

## bgC3 Trip Report: Tel Aviv (August 20-22, 2017)

### Key takeaways

- Advances in immunology and hyperbarics may hold promise in the diagnosis and management of chronic and degenerative disease.
- Focused sources of physical energy can be complementary tools in the detection and treatment of disease.
- Cognitive decline may best be understood in the context of natural aging and many approaches to brain health are being targeted – and individualized – across the full life span.
- Israel's unique geopolitical landscape provides start-up founders cross-disciplinary experiences, including the IDF, to build new technologies and approaches.

### Background

Last week, Drs. Gilla Kaplan (BMGF), Niranjan Bose and [REDACTED] traveled to Tel Aviv to

- Learn more about the life sciences technology landscape in Israel
- Identify life science and other technologies or emerging practices with potential for scale and/or widespread adoption
- Validate the most promising of these technologies or practices, especially those with neuroscience application

Israel has a strong tradition of putting science and technology at the forefront of its economic development. The country invests 4%-5% of its GDP on R&D each year, which is the highest rate in the world, and has developed leadership in terms of scientists, engineers and patents per capita. Despite its small size, Israel has become an important center for innovation and has a proven track record in fields such as computer science, navigation, nanotechnology, and brain research.

### Recommendations

- There are a few groups pursuing extremely interesting approaches towards AD and neurodegeneration
- Foundation and bgC3 should continue to watch the landscape of companies and technologies emerging out of Israel and find a way to stay engaged
- There might be great value in planning a 1 day visit for Bill when he is in the region or curating a set of learning/science sessions in Europe with some of the Israeli companies

## Academic Highlights

### *Immune Gatekeeping in Aging and Degenerative Disease*

Dr. Michael Schwartz Lab: <http://www.weizmann.ac.il/neurobiology/labs/schwartz/>

Can immunotherapy treat neurodegeneration? Dr. Schwartz has a notable research background and in the last decade has refocused her lab around harnessing the immune system to combat Alzheimer's disease and age-related dementia – specifically in the potential use of immune checkpoint blockade. Milestones in her studies that have led to this conclusion include:

1. Circulating immune cells support brain plasticity and repair
2. The brain's choroid plexus epithelium –a permissive gateway to the brain
3. Under brain pathologies the gateway (communication) is malfunctioning
4. Immune checkpoint blockade for fighting against Alzheimer's disease

These findings (and more) have led to the conclusion that reversing the age-related signature of the aging choroid plexus restores brain function and microglial function. Her current “neuro-immunotherapeutic” direction includes the development of anti-PD-L1 as the first generation of immunotherapy to combat Alzheimer's disease, and searching for novel CNS specific checkpoint targets as the second generation of immunotherapy. They are specifically going after discovering novel antibodies in partnership with Lundbeck.

### *Cellular Rejuvenation Therapy and Biomarker Development*

Dr. Shai Efrati Lab: <http://www.assafh.org/sites/en/clinic/Hifrbaric/Pages/default.aspx>

Hyperbaric medicine was originally conceptualized to ameliorate the effects of air embolism in deep water divers. Dr. Efrati is proposing new indications for this technology, based on the premise that an immediate and sustained healing response – for all tissues – is stimulated during the temporal delta when dropping oxygen concentration from 100% to ambient levels under high pressure. This reduction in oxygen concentration (rather than an absolute) promotes the production of a number of measurable factors associated with wound healing and cellular rejuvenation. He now seeks to classify and validate the biomarkers he has identified in order to scale the concept and expand the indications for HBOT (hyperbaric oxygen therapy).

Dr. Efrati and his lab partners at Tel Aviv University have proven that HBOT can induce neuroplasticity in stroke and traumatic brain injuries even years after an acute incident, and also reverse early cognitive decline. However since he is the only lab in the world applying the technology in this way, he has struggled to gain the momentum required to take this concept to greater scale. Despite this, he continues to treat hundreds of patients per day and has a waiting list of more than 10,000 people.

## Companies

### MyndYou

Concept	Voice recognition of cognitive decline
Stage	R&D; raised \$320K till date
Contact	<a href="http://www.myndyou.com/">http://www.myndyou.com/</a> Ruth Baruchi, Founder and CEO ( <a href="mailto:ruth@myndyou.com">ruth@myndyou.com</a> )
Notes	MyndYou is developing a mobile platform for monitoring patients with cognitive decline, based on participation, speech and language patterns. The platform collects and analyzes passive cognitive and behavioral data in order to generate actionable insights for therapists – with algorithms informed by longitudinal (youtube) videos of public figures with known cognitive decline.

### SipNose

Concept	Nasal drug delivery device
Stage	Clinical Trial
Contact	<a href="https://www.sipnose.com/">https://www.sipnose.com/</a> Iris Schichor, Founder and CEO ( <a href="mailto:iris@sipnose.com">iris@sipnose.com</a> )
Notes	SipNose (nasal drug delivery device): SipNose focuses on nose-to-brain medical applications and is developing a nasal delivery platform for local, systemic, and central nervous system indications that bypasses the blood-brain barrier. SipNose's intranasal drug delivery platform uses a mechanism that can improve efficacy, patient compliance, and safety. SipNose's noninvasive devices ensure accurate dose delivery via the nasal cavity and incorporate a simple, efficient mechanism to allow localization of the aerosolized drug in the olfactory epithelium, resulting in better absorption to the olfactory bulb and brain. Currently under investigation using midazolam, cannabis, and topiramate but fit for chemo, protein drugs and biologicals. The founder is a former post-doc in Dr. Langer's laboratory.

### ContinUse

Concept	Nanoscale resolution contactless biometrics
Stage	R&D. Founded in Q1 2015 and have raised \$7.2 million in equity. The product will likely enter commercial markets through a partnership with Motorola with a price point of \$30 additional per device at scale. Engaged in a technical partnership with GE as well.
Contact	<a href="https://www.cu-bx.com/">https://www.cu-bx.com/</a> Asher Polani, co-founder and CEO ( <a href="mailto:asher.polani@cu-bx.com">asher.polani@cu-bx.com</a> )
Notes	ContinUse has developed a remote, contactless biometrics based on mechanical oscillations – basically a remote optical stethoscope. The company's sensor performs active and continuous biometrics, scanning a distance of up to several hundred meters. The sensor is based on nanotechnology that detects molecular vibration and is unaffected by clothing or other physical conditions. ContinUse currently measures over 20 bioparameters at nanoscale resolution (heart rate, respiration rate, blood pressure, glucose levels, alcohol levels, etc.) – albeit indirectly. There is an appetite to develop beyond – into coagulation or pathologic states.

### Breezometer

Concept	Real time hyperlocal air quality management platform
Stage	Released. Company has raised \$5 million to date.
Contact	<a href="https://breezometer.com/">https://breezometer.com/</a> Ran Korber, co-founder and CEO ( <a href="mailto:rank@breezometer.com">rank@breezometer.com</a> )
Notes	BreezoMeter utilizes big-data infrastructure to continuously gather air quality and weather measurements from thousands of sources (e.g., satellites, weather, traffic, and monitoring stations). They do not deploy any of their own sensors. The collected data is processed through algorithms to provide air quality information with hyperlocal street-level accuracy in more than 24,000 cities. BreezoMeter also provides personalized health solutions for adults and children, athletes, and people with health sensitivities. Propellor health (US based health focused company) is powered by Breezometer data.

### Somatix

Concept	Hand gesture-based behavioral analytics platform
Stage	Beta
Contact	<a href="http://somatix.com/">http://somatix.com/</a> Eran Ofer, co-founder and CEO ( <a href="mailto:erano@somatix.com">erano@somatix.com</a> )
Notes	Somatix develops data-integrated behavioral health therapies. The company's technology utilizes sensors in smartwatches and wristbands to enable real-time measurement of smoking, drinking, eating, and other hand-to-mouth gestures (tremor, bradykinesia, medication compliance). The data can then be mined for interpretations and applications for both individual and healthcare enterprise clients.

### Intendu

Concept	Adaptive gaming platform for cognitive training
Stage	Beta
Contact	<a href="http://www.intendu.com">http://www.intendu.com</a> Nimrod Madar, founder and CEO ( <a href="mailto:nimrod@intendu.com">nimrod@intendu.com</a> )
Notes	The Intendu solution is based on body-controlled, adaptive videogames. The games include interaction with characters and using natural body gestures within functional environments. The Intendu training platform provides real-time personalization through games targeting cognitive function. The platform has been tested in populations with cognitive impairments due to various brain conditions including cognitive decline.
More	<a href="#">Intendu Functional Brain Trainer - Intro Video</a>

### ElMinda

Concept	EEG-based high resolution functional map of the brain
Stage	Released
Contact	<a href="http://www.elminda.com">http://www.elminda.com</a> Ronen Gadot, CEO and founder ( <a href="mailto:ronen@elminda.com">ronen@elminda.com</a> )
Notes	ElMindA's BNA technology is based on noninvasive recordings of multi-channel, EEG event-related potentials. ElMindA developed the Brain Networks Activation (BNA) platform, which provides high-resolution visualization and evaluation of the complex neuro-physiological interconnections of the human brain. The platform captures information on the composition, connectivity, synchronization, and operation of brain networks. Applications broadly for neurologic pathology.

### BrighTap

Concept	Smart water meter
Stage	R&D (prototype development)
Contact	<a href="http://www.brightap.com/">http://www.brightap.com/</a> Konstantin Berezin, founder and CEO ( <a href="mailto:konstantin@bwareit.com">konstantin@bwareit.com</a> )
Notes	The BrighTap is smart water meter that attaches to any water tap, pipe, or hose. BrighTap provides water-quality and consumed-water quantity data (water quality index, liters/gallons, temperature, costs, etc.) on the product's display. BrighTap combines its in-house-developed analytic algorithm and turbine technology to measure water flow with a +/- 4% margin of error. This data can be tracked via the associated app.

### EarlySense

Concept	Contactless biometric product
Stage	Released
Contact	<a href="http://www.earlysense.com">http://www.earlysense.com</a> Avner Halperin, founder and CEO ( <a href="mailto:AvnerH@earlysense.com">AvnerH@earlysense.com</a> )
Notes	Using data from 400,000 patients and > 100 million monitoring hours, EarlySense has developed a continuous, contact-free monitoring solution designed to enhance safety and reduce risk for general care patients. EarlySense can be used by hospitals, healthcare systems, integrated delivery networks, and rehabilitation centers. Based on piezoelectric principles and placed under a mattress or chair cushion. Super exciting ovulation-tracking product to be released next month. See supplemental reading (document) on ROI.
More	<a href="#">Purchase product on Amazon</a>

### BrainQ

Concept	Contactless biometric product
Stage	Clinical trial
Contact	<a href="http://www.brainq.co/">http://www.brainq.co/</a> Yotam Dreschler, CEO ( <a href="mailto:yotam@brainqtech.com">yotam@brainqtech.com</a> )
Notes	BrainQ is a clinical-stage medical technology company that aims to significantly improve recovery from a wide variety of neurological disorders using non-invasive means. Their technology is personalized from EEG and other imaging and electrodiagnostics and delivers 0.5 gauss of focused electromagnetic stimulation to repair the neural networks at the site of injury. Data shown from patient videos and imaging demonstrates regrowth of spinal cord and brain pathology.

### BrainMarc

Concept	Wearable EEG-based cognitive training platform
Stage	Clinical trial
Contact	<a href="http://www.brainmarc.com/">http://www.brainmarc.com/</a> Sefi Epel, co-founder and CEO ( <a href="mailto:sefi@brainmarc.com">sefi@brainmarc.com</a> )
Notes	BrainMARC has developed an EEG platform for monitoring mental activity compatible with off-the shelf devices. The company's biomarkers are applicable to a wide spectrum of neuropsychiatric syndromes where they can enhance therapeutic protocols, predict clinical dynamics, and promote general wellness. The first mobile health tools that BrainMARC developed based on its platform technology are the Brain Engagement Monitor (BEM), which measures attention-related performance biomarkers, and a

	Comfort Monitor (CM), which measures affect-related biomarkers. The BEM uses the Brain Engagement and Focus Events indices to provide real-time feedback regarding the effectiveness of treatment, whether pharmaceutical, electromagnetic, behavioral, or other for a variety of dysfunctions. The CM uses the Comfort and Comfort Tendency indices to provide real-time feedback regarding levels of stress, interest/memorization, and enjoyment. It can be used to assess the effectiveness of stress-reduction treatments for anxiety and migraine, as well as evaluate viewer responses to media clips.
--	---

## Companies Not Visited, Worth a Second Look

Life Sciences	
<a href="#">Tissue Dynamics</a>	Lab on a chip
<a href="#">Polypid</a>	Encapsulated drug delivery
<a href="#">Sonorapy</a>	Soundwave diagnostics
<a href="#">Protekt</a>	Memory-enhancing therapeutic (Takeda/FutureRx)
<a href="#">RetiSpec</a>	Retinal Alzheimer diagnostics
<a href="#">Oramed Pharmaceuticals</a>	Injectable to oral therapy tech
<a href="#">Treato</a>	Health data / social portal
<a href="#">Aidoc</a>	AI radiology
<a href="#">Zebra Medical Vision</a>	AI radiology
<a href="#">Brainvivo</a>	MRI neuromarkers
<a href="#">Valera Health</a>	Insurance-mining and compliance algorithms
<a href="#">Myndlift</a>	Personalized neurofeedback
Adaptive Technologies	
<a href="#">Sesame Enable</a>	Tablet-based tracking and communications tech
Physical Sciences	
<a href="#">Sensilize</a>	Precision agriculture
<a href="#">SolCold</a>	Solar-powered cooling (no electricity/CO2 emissions)
<a href="#">StoreDot</a>	Amino acid-based nanodot flash batteries

## Supplemental Reading

- Dr. Michal Schwartz short summary (larger document available...)
- Return on Investment on clinical monitoring