

Counterpoint Global Insights

Case Study: CRISPR

EDGE | JANUARY 2017

WELCOME TO THE EDGE.

Morgan Stanley Investment Management's Counterpoint Global shares their proprietary views on a big idea that has the potential to trigger far-reaching consequences—ideas such as autonomous vehicles, artificial intelligence, robotics and bioengineering.

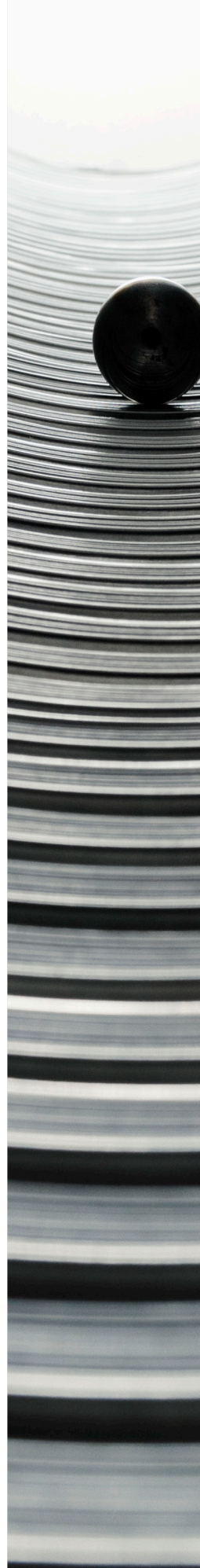
Counterpoint Global's long-term ownership mindset emphasizes perspective, insight and thinking across categories, while our investment process focuses on identifying unique companies with sustainable competitive advantages. Through The EDGE, we share our framework for thinking about change and our process for recognizing patterns that may drastically alter the investment landscape over the longer term.

This work complements our team's more traditional, fundamental research to create a framework for long-term investing that is grounded in intellectual curiosity and flexibility, perspective, self-awareness and partnership.

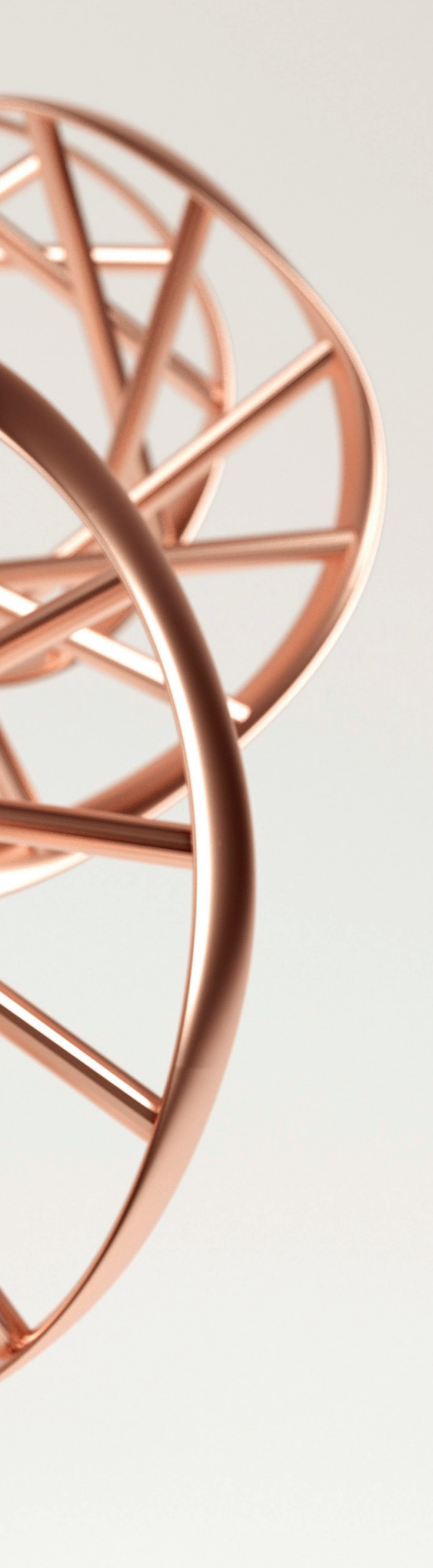
Clustered regularly interspaced short palindromic repeats (CRISPR) is a new tool for genetic research that allows scientists to locate specific segments of DNA and then replace or delete those segments. It enables scientists to alter organisms for either therapeutic or research purposes, both before and after they have developed. For investors, it has the potential to birth new industries and disrupt existing medical treatments.

CRISPR is a string of DNA that was originally discovered as part of a bacterium's immune system. Using this simple string of DNA, bioengineers figured out how to repurpose the immune system to have it target select strands of human, animal or plant DNA instead of the natural threats to bacteria. They can thus locate specific portions of a human genome—the blueprint of the human body. Cells use DNA, which is the language of the blueprint, to construct organs and enable the various functions of the body. CRISPR allows scientists to read, write and edit this blueprint. ►

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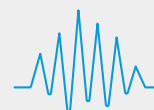
► This breakthrough creates an opportunity for innovations to flourish. Some of the first applications of CRISPR have been in agriculture, where genetic modifications are being made to crops. Imagine an apple that doesn't brown or crops that are mildew resistant. For diseases caused by known faulty mutations—"typos" in the three-billion letter sequence of the human genome—such as cystic fibrosis, hemophilia and Tay-Sachs disease, CRISPR offers therapeutic opportunities. Once the "typos" are located, they can either be excised or altered. This treatment could radically disrupt existing therapeutics, many of which treat symptoms rather than underlying causes. The technology can even be used to target viruses, such as HIV. Such disruption would be a detriment to the annuity streams of many pharmaceutical companies. More utopian or dystopian is the possibility of "designer babies"—allowing parents to choose the traits and qualities they want in their children.

This breakthrough creates an opportunity for innovations to flourish.

To be sure, there are a number of causes for doubt. Ethical questions could bring on regulatory scrutiny. There is also legal uncertainty over the intellectual property; the Supreme Court and Congress may have to clarify the patentability of CRISPR. Finally, science is generally incremental, and there are few paradigm shifts that change things overnight.

CRISPR is still in its early stages, with the first clinical trial receiving approval in June 2016. Short of some miracle breakthrough, it could be years before treatments are approved. Other segments, like agriculture, may move faster.

We will continue to monitor the scientific and clinical research that is being conducted and are mindful of the tremendous potential here.



OTHER DISRUPTORS

Other themes the team is currently researching include

- Blockchain
- Machine Learning
- Autonomous Vehicles

Risk Considerations

There is no assurance that a Portfolio will achieve its investment objective. Portfolios are subject to **market risk**, which is the possibility that the market values of securities owned by the Portfolio will decline and that the value of Portfolio shares may therefore be less than what you paid for them. Market values can change daily due to economic and other events (e.g. natural disasters, health crises, terrorism, conflicts and social unrest) that affect markets, countries, companies or governments. It is difficult to predict the timing, duration, and potential adverse effects (e.g. portfolio liquidity) of events. Accordingly, you can lose money investing in this Portfolio. Please be aware that this Portfolio may be subject to certain additional risks. In general, **equities securities'** values also fluctuate in response to activities specific to a company. Investments in **foreign markets** entail special risks such as currency, political, economic, market and liquidity risks. The risks of investing in **emerging market countries** are greater than risks associated with investments in foreign developed countries. **Privately placed and restricted securities** may be subject to resale restrictions as well as a lack of publicly available information, which will increase their illiquidity and could adversely affect the ability to value and sell them (liquidity risk). **Derivative instruments** may disproportionately increase losses and have a significant impact on performance. They also may be subject to counterparty, liquidity, valuation, correlation and market risks. **Illiquid securities** may be more difficult to sell and value than public traded securities (liquidity risk). The **healthcare industry** can be affected by various political, economic, regulatory, and supply-and-demand factors. Furthermore, it can be subject to government approval of products and services, which could have an effect on price and availability, and can be affected by rapid obsolescence and patent expirations.

Counterpoint Global

INVESTORS	FUNDAMENTAL RESEARCH RESPONSIBILITIES	YEARS OF EXPERIENCE	YEARS WITH FIRM	YEARS WITH TEAM
DENNIS LYNCH	Lead Investor Head of Counterpoint Global	31	27	27
SAM CHAINANI	Head of Counterpoint Global ~ New York, Technology	29	29	25
JASON YEUNG	Health Care	28	23	21
ARMISTEAD NASH	Business Services, Software	25	23	21
DAVID COHEN	Consumer	37	32	26
ALEX NORTON	Consumer, Industrials, Technology (ex Software)	30	25	25
MANAS GAUTAM	Head of Global Endurance, Generalist	13	10	10
ANNE EDELSTEIN	Co-Head of Vitality, Health Care	14	7	7
JENNY LEEDS	Co-Head of Vitality, Health Care	9	6	6
ABHIK KUMAR	Software, Media	16	6	6
JOSHUA JARRETT	Director of Research, Generalist	20	5	5
RUOBING CHANG	Internet	13	9	5
ALEKS SAMETS	Payments	5	5	5
BETH FIFER	Health Care	13	4	4
MUHAMMADRAZA PANJU	Internet	6	4	4
PETE STOVELL	Generalist	31	4	4
MICHAEL MORITZ	Generalist	7	3	3
GINO GRAZIADIO	Generalist	1	1	1
CONSILIENT RESEARCH				
MICHAEL MAUBOUSSIN	Head of Consilient Research	39	5	5
DAN CALLAHAN	Consilient Research	20	5	5
DISRUPTIVE CHANGE RESEARCH				
STAN DELANEY	Big Ideas, Emerging Themes	24	24	21
SASHA COHEN	Big Ideas, Emerging Themes	8	8	8
JUSTIN AMEZQUITA	Big Ideas, Emerging Themes	5	5	5
SUSTAINABILITY RESEARCH				
THOMAS KAMEI	Head of Sustainability Research, Tailwinds	13	13	13
DERRICK MAYO	Sustainability Research	20	11	4
CLIENT RELATIONSHIP & BUSINESS MANAGEMENT				
MARK TODTFELD	Chief Operating Officer	30	20	6
KERRY ANN JAMES	Head of Client Relations, Portfolio Specialist	28	8	4
PRAJAKTA NADKARNI	Portfolio Specialist	21	18	14
MICK MORAN	Portfolio Specialist	11	11	3
MCKENZIE BURKHARDT	Portfolio Specialist	22	22	22
XAVIER SALAZAR	Portfolio Analyst	7	7	3
KATHRYNE HORAN	Portfolio Specialist ~ Global Endurance	13	13	3
EARL PRYCE	Portfolio Administrator	25	25	18
CHAYSE MORGAN	Portfolio Administrator	5	5	5
ERICA CASARENO	Portfolio Administrator	3	3	3
AMBER YANG	Business Management	15	7	4

"Investor" refers to an analyst or portfolio manager of Counterpoint Global.

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Years of Experience, Years with Firm and Years with Team are as of December 31, 2024.

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