



Moderna Inc.- MRNA (6/13/19)

Description: Moderna, Inc., a clinical stage biotechnology company that develops therapeutics and vaccines based on messenger RNA for the treatment of infectious diseases, immuno-oncology, rare diseases, and cardiovascular diseases. Moderna, Inc. was founded in 2010 and is headquartered in Cambridge, Massachusetts.

Ticker: MRNA

Price: \$16.16

Market Cap: \$5.3B

Performance: +5.8% YTD

Analysis

Moderna hit the public markets in December of 2018 at \$23 share valuing the company at \$7.5B and making it the biggest biotech stock IPO ever.

What makes MRNA so special to get a valuation like that? mRNA, do not confuse this with their ticker, stands for messenger ribonucleic acids (mRNA). Without mRNA, your genetic code would never get used by your body. Proteins would never get made and your body wouldn't - actually couldn't - perform its functions. mRNA plays a vital role in human biology, specifically in a process known as protein synthesis. mRNA is a single-stranded molecule that carries genetic code from DNA in a cell's nucleus to ribosomes, the cell's protein-making machinery. mRNA's role is to transport genetic information from DNA to the ribosome, offering up the amino acid sequence of the eventual proteins the DNA is coding for. Moderna's tech platform is designed to engineer mRNA to deliver whatever protein codes they want the cells to produce, in effect, turning the cells themselves into vaccine or drug-manufacturing factories.

As always when discussing biotechs, the goal is to get these crazy terms down to brass tax. What does any of this stuff mean? Point blank, DNA translates to RNA, RNA translates to Proteins. Moderna views the DNA as storage and the mRNAs as the software. With their

technology they believe they can edit the “software” (mRNAs) to achieve a desired outcome as it will change the protein makeup and thus cure diseases and illnesses.

If successfully implemented this kind of technology can literally change the entire medical landscape as we know it and that is why Moderna carries such a large valuation.

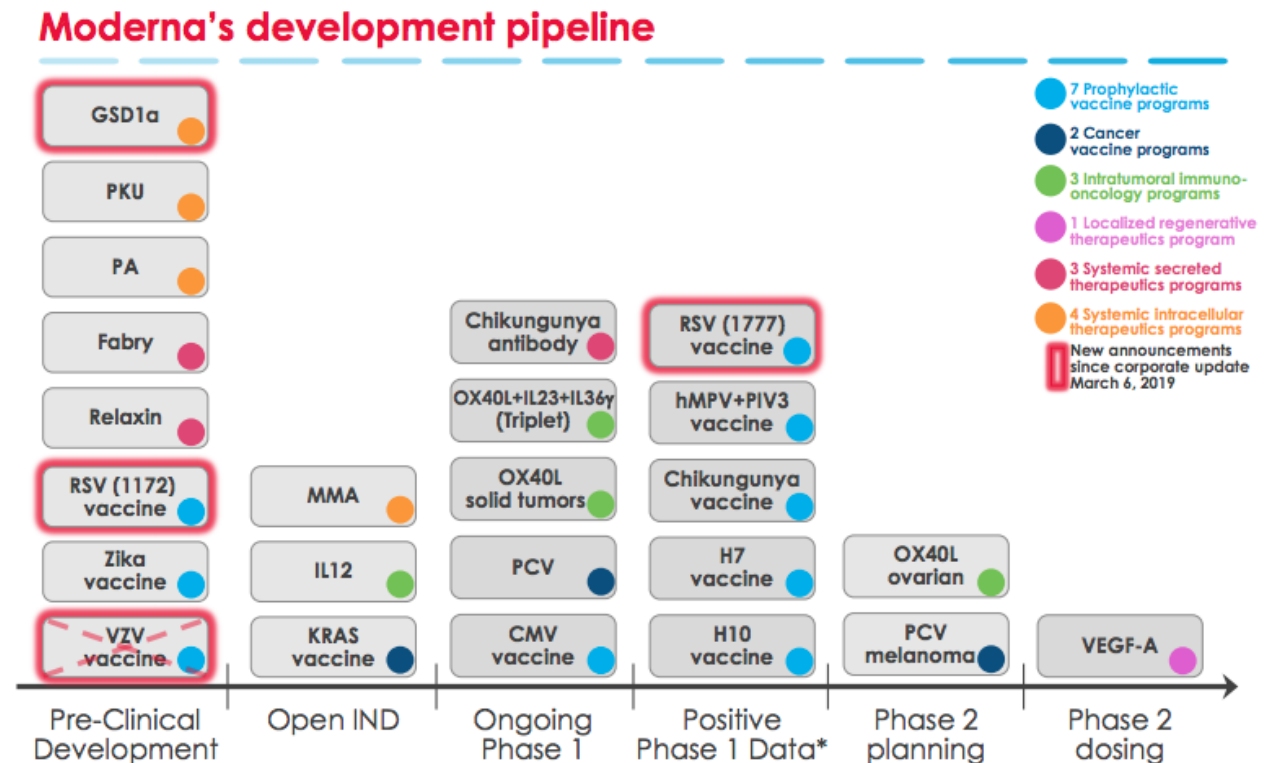
Currently, the company has 10 programs in clinical trials and a total of 21 development candidates in six modalities comprising of prophylactic vaccines, cancer vaccines, intratumoral immuno-oncology, localized regenerative therapeutics, systemic secreted therapeutics, and systemic intracellular therapeutics.

They have strong strategic alliances with AstraZeneca, Merck & Co., Vertex Pharmaceuticals, Biomedical Advanced Research and Development Authority, Defense Advanced Research Projects Agency, and Bill & Melinda Gates Foundation. As a testament to their support, before even going public Moderna was able to raise \$2.6B in the private market.

The company has a deep pipeline which is still in its early days as only one candidate is in Phase 2.

Modality	Program #	Program Indication	Preclinical development	Phase 1	Phase 2	Phase 3 and commercial	Moderna rights
Prophylactic vaccines	mRNA-1172	Respiratory syncytial virus (RSV) vaccine		Merck filed IND			Merck to pay milestones and royalties
	mRNA-1777	Respiratory syncytial virus (RSV) vaccine			Paused		
	mRNA-1647	Cytomegalovirus (CMV) vaccine					Worldwide
	mRNA-1653	Human metapneumovirus and parainfluenza virus 3 (hMPV+PIV3) vaccine	Phase 1b (pediatrics)	Phase 1 (adults)			Worldwide
	mRNA-1440	Influenza H10N8 vaccine					Worldwide Advancing subject to funding
	mRNA-1851	Influenza H7N9 vaccine					Worldwide Advancing subject to funding
	mRNA-1893	Zika vaccine					Worldwide BARDA funded
	mRNA-1388	Chikungunya vaccine					Worldwide Advancing subject to funding
Cancer vaccines	mRNA-4157	Personalized cancer vaccine (PCV)					50-50 global profit sharing with Merck
	NCI-4650	Personalized cancer vaccine (PCV)					
	mRNA-5671	KRAS vaccine					50-50 global profit sharing with Merck
Intratumoral immuno-oncology	mRNA-2416	OX40L Solid tumors/lymphoma Advanced ovarian carcinoma (Ph 2 cohort)	Solid tumors/lymphoma	Ovarian			Worldwide
	mRNA-2752	OX40L+IL23+IL36y (Triplet) Solid tumors/lymphoma					Worldwide
	MEDI1191	IL12 Solid tumors					50-50 U.S. profit sharing; AZ to pay royalties on ex-U.S. sales
Localized regenerative therapeutics	AZD8601	VEGF-A Myocardial ischemia					AZ to pay milestones and royalties
Systemic secreted therapeutics	mRNA-1944	Antibody against Chikungunya virus			Second dose level cohort enrolled		Worldwide DARPA funded
	AZD7970	Relaxin Heart failure					50-50 U.S. profit sharing; AZ to pay royalties on ex-U.S. sales
	mRNA-3630	α-GAL Fabry disease					Worldwide
Systemic intracellular therapeutics	mRNA-3704	MUT Methylmalonic Acidemia (MMA)					Worldwide
	mRNA-3927	PCCA+PCCB Propionic Acidemia (PA)					Worldwide
	mRNA-3283	PAH Phenylketonuria (PKU)					Worldwide
	mRNA-3745	G6Pase Glycogen Storage Disorder Type 1a (GSD1a)			DC nomination		Worldwide

Moderna is aiming to treat methylmalonic acidemia (MMA), propionic acidemia (PA), phenylketonuria (PKU), Fabry disease, and glycogen storage disorder (GSD1a). They are also working on vaccines for unmet medical needs, which include respiratory syncytial virus (RSV), cytomegalovirus (CMV), human metapneumovirus (hMPV), Zika virus, Chikungunya virus, and two pandemic influenza viruses. With Moderna's support, Merck has advanced an improved version of an RSV vaccine, and they've recently filed an IND (investigational new drug application) with the FDA.



In CUBE's view, this is a super long-term play on the mRNA industry. Moderna is still years away from full-on FDA approval on their products BUT if they are able to pull it off, the products will be revolutionary. The biggest difficulty they, and others in the space, are facing, is the delivery aspect of getting the mRNA into cells. A common solution is to wrap the mRNA in fatty vessels called lipid nanoparticles. These lipid nanoparticles have a tendency to aggregate in the liver and makes mRNA useful for producing therapeutic proteins and antibodies that are secreted from liver cells and circulated in the bloodstream. The problem here is that it creates a problem for other areas in the body. In other areas, it will have to be injected directly.

So what we have here is a potential ground-breaking solution to curing all kinds of diseases but the genetic designing and delivery of the mRNA's to create proteins to cure such diseases and illnesses is something that makes it extremely challenging.

Moving onto the financials. At this moment, Moderna brings in revenues from collaborations with the partners mentioned above like AstraZeneca and Merck. In their Q1 report last month, revenue was \$16.0M and net losses were \$132.7M, or -\$0.40 in EPS. More importantly, net cash used in operating activities was \$143.9 million for the three months ended March 31, 2019 compared to \$111.4 million for the three months ended March 31, 2018. Cash and cash equivalents on hand now stands at a fairly healthy \$1.55B.

At the current cash burn of ~\$150M per quarter, MRNA has enough cash on hand for the year but they are ramping up R&D as expenses were \$130.6 million for the three months ended March 31, 2019 compared to \$90.1 million for the three months ended March 31, 2018.

Moderna is not alone in this space. In comparison to other more established mRNA players like Ionis Pharma (IONS) and Alnylam Pharma (ALNY), MRNA trades at a pretty steep valuation.

IONS has a product on the market called Spinraza which is an mRNA product that is approved in 40 countries and brings in sales for the company. Spinraza is dedicated to treating spinal muscular atrophy, a rare neuromuscular disorder. IONS is expected to bring in \$725M in revenue this year, over \$100M in operating profit, and sits on \$2B worth of cash and is valued at \$8.8B.

ALNY also has a product on the market known as Onpattro that is dedicated to treating those with polyneuropathy of hereditary transthyretin-mediated amyloidosis in adults. Onpattro, which was recently approved brought in \$26.3M in revenue for the company in Q1 and has yet to be fully rolled out around the world commercially. The company also has cash & cash equivalents of roughly \$1.25B and trades at a valuation of \$7.6B.

To summarize and make the point here, MRNA, which doesn't have any products live or even in Phase 3 yet, trades at a \$5.3B valuation while IONS and ALNY which do have products live that are generating revenue and have more cash on hand trade at \$8.8B and \$7.6B, respectively. This doesn't necessarily mean that MRNA is overvalued as based on what I've seen MRNA's pipeline is much larger than IONS and ALNY and could therefore be the top player here but we won't know for sure for at least a couple of years. Put simply, MRNA is the riskier play but if it does pan out could have the greater upside.

I mentioned two established companies, there are also two other companies in the mRNA space that are preclinical like MRNA and trade at much smaller valuations. For example, Arrowhead Pharma (ARWR) and Regulus Therapeutics (RGLS). Both are also speculative but trade at \$2.5B and \$20M market caps, respectively.

So basically, MRNA is being valued in-between the two groups of companies. Essentially this is a speculative bet on a potential medical breakthrough but it will take years to know for sure what will happen. As a reminder, Moderna has 21 mRNA-based drugs in the pipeline, only 10 are in clinical trials and while the potential is very enticing there are risks this doesn't pan out. For example, earlier this year, Moderna ran into a speed bump while working on combining two vaccines for cytomegalovirus, or CMV, according to the company's securities filings. Moderna was running an early-stage trial when it realized in August one of the vaccines "did not meet our internal quality control specifications for visual inspection after one year of storage." The FDA placed a clinical hold on the trial and Moderna agreed to remove that vaccine from the study.

Technical Analysis



As clearly seen, MRNA is in a real bad downtrend right now with little bounce backs. I believe a lot of this has to do with the IPO lockup period expiring after their IPO in December but if we look at IONS and ALNY they also sold off over the last several months since April 1st. All three are down a little over 20% since April 1st but MRNA picked up the pace of its downfall in June right around the time of the IPO lockup expiration on June 5th.

The next levels of support that need to be looked out for are \$15.28 and \$14.82. The stock has been oversold on the Williams %R and RSI but that hasn't shown to get technical traders interested in jumping in yet. There was zero bounce on the previous supports of its 50 day moving average of \$23.00 and S1 support line of \$18.03 – MRNA just blew right by them to the downside.

In cases like this I think it's better to wait for more of a stabilized bottom which it may want to do right here since it caught a little bit of a buy the other day but it's not enough to draw any conclusions at this time which generally happens with recent IPOs.

All in all, MRNA can be used as a trading vehicle but if you're looking for a long-term investment that has big upside this could be for you but remember that it is super speculative and right now the short-term charts don't point towards anything bullish.