 14        | 342                  | 47                   | 54%              | NM       | NM     | 17            | 22%                                    | 429                       | Pending              | N/A                                  | Phase I                            |
| Evelo                | Miscellaneous          | Biologic       | Platform                | 05/08/18         | 16        | 283                  | ND                   | (6%)             | NM       | NM     | 13            | (16%)                                  | 428                       | Pending              | N/A                                  | Phase I                            |
| Surface              | Oncology               | Biologic       | Asset(s)                | 04/18/18         | 15        | 415                  | 47                   | (5%)             | NM       | NM     | 10            | (35%)                                  | 268                       | Pending              | N/A                                  | Phase I                            |
| Unum                 | Oncology               | Gene Therapy   | Platform                | 03/28/18         | 12        | 355                  | 77                   | (2%)             | NM       | NM     | 16            | 36%                                    | 487                       | Pending              | N/A                                  | Phase I/II                         |
| Arcus                | Oncology               | Small Molecule | Asset(s)                | 03/14/18         | 15        | 638                  | 177                  | 2%               | NM       | NM     | 14            | (4%)                                   | 640                       | 07/17/18             | 0.34 years                           | Phase Ib                           |
| BioXcel              | Neurology/Oncology     | Small Molecule | Hybrid                  | 03/08/18         | 11        | 172                  | ND                   | 0%               | NM       | NM     | 9             | (16%)                                  | 144                       | 06/27/18             | 0.30 years                           | Phase Ib                           |
| Solid Biosciences    | Musculoskeletal        | Biologic       | Hybrid                  | 01/25/18         | 16        | 546                  | 67                   | 85%              | 145%     | NM     | 43            | 167%                                   | 1,512                     | Pending              | N/A                                  | Phase I/II                         |
| Denali               | CNS                    | Small Molecule | Platform                | 12/07/17         | 18        | 1,584                | 347                  | (7%)             | 17%      | NM     | 20            | 9%                                     | 1,861                     | Pending              | N/A                                  | Phase I                            |
| Spero                | Infectious Diseases    | Small Molecule | Asset(s)                | 11/01/17         | 14        | 195                  | 115                  | (13%)            | (14%)    | NM     | 11            | (19%)                                  | 207                       | 07/09/18             | 0.68 years                           | Phase I                            |
| Deciphera            | Oncology               | Small Molecule | Platform                | 09/27/17         | 17        | 543                  | 158                  | 10%              | 23%      | NM     | 37            | 118%                                   | 1,393                     | 06/02/18             | 0.68 years                           | Phase III                          |
| Mersana              | Oncology               | Small Molecule | Platform                | 06/27/17         | 15        | 340                  | 147                  | 1%               | 10%      | 28%    | 14            | (7%)                                   | 323                       | 06/04/18             | 0.94 years                           | Phase I                            |
| Zymeworks            | Oncology               | Biologic       | Platform                | 04/27/17         | 13        | 324                  | 161                  | (2%)             | (33%)    | (8%)   | 14            | 8%                                     | 587                       | 12/05/17             | 0.61 years                           | Phase I                            |
| Jounce               | Oncology               | Biologic       | Hybrid                  | 01/26/17         | 16        | 499                  | 139                  | 24%              | (17%)    | 36%    | 8             | (51%)                                  | 256                       | 06/05/17             | 0.36 years                           | Phase II                           |
| Protagonist          | GI                     | Biologic       | Hybrid                  | 08/11/16         | 12        | 209                  | 67                   | 3%               | 49%      | (2%)   | 10            | (20%)                                  | 204                       | 10/17/16             | 0.18 years                           | Suspended                          |
| Audentes             | Musculoskeletal        | Biologic       | Platform                | 07/20/16         | 15        | 341                  | 138                  | (4%)             | 19%      | 37%    | 36            | 143%                                   | 1,359                     | 01/04/18             | 1.46 years                           | Phase I/II                         |
| Selecta              | Platform               | Gene Therapy   | Hybrid                  | 06/22/16         | 14        | 266                  | 159                  | (2%)             | 23%      | 25%    | 14            | (3%)                                   | 304                       | 12/07/16             | 0.46 years                           | Phase II                           |
| Merus                | Immuno-oncology        | Biologic       | Platform                | 05/19/16         | 10        | 158                  | 93                   | (19%)            | 70%      | 106%   | 21            | 114%                                   | 485                       | 05/17/17             | 0.99 years                           | Phase II                           |
| Aeglea               | Oncology               | Biologic       | Asset(s)                | 04/07/16         | 10        | 315                  | 109                  | (13%)            | (32%)    | (26%)  | 11            | 9%                                     | 240                       | 11/09/16             | 0.59 years                           | Phase II                           |
| Corvus               | Immuno-oncology        | Small Molecule | Asset(s)                | 03/23/16         | 15        | 315                  | 109                  | 1%               | (2%)     | 37%    | 11            | (27%)                                  | 320                       | 10/10/16             | 0.55 years                           | Phase II                           |
| Proteostasis         | Respiratory            | Small Molecule | Hybrid                  | 02/11/16         | 8         | 156                  | 143                  | 12%              | 65%      | 85%    | 3             | (66%)                                  | 99                        | 12/11/17             | 1.83 years                           | Phase II                           |
| AveXis               | Gene Therapy           | Gene Therapy   | Platform                | 02/10/16         | 20        | 448                  | 75                   | 6%               | 71%      | 195%   | 218           | 990%                                   | N/A                       | 04/01/16             | 0.14 years                           | Phase III                          |
| BeiGene              | Immuno-oncology        | Small Molecule | Hybrid                  | 02/03/16         | 24        | 830                  | 170                  | 35%              | 8%       | 51%    | 178           | 640%                                   | 10,479                    | 12/05/16             | 0.84 years                           | Phase III                          |
| Voyager              | CNS                    | Gene Therapy   | Hybrid                  | 11/11/15         | 14        | 367                  | 200                  | 69%              | (13%)    | (18%)  | 22            | 55%                                    | 705                       | 12/07/16             | 1.07 years                           | Phase I                            |
| MyoKardia            | Cardiovascular         | Small Molecule | Asset(s)                | 10/29/15         | 10        | 281                  | 75                   | 24%              | 23%      | 61%    | 62            | 517%                                   | 2,473                     | 07/11/16             | 0.70 years                           | Phase III                          |
| Mirna <sup>(1)</sup> | Oncology               | Gene Therapy   | Platform                | 10/01/15         | 7         | 147                  | 90                   | 478%             | 398%     | 102%   | NM            | NM                                     | N/A                       | N/A                  | N/A                                  | Suspended                          |
| RegenXBio            | Metabolic              | Gene Therapy   | Platform                | 09/17/15         | 22        | 640                  | 116                  | (16%)            | (44%)    | (41%)  | 70            | 220%                                   | 2,495                     | Pending              | N/A                                  | Phase I/II                         |
| Aimmune              | Allergy                | Biologic       | Asset(s)                | 08/06/15         | 16        | 693                  | 80                   | 41%              | (9%)     | (25%)  | 28            | 74%                                    | 1,632                     | 08/10/16             | 1.01 years                           | Phase III                          |
| Catabasis            | Rare Disease           | Small Molecule | Platform                | 06/25/15         | 12        | 185                  | 103                  | 16%              | (19%)    | (66%)  | 1             | (94%)                                  | 50                        | 01/25/16             | 0.59 years                           | Phase III                          |
| Nivalis              | Respiratory            | Small Molecule | Asset(s)                | 06/17/15         | 14        | 217                  | 41                   | 443%             | 126%     | 26%    | 14            | NM                                     | 219                       | 10/07/15             | 0.31 years                           | Suspended                          |

(1) August 28, 2017, Mirna was the target of a reverse merger with Synlogic.

Note: Blue highlighting indicates that the company was acquired post-IPO.

Note: Purple highlighting indicates that the company went through a reverse merger.

Source: Capital IQ, FactSet Research Systems, EvaluatePharma, BiomedTracker, Company Websites and Company Filings as of 09/04/18.

# IPOs 2012 – H2:2018 (YTD)

Phase I Companies Have The Highest Valuations and Raises Than All Other IPOs

| Company                    | Therapeutic Area | Modality       | Primary Source of Value | IPO Pricing Date | IPO Price | Implied Value (\$mm) | Amount Raised (\$mm) | Return Since IPO |            |            | Current Price | Change from IPO to Current Stock Price | Current Market Cap (\$mm) | Phase I Data Readout | Time from Pricing to Phase I Readout | Current Phase of Lead Asset at IPO |
|----------------------------|------------------|----------------|-------------------------|------------------|-----------|----------------------|----------------------|------------------|------------|------------|---------------|--|---------------------------|----------------------|--------------------------------------|------------------------------------|
|                            |                  |                |                         |                  |           |                      |                      | 1 Month          | 6 Months   | 1 Year     |               |  |                           |                      |                                      |                                    |
| aTyr                       | Rare Disease     | Biologic       | Asset(s)                | 05/07/15         | \$14      | \$335                | \$181                | 85%              | (13%)      | (75%)      | \$1           | (95%)                                  | \$22                      | 03/30/16             | 0.90 years                           | Suspended                          |
| Adaptimmune <sup>(1)</sup> | Oncology         | Gene Therapy   | Platform                | 05/05/15         | 17        | 1,203                | 104                  | (11%)            | (37%)      | (43%)      | 12            | (32%)                                  | 1,088                     | 06/05/16             | 1.09 years                           | Phase II                           |
| Bellicum                   | Oncology         | Gene Therapy   | Platform                | 12/19/14         | 19        | 515                  | 101                  | 53%              | 19%        | (7%)       | 7             | (62%)                                  | 313                       | 12/05/15             | 0.96 years                           | Phase I/II                         |
| Juno                       | Oncology         | Gene Therapy   | Platform                | 12/19/14         | 24        | 1,910                | 314                  | 109%             | 114%       | 87%        | 87            | 263%                                   | N/A                       | 07/28/16             | 1.61 years                           | Phase III                          |
| Calithera                  | Oncology         | Small Molecule | Platform                | 10/02/14         | 10        | 188                  | 79                   | (6%)             | 64%        | (40%)      | 5             | (46%)                                  | 196                       | 05/30/15             | 0.66 years                           | Phase II                           |
| Loxo                       | Oncology         | Small Molecule | Asset(s)                | 07/31/14         | 13        | 91                   | 61                   | 0%               | (15%)      | 21%        | 169           | 1200%                                  | 5,149                     | 04/21/15             | 0.72 years                           | NDA                                |
| Avalanche                  | Ophthalmology    | Gene Therapy   | Platform                | 07/30/14         | 17        | 447                  | 59                   | 74%              | 159%       | (13%)      | 8             | (55%)                                  | 476                       | 06/15/15             | 0.88 years                           | Suspended                          |
| Immune Design              | Oncology         | Gene Therapy   | Platform                | 07/24/14         | 12        | 206                  | 94                   | (1%)             | 121%       | 114%       | 4             | (68%)                                  | 183                       | 03/31/15             | 0.68 years                           | Phase I/II                         |
| Pfenex                     | Ophthalmology    | Biosimilar     | Platform                | 07/23/14         | 6         | 125                  | 10                   | 4%               | 13%        | 296%       | 5             | (12%)                                  | 166                       | 08/08/16             | 2.05 years                           | Program Hold                       |
| Sage                       | CNS              | Steroid        | Asset(s)                | 07/17/14         | 18        | 491                  | 91                   | 52%              | 140%       | 305%       | 164           | 813%                                   | 7,665                     | 11/03/14             | 0.30 years                           | Suspended                          |
| Kite                       | Oncology         | Gene Therapy   | Platform                | 06/20/14         | 17        | 747                  | 85                   | 34%              | 211%       | 244%       | 180           | 959%                                   | N/A                       | 08/25/14             | 0.18 years                           | Approved                           |
| Karyopharm                 | Oncology         | Small Molecule | Asset(s)                | 11/06/13         | 16        | 482                  | 44                   | 6%               | 82%        | 157%       | 21            | 32%                                    | 1,275                     | 12/07/13             | 0.08 years                           | NDA                                |
| Five Prime                 | Oncology         | Biologic       | Hybrid                  | 09/17/13         | 13        | 224                  | 311                  | 4%               | 44%        | (9%)       | 14            | 8%                                     | 498                       | 02/10/14             | 0.40 years                           | Phase I                            |
| OncoMed                    | Oncology         | Biologic       | Platform                | 07/17/13         | 17        | 511                  | 317                  | 9%               | 98%        | 30%        | 2             | (86%)                                  | 89                        | 01/17/14             | 0.50 years                           | Suspended                          |
| bluebird bio               | Rare Disease     | Gene Therapy   | Platform                | 06/18/13         | 17        | 457                  | 177                  | 104%             | 19%        | 53%        | 168           | 890%                                   | 9,115                     | 06/14/14             | 0.99 years                           | Phase III                          |
| Epizyme                    | Oncology         | Small Molecule | Platform                | 05/30/13         | 15        | 487                  | 198                  | 88%              | 41%        | 54%        | 12            | (21%)                                  | 820                       | 01/06/14             | 0.61 years                           | Phase I <sup>(2)</sup>             |
|                            |                  |                |                         |                  |           | <b>Mean</b>          | <b>\$452</b>         | <b>\$127</b>     | <b>37%</b> | <b>49%</b> | <b>51%</b>    | <b>133%</b>                            | <b>\$1,274</b>            |                      |                                      | <b>0.74 years</b>                  |
|                            |                  |                |                         |                  |           | <b>Median</b>        | <b>367</b>           | <b>106</b>       | <b>6%</b>  | <b>23%</b> | <b>30%</b>    | <b>8%</b>                              | <b>476</b>                |                      |                                      | <b>0.68 years</b>                  |

| Detailed Analysis of 276 IPO's from 2012 - H2:2018 (YTD) | Early-Stage (27%) | \$457 | \$113 |
|--|-------------------|-------|-------|
|  | Mid-Stage (40%)   | 343   | 84    |
|  | Late-Stage (33%)  | 394   | 88    |
|  | All Stages        | 398   | 95    |

(1) September 7, 2017, GSK exercised its option to exclusively license the right to research, develop, and commercialize the NY-ESO SPEART-cell therapy program, Adaptimmune's lead asset at time of IPO.

(2) Phase I refers to the current status of Pinometostat, Epizyme's lead asset at the time of IPO. Epizyme's current lead asset, Tazemetostat, is in Phase II.

Note: Blue highlighting indicates that the company was acquired post-IPO.

Source: Capital IQ, FactSet Research Systems, EvaluatePharma, BiomedTracker, Company Websites and Company Filings as of 09/04/18.



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