

January 5, 2015
(Circ. 17,000)

Upstarts see opportunity in concussion focus **By Daniel Kaplan**

Pressurized oxygen chambers. Blood biomarkers. Shock-absorbing helmets. Advanced brain imaging. These are just some of the products winding their way through development at hundreds of startups, large and small, in response to the national and NFL focus on traumatic brain injuries (TBI).

And like any new product, their development takes financing. An emerging class of investors is beginning to stake claims in the field of concussion prevention, diagnosis and treatment, though the investment cycle is still in its early stages.



High-profile efforts by leagues such as the NFL have created a rush of development and investment in the field of concussion prevention, diagnosis and treatment.

“Investors are trying to figure out when to jump in,” said Doug Cole, general partner of Flagship Ventures, a biotechnology investment fund that was an early investor in Quanterix, which identifies and patents biomarkers to identify concussions. The company last year received a grant from the NFL’s \$40 million Head Health Challenge, which General Electric and Under Armour also fund.

“[W]hen you get a GE, a large company linking with an entity like the NFL ... that is going to get some

investors' attention," Cole added.

ImmunArray, which also identifies and patents biomarkers — essentially molecules in the blood that signal, in the case of TBI, when a concussive episode has occurred — also won a Head Health grant last year. Now, the company plans to raise \$10 million in the coming months and has hired Cary Street Partners, a Richmond, Va., investment bank, to raise the money.

"This is a very important time in our company's history, and it will require capital to do it right," said Donna Edmonds, ImmunArray's chairman of the board.

Turnkey Sports Poll

The following are results of the Turnkey Sports Poll taken in December. The survey covered more than 2,000 senior-level sports industry executives spanning professional and college sports.

■ If you had the opportunity to invest in a startup related to sports, in which of the following type of companies would you be most likely to invest?

Data analytics	41%
Fantasy sports technology	21%
Social media technology	15%
Injury prevention	12%
3-D viewing technology	5%
Video games	2%
Not sure / No response	4%

■ A startup company focused on which sports level would generally offer the best investment opportunity?

Professional	47%
Youth	26%
College	22%
Not sure / No response	5%

■ If you had the opportunity to invest in any type of startup, would the company be in sports or a different industry?

Different industry	60%
Sports	30%
Not sure / No response	10%

Source: Turnkey Sports & Entertainment in conjunction with SportsBusiness Journal. Turnkey Intelligence specializes in research, measurement and lead generation for brands and properties. Visit www.turnkeyse.com.

CVAC Systems, which makes pressurized air pods that have had some success in treating concussion victims, recently hired Livingston Securities to seek new investors willing to fund the \$10 million to \$20 million the company needs to pay for large-scale studies of its technology.

"This company is the Tesla Motors of concussions," said Scott Livingston, founder of the eponymously named firm that is focusing on the area. "There is tremendous investment interest in concussion detection and treatment."

In CVAC's case, Livingston compares the podmaker to Tesla because, like the electric car company, initial funding is coming from customers. One enthusiastic customer, who is an investor who asked to remain anonymous, even hosted SportsBusiness Journal in his spacious Manhattan apartment to take a test run in the pod. It is believed to be the only residence in New York City with the pod, which technically is called a hypobaric pressure chamber. The chamber simulates high altitudes, which may stimulate the body's healing mechanisms.

"Our orders have been taking off, our prices have gone up by 55 percent in the last four months," said Allen Ruszkowski, president and CEO at CVAC. Competitive athletes, including Novak Djokovic, have used the company's pressure chambers (see related story, Page 19). The list price of the chambers is now \$129,000.

Part of the challenge for investors is weeding through the companies. The NFL received nearly 900 submissions for its Health Challenge, though some of those were from government agencies and universities.

Take the sensor market, which aims to design chips, implanted in helmets and other football equipment, to measure the velocity of hits.

“The sensor space is the wild, wild west,” said Chad Hollingsworth, vice president of business development for Triax, one of the companies in the field. “A lot of people are trying a lot of things. Most of [what] you read is written by a PR team by one of the companies.”

Family and friends, Hollingsworth said, so far fund Triax but venture capital money is available. “We know we could get money from professional investors,” he said. “If you want the VC money it is definitely there, but it is at a valuation where they own the company.”

The sensor market is not unique in offering opportunity, but confusion to investors. In brain imaging, companies are also scrambling to come up with products that do more than traditional CT scans and MRIs.

“Investors know it is a potentially big space, but they don’t know what company to back,” said James Thompson, chief strategy officer and chief technical officer of Evoke Neuroscience, which makes portable assessment modules to measure brain functions. “There is so much going on, what is effective, what is the regulatory status, will it require FDA approval?”

Concussions and head trauma only in the last decade have become major areas of public focus. The NFL began to shift its position after 2009 congressional hearings trained attention to the issue. So it’s in part why the science of concussions is not as far along as many other life-science research areas.

“The field is emerging, it is important, and worth investing in ... and it is much more complicated than a lot of us had anticipated,” said ImmunArray’s Edmonds.

If successful, then blood tests could be quickly taken on sidelines and analyzed to see if a player has a concussion.

Edmonds is a proponent of money flowing to more established operators. She has an extensive background in medical startups, first in the cardiovascular field, and now through biomarkers. ImmunArray initially has been funded through Virginia Life Sciences Investments.

“There is a lot of early investments looking to capitalize on the high-profile problem,” she said. “Leadership in the field is concerned about opportunistic investments being made in products and services that have not been studied and validated.”

In fact, she pointed out that the number of submissions to the NFL’s Head Health Challenge is somewhat troubling.

“Nine hundred is a very large number,” she said.

That said, plenty of companies do start small, and one of the Head Health Challenge grant winners is proudly such.

“Our corporate address is a garage,” said Mark Tommerdahl, CEO of Cortical Metrics. Cortical’s product, according to the company’s press release announcing its NFL grant, is “shaped like a computer mouse and able to connect to any desktop or laptop, and uses both vibrations and the patient’s ability to sense those vibrations to measure the severity of a concussion.”

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DOUG COLE

GENERAL PARTNER, FLAGSHIP VENTURES

And not all agree that the large number of companies responding to the NFL represents a money chase. Some of the interest is filling gaps created by declines in government funding, said Jeff Miller, the NFL’s senior vice president of player health and safety.

Kevin Hrusovsky, executive chairman of Quanterix, found the number of applicants

important because it helped distinguish the winners.

“The fact there were 400 different companies in 27 different countries and we got selected is a pretty important breakthrough,” he said, referring to the NFL Challenge’s first round of grants. “That’s generated a lot of interest for us.”

To date, no investment fund has emerged to focus only on concussions. So far, dollars are coming from individual investors or funds that are always focused on life sciences. That could change, though, as the science develops, and if one breakthrough technology appears on the scene.

“Selling things to some NFL team, or a sports team, would make this a very scalable business,” said Livingston, the investment banker. “The holy grail would be some kind of machine in every bag of every little league coach. We haven’t seen that kind of technology, yet.”