

INDEPTH RESEARCH NOTE

MMJ PhytoTech Ltd

Price: A\$0.33 | ASX: MMJ | 18 September 2017

MMJ PhytoTech Ltd (ASX: MMJ) was the first medical grade cannabis company to list on the ASX. MMJ is a unique pure play cannabis company. In our view, MMJ deserves a higher rating relative to its ASX-listed cannabis and pharmaceutical peers when comparing value proposition/investment thesis and a re-rating can result from announcements of (1) achievable earnings in the near term from the legalization of recreational marijuana in Canada (and elsewhere); or (2) Phase II clinical trial in childhood epilepsy is underway and a second Phase II for multiple sclerosis received ministry of health approval or (3) achievable sales growth in the near term for its marijuana nutraceutical products. In this report, we discuss key investment drivers for MMJ and highlight the unique investment proposition MMJ offers to investors.

- **Company Overview.** MMJ PhytoTech Ltd (ASX: MMJ) was the first medical grade cannabis company to list on the ASX (listing on 20 January 2015). MMJ PhytoTech Ltd (MMJ) is a pure play medicinal cannabis company operating across the entire medical cannabis industry. MMJ owns ~59.8% of Harvest One Cannabis (HVST), which is listed in Canada (TSX-V).

Key investment drivers/catalyst likely to affect MMJ's share price:

- **Investment driver #1: An experienced executive team.** MMJ is led by an experienced Board and management team (including leadership within its two subsidiaries as MMJ owns 100% of PhytoTech Medical and 59.8% of Harvest One Cannabis Inc.), with significant experience in start-ups, product development, and the biotech and finance industry.
- **Investment driver #2: Well positioned to benefit from positive trend in legalization of recreational marijuana and significant market opportunity.** The Canadian Federal Government recently confirmed it will move to legalise the recreational cannabis market by 1 July 2018. According to Deloitte's 2016 Insights and Opportunities Report on Recreational Marijuana Report (done in partnership with Toronto's RIWI Corp), Deloitte estimates suggest that on sales of recreational marijuana, the Canadian marketplace could be as much as C\$5 billion per year to start with. Taking into account, people who are "likely to consume," Deloitte estimate marijuana sales could be as high as C\$8.7 billion. When adding for ancillaries such as security, transportation, etc., the potential economic impact approaches C\$23 billion (excluding potential upside from taxes, licensing fees, and tourism). MMJ's Duncan facility has Current capacity of ~1,000 kg/year with an immediate greenhouse expansion plan, targeting capacity growth to ~7,500 kg/year in 12 months.
- **Investment driver #3: Potential success in clinical trials and significant market opportunity in multiple sclerosis (MS).** GlobalData estimates MS is currently a ~US\$17.8 billion industry with the potential to be a ~\$20.0 billion industry. MS has an incidence rate of ~2.3 persons per 100,000, or ~1.1 million globally. 68.9% of the sales revenue for current marketed drugs is derived from the US. MMJ's aim is to treat spasticity related symptoms in MS patients which occurs in ~80% of MS sufferers. In May 2017, MMJ announced it received Helsinki (IRB of Sheba Clinical Site) and Ministry of Health (MOH) approvals to conduct its Phase II clinical study into the safety and efficacy of its PTL201 capsules in treating spasticity related symptoms of multiple sclerosis (MS) patients.
- **Investment driver #4: Potential success in clinical trials and significant market opportunity in childhood epilepsy.** According to GlobalData, in 2012 the estimated global prevalence of childhood epilepsy (for children between the ages of 0-14 years old) was 847,946 cases globally. GlobalData estimates the prevalence growth CAGR of ~0.17% between 2012 and 2023. Approximately 30% of epileptic patients are refractory. MMJ's clinical trial in refractory pediatric epilepsy is underway. This trial commenced in February 2016.
- **Investment driver #5: Significant market opportunity in marijuana nutraceutical market.** Marijuana is a prohibited ingredient in nutraceuticals, so there is no marijuana nutraceutical market, per se. However, Satipharm is responsible for developing cannabis based pharmaceutical and nutraceutical products for a variety of conditions. Satipharm, together with its cannabis extraction manufacturing partners, have developed a proprietary gastro-resistant Cannabidiol (CBD) pill. The pill is currently sold as a dietary supplement over the counter in Europe.

Investment Thesis

We see the following drivers of share price performance:

- An experienced team with experience in start-ups, product development, and the biotech and finance industry.
- Positive trend in legalization of recreational marijuana and significant market opportunity. MMJ's Duncan Facility and Laboratory will be able to produce up to 7,500kg of Medical Grade Cannabis per annum by the end of 2018.
- Potential success in clinical trials and significant market opportunity in childhood epilepsy. According to GlobalData, in 2012 the estimated global prevalence of childhood epilepsy (for children between the ages of 0-14 years old) was 847,946 cases globally. GlobalData estimates the prevalence growth CAGR of ~0.17% between 2012 and 2023. Approximately 30% of epileptic patients are refractory. MMJ's clinical trial in refractory pediatric epilepsy is underway. This trial commenced in February 2016.
- Potential success in clinical trials and significant market opportunity in multiple sclerosis. MMJ is shortly initiating Phase II clinical study into the safety and efficacy of its PTL201 capsules in treating spasticity related symptoms of multiple sclerosis (MS) patients.
- Significant opportunity in nutraceutical market. Satipharm, together with its cannabis extraction manufacturing partners, have developed a proprietary gastro-resistant Cannabidiol (CBD) pill. The pill is currently legally sold as a dietary supplement over the counter in Europe.

Key Risks

We see the following key risks to our investment thesis:

- **Dilution risk.** While the Company has enough funding in place for near-term clinical trials and expansion plans at its Duncan facility, it is likely the Company will need to raise cash again via capital raisings in order to fund future development plans.
- **Early stage company with an unproven treatment.** MMJ is an early stage company with an unproven treatment. There is no guarantee MMJ's treatment will be successful during clinical trials and even if successful will achieve the necessary regulatory approvals to distribute its product.
- **Clinical trials risk.** Clinical trials may fail to prove the efficacy of PTL101 and PTL201.
- **Licensing & regulatory risk.** MMJ may not get approvals to cultivate cannabis and conduct its clinical trials. Prolonged delays or abandonment in legislative efforts to legalise marijuana for recreational use is a key risk.
- **Competitive risk.** Increased competition from an existing or new innovative product.
- **Doctors risk.** Failure of the medical industry to recognize MMJ's product as credible treatment for childhood epilepsy and multiple sclerosis.

Company Description

MMJ PhytoTech Ltd (ASX: MMJ) was the first medical grade cannabis company to list on the ASX (listing on 20 January 2015). MMJ PhytoTech Ltd (MMJ) is a pure play medicinal cannabis company operating across the entire medical cannabis industry. MMJ owns ~59.8% of Harvest One Cannabis (HVST), which is listed in Canada (TSX-V).

Investment drivers...

Investment driver #1: An experienced team with expertise in operations. MMJ is led by an experienced Board and management team (including leadership within its segments), with significant experience in start-ups, product development and the biotech and finance industry.

Investment driver #2: positive trend in legalization of recreational marijuana and significant market opportunity. The Canadian Federal Government recently confirmed it will move to legalise the recreational cannabis market by 1 July 2018. The Federal Government's initial plans and proposed legislative framework were tabled in a Bill to the House of Commons on 13 April 2017. The Canadian government released its Final Report into Cannabis Legalisation and Regulation in December 2016. According to Deloitte's 2016 Insights and Opportunities Report on Recreational Marijuana Report (done in partnership with Toronto's RIWI Corp), Deloitte estimates suggest that on sales of recreational marijuana, the Canadian marketplace could be as much as C\$5 billion per year to start with. Taking into account, people who are "likely to consume," Deloitte estimate marijuana sales could be as high as C\$8.7 billion. When adding for ancillaries such as security, transportation, etc., the potential economic impact approaches C\$23 billion (excluding potential upside from taxes, licensing fees, and tourism). Harvest One Cannabis (60% owned by MMJ) is currently in a Phase 1 Expansion Plan at its United Greeneries segment, aiming to achieve expansion of production capacity from to 7,500 kg/y from 1,000 kg/y.

Investment driver #3: Potential success in clinical trials and significant market opportunity in multiple sclerosis (MS). GlobalData estimates MS is currently a ~US\$17.8 billion industry with the potential to be a ~\$20.0 billion industry. MS has an incidence rate of ~2.3 persons per 100,000, or ~1.1 million globally. 68.9% of the sales revenue for current marketed drugs is derived from the US. MMJ's aim is to treat spasticity related symptoms in MS patients which occurs in ~80% of MS sufferers. In May 2017, MMJ announced it received Helsinki (IRB of Sheba Clinical Site) and Ministry of Health (MOH) approvals to conduct its Phase II clinical study into the safety and efficacy of its PTL201 capsules in treating spasticity related symptoms of multiple sclerosis (MS) patients.

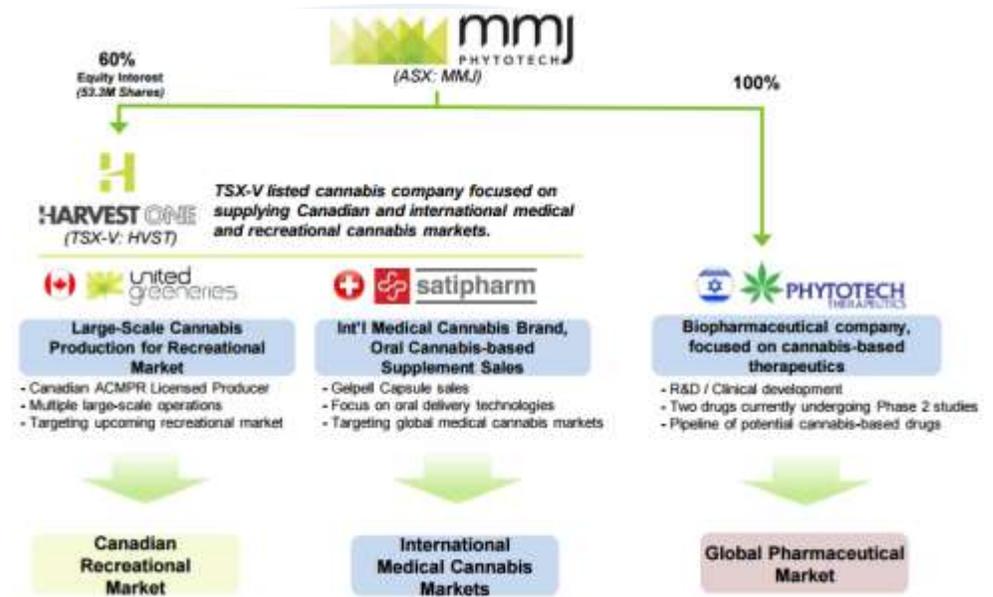
Investment driver #4: Potential success in clinical trials and significant market opportunity in childhood epilepsy. According to GlobalData, in 2012 the estimated global prevalence of childhood epilepsy (for children between the ages of 0-14 years old) was 847,946 cases globally. GlobalData estimates the prevalence growth CAGR of ~0.17% between 2012 and 2023. Approximately 30% of epileptic patients are refractory. MMJ's clinical trial in refractory pediatric epilepsy is underway. This trial commenced in February 2016.

Investment driver #5: Significant market opportunity in marijuana nutraceutical market. Harvest One Cannabis (60% owned by MMJ) owns Satipharm, which is responsible for developing cannabis based pharmaceutical and nutraceutical products for a variety of conditions. Satipharm, together with its cannabis extraction manufacturing partners, have developed a proprietary gastro-resistant Cannabidiol (CBD) pill. The pill is currently legally sold as a dietary supplement over the counter in Europe. European sales of Gelpell CBD capsules are expected to expand significantly with Satipharm's targeted entry into select EU markets.

MMJ PhytoTech Ltd (MMJ) Overview...

From “Farm to Pharma”. MMJ PhytoTech Ltd (MMJ) is a pure play medicinal cannabis company operating across the entire medical cannabis industry. MMJ owns ~59.8% of Harvest One Cannabis (HVST) post a recent corporate restructuring. HVST is listed in Canada (TSX-V). HVST owns United Greeneries and Satipharm. MMJ also owns 100% of PhytoTech Therapeutics. HVST completed an oversubscribed C\$25M concurrent equity deal and commenced trading on April 28, 2017

Figure 1: MMJ Company Structure

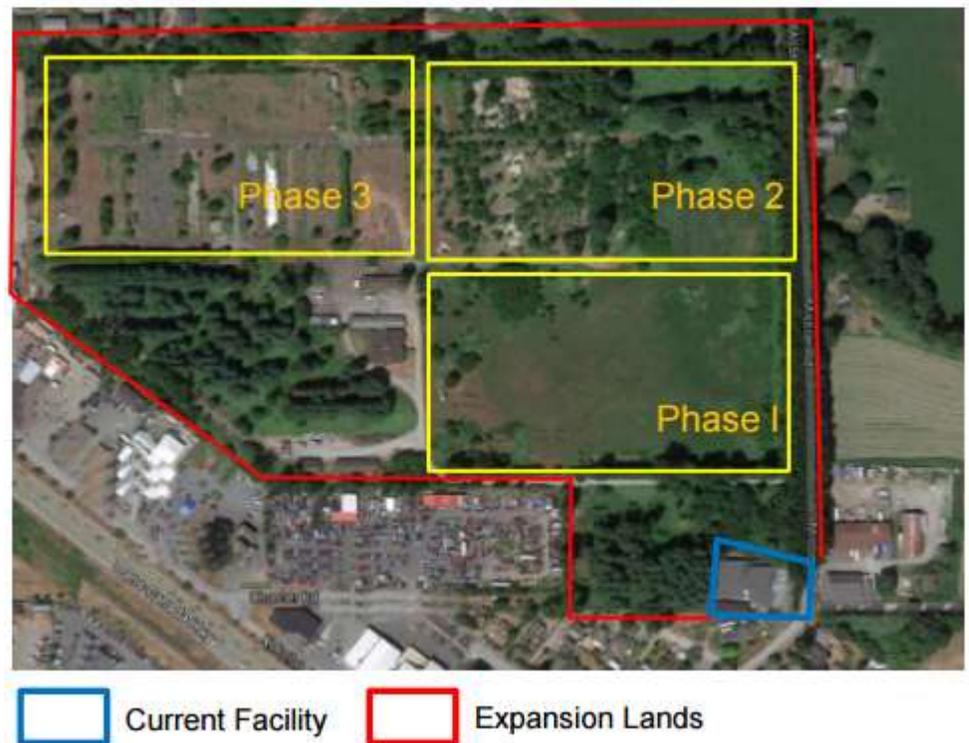


Source: Company

(1) United Greeneries (UG). UG is a Canadian licensed producer focused on operating large scale horticultural operations to service an upcoming recreational market. With UG, MMJ owns two state-of-the-art medical grade cannabis cultivation facilities. The Duncan Facility and the Lucky Lake Facility has a combined footprint of 78,000ft². The Duncan Facility and Laboratory is located on Vancouver Island in Duncan, British Columbia and is a 16,000ft² building with a level-8 vault, 3 growing bays and close to 10,000ft² of cultivation area. MMJ estimates that the Duncan Facility will be able to produce up to 700kg of Medical Grade Cannabis per annum once granted an MMPR (Marijuana for Medical Purposes Regulation) production license. AgriChem Analytical is part of UG's operation. Via UG, MMJ has a Canadian ACMPR license.

Expansion plans...UG's current capacity is at ~1,000 kg/year. HVST intends on undertaking a greenhouse expansion plan to increase capacity growth to ~7,500 kg/year in 12 months (Phase I). Its ultimate aim is a 3-phase modular expansion up to ~50,000 kg/year within 3 years.

Figure 2: Expansion plans at Duncan Facility



Phase	Expected Cost (\$M)	Add. Prod. Capacity (kg/y)	Gross Area (a)
1	9	7,500	3
2	17.5	17,500	7
3	25	25,000	10
Total	51.5	50,000	20

Source: Company

(2) Satipharm. Satipharm is HVST’s international medical cannabis brand focused on oral delivery technologies for strategic entry in emerging medical cannabis markets and the existing medical cannabis market in Canada. Satipharm is responsible for developing cannabis based pharmaceutical and nutraceutical products for a variety of conditions. Satipharm, together with its cannabis extraction manufacturing partners, have developed a proprietary gastro-resistant Cannabidiol (CBD) pill. The pill is currently legally sold as a dietary supplement over the counter in Europe. Management believes its flagship Gelpell® Microgel Capsules to will drive growth.

Growth plans. Satipharm is currently preparing a marketing campaign to drive sales of 10mg and 50mg capsules throughout the EU.

(3) PhytoTech Therapeutics Ltd. (PTL). PTL is 100% owned by MMJ and is a private Israeli pure play biopharmaceutical company focused on developing and commercialising cannabis-based therapeutics. PTL has a strategic long-term supply arrangement with UG and Satipharm for medical cannabis supply. PTL is developing drug-products for administering cannabinoids to treat various medical conditions. PTL has an exclusive research and licensing agreement with Yissum Research Development Company (“Yissum”). Yissum is the research development and technology transfer

company of the Hebrew University of Jerusalem. Yissum has over 8,000 patents, >700 licenses, >80 companies that have formed as a result of its research work, and over US\$2 billion of sales of products based on its technologies. PTL is developing several oral capsules containing a combination of CBD and CBD:THC for treating various clinical indications. The safety and high bioavailability of these capsules were demonstrated in phase 1 trial. Phase II study using highly purified CBD capsule for refractory pediatric epilepsy has already commenced in February 2017. A combination of CBD:THC capsule is expected to shortly enter Phase II clinical trial for the treatment of pain and spasticity in Multiple Sclerosis patients.

Experienced management team...

MMJ is led by an experienced Board and management team, which importantly includes experience in the pharmaceutical industry. We note the following key executives:

Andreas Gedeon (Managing Director / Non-Independent/ Founder of MMJ). Andreas Gedeon, a former Officer in the German Navy, is an experienced entrepreneur and businessman with proven expertise in largescale and HR intensive projects. His previous areas of business include media production and commercial construction. As the founder of United Greeneries and Satipharm, Gedeon became Managing Director of MMJ Phytotech at time of the merger with Phytotech Therapeutics in July 2015. He currently oversees the global expansion strategy of the MMJ group.

Dr. Daphna Heffetz (Chief Executive Officer, PhytoTech Therapeutics Ltd). Dr. Heffetz's has over 20 years' experience in establishing and growing Biotech and Medtech technology based companies. Her most recent position was Chief Executive Officer with Alon MedTech Ventures, an Israeli medical device and technology accelerator. In 2000 she founded TransPharma Medical, a specialty pharmaceutical company, where she remained as CEO and Director of the Board until 2012. Dr. Daphna Heffetz holds M.Sc and Ph.D degrees in Biochemistry and a Post-Doctoral Fellow in molecular biology from the Weizmann Institute of Science.

Catherine Harvey (Chief Operating Officer). Catherine oversees the daily operations of MMJ's key business divisions with a focus on the execution of key international growth objectives. Catherine works closely with MMJ's senior management team to design and deliver MMJ's commercial and regulatory strategy. Catherine previously held executive leadership positions including Director of Business Development and Corporate Affairs at Mundipharma Pty Limited and Business Development Manager at Norwegian Pharmaceutical company, Nycomed.

MMJ's Products...

MMJ has several products in production and under development which includes:

(1) Satipharm gastro-resistant CBD pill (dietary supplement). HVST's Swiss segment Satipharm developed, a proprietary gastro-resistant Cannabidiol (CBD) capsule taken as a dietary supplement. Satipharm CBD Capsules were developed under exclusive partnership with Swiss partners AiFame GmbH, an integrated cannabis-focused pharmaceutical compound manufacturer and Gelpell AG, a premium contract manufacturer of supplements and phyto-pharmaceuticals.

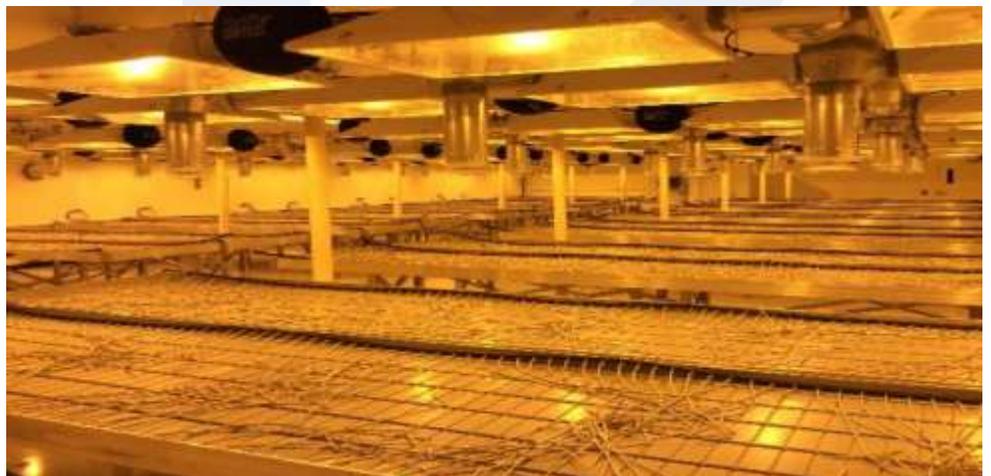
(2) Oral capsule to increase drug bioavailability in the treatment of Multiple Sclerosis (MS). MS is a disabling disease, which attacks the central nervous system.

Global data estimates the addressable market is ~1.2 million people worldwide. Spasticity is one common symptoms of MS, affecting ~84% of patients. Despite the therapeutic rationale for the THC and CBD combination, an optimal oral dosage form is not yet available due to the substantial “first pass” metabolic effect of the cannabinoids in the gastrointestinal tract leading to limited oral bioavailability. MMJ is working to develop unique oral capsules which potentially assist in increasing the bioavailability of THC and CBD in the treatment of pain and spasticity of MS. In a phase 1 clinical trial, MMJ’s oral capsule formulation demonstrated, significantly enhanced bioavailability of THC and CBD.

(3) PTL101 capsules in treating refractory epilepsy in children. Refractory epilepsy is a treatment resistant category of the epilepsy which causes uncontrollable seizures. Current drugs have the issue of (1) failing to control the seizure frequency; or and (2) related side effects are intolerable can may impair a patient’s motor skills and cognitive abilities. The PTL101 capsules / beads utilises MMJ’s proprietary formulation developed via its Gelpell-CBD(TM) product technology. According to MMJ, the PTL101 drug beads contain organically derived, highly purified CBD packed in natural gelatin beads under 2mm that bound and protect the CBD compound. The gelatin matrix pellets dispense over the gastrointestinal system to achieve a constant GI-transit time. MMJ’s phase 2 clinical trial of PTL101, is now underway, following completion of successful phase 1 trial in 2016.

(4) Agro-Medical business. UG is an Access to Cannabis for Medical Purposes Regulations (ACMPR) Licensed Producer in Canada. ACMPR allows United Greeneries to cultivate and commercially produce varying and advanced strains of medical grade cannabis at its Duncan facility to supply registered patients and globally regulated markets. Via its cultivation operation, United Greeneries can develop cannabis strains and genetics with unique characteristics to suit the specific treatment of different types of medical conditions. United Greeneries’ Duncan facility is a state of the art medical cannabis operation with ~10,000ft² of cultivation area. UG ultimate aim is a 3-phase modular expansion up to ~50,000 kg/year within 3 years. Further, United Greeneries also owns Lucky Lake facility, which is a 62,000ft² agricultural facility. MMJ expects to benefit from the potential legalization of recreational market in Canada (and elsewhere) as well as the legal medical market.

Figure 3: State of the art cultivation area at Duncan Facility



Source: Company

(4) Clinical development. MMJ via its segment, PT is planning to enter Phase II clinical trials for: (1) PTL101 – an oral drug to treat seizures of pediatric patients with refractory epilepsy; and (2) PTL201 – an oral drug for treating spasticity related symptoms. Phase I studies were successful and showed (1) PTL capsules were safe and had no significant side effects; and (2) bioavailability of PTL’s oral formulation was as good as the leading comparator product.

Industry Overview...

MMJ is focused on **(1)** the recreational market for cannabis; and its clinical trials target treatment of **(2)** multiple sclerosis and **(3)** childhood epilepsy.

(1) Recreational market for cannabis overview...

Canadian Government opening recreational marijuana market. The Canadian Federal Government recently confirmed it will move to legalise the recreational cannabis market by 1 July 2018. The Federal Government’s initial plans and proposed legislative framework were tabled in a Bill to the House of Commons on 13 April 2017. The Canadian government released its Final Report into Cannabis Legalisation and Regulation in December 2016. Key points from the initial framework include:

- The Canadian government has decided to continue with the existing Licensed Producer ("LP") framework in place for supply to the medicinal cannabis, and will utilise this model for governing supply to the recreational market.
- The government aims to legalise oils and dried cannabis.
- The government advises that sales in a retail environment must happen from a "licensed" distributor and there will be restrictions not a ban on promotional activities.

Presently, 41 approved companies operate under the current regulatory framework. 10 out of the 41 are publicly listed in Canada.

Market Size. According to Deloitte’s 2016 Insights and Opportunities Report on Recreational Marijuana Report (done in partnership with Toronto’s RIWI Corp), 22% of the Canadian adult population consume recreational marijuana (not inclusive of medical marijuana) on at least an occasional basis, and 7% consume on a daily basis. Deloitte estimates suggest that on sales of recreational marijuana, the Canadian marketplace could be as much as C\$5 billion per year to start with. Taking into account, people who are “likely to consume,” Deloitte estimate marijuana sales could be as high as C\$8.7 billion. When adding for ancillaries such as security, transportation, etc., the potential economic impact approaches C\$23 billion (excluding potential upside from taxes, licensing fees, and tourism).

Figure 4: Estimated size of Canadian recreational marijuana market



Source: Deloitte

(2) Multiple Sclerosis (MS) overview...

Multiple sclerosis (MS) is an inflammatory autoimmune disease of the central nervous system that leads to neurological disability.

Multiple Sclerosis market opportunity. GlobalData estimates MS is currently a ~US\$17.8 billion industry with the potential to be a ~US\$20.0 billion industry. MS has an incidence rate of ~2.3 persons per 100,000, or ~1.1 million globally. 68.9% of the sales revenue for current marketed drugs is derived from the US.

Figure 5: Incidence and Market Size of Multiple Sclerosis

Data Type	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Market Size (USD Million)	17,197	17,816	18,362	18,777	19,214	19,157	19,260	19,574	19,690	19,878	19,976
Incidence (Cases per 100,000 Population)	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2
Incident Cases (N)	65,866	66,112	66,371	66,617	66,859	67,111	67,369	67,630	67,853	68,053	68,248
Prevalence (%)	0.036	0.036	0.036	0.036	0.035	0.035	0.035	0.035	0.035	0.035	0.034
Prevalent Cases (N)	1,026,035	1,031,640	1,036,953	1,041,208	1,045,391	1,049,503	1,053,894	1,058,216	1,062,189	1,065,688	1,068,777
Cases Treated With Drug Therapy (%)	66.468	66.944	67.423	67.909	68.413	69.049	69.831	70.733	71.597	72.271	72.554
Cases Treated with Drug Therapy (N)	604,463	611,860	619,140	625,834	632,677	640,745	650,418	661,212	671,473	679,647	683,871

Source: GlobalData

Figure 6: Multiple Sclerosis: Key Metrics in Ten Major Pharmaceutical Markets

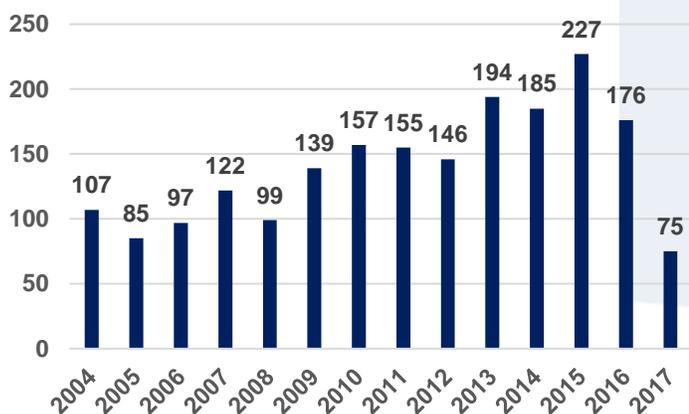
2014 Epidemiology	
Diagnosed Prevalent Population	909,398
Treated Population	604,463
2014 Market Sales	
US	\$11,852.1m
5EU	\$3,908.7m
Japan	\$109.6m
Canada	\$1,245.1m
China and India	\$81.2m
Total	\$17,196.8m
Pipeline Assessment	
Number of drugs in Phase IIb–III clinical trials	13
Number of first-in-class drugs	7
2024 Market Sales	
US	\$12,607.4m
5EU	\$5,452.9m
Japan	\$131.3m
Canada	\$1,633.0m
China and India	\$151.4m
Total	\$19,976.0m

Source: GlobalData

5EU = France, Germany, Italy, Spain, UK; SPMS = secondary progressive multiple sclerosis

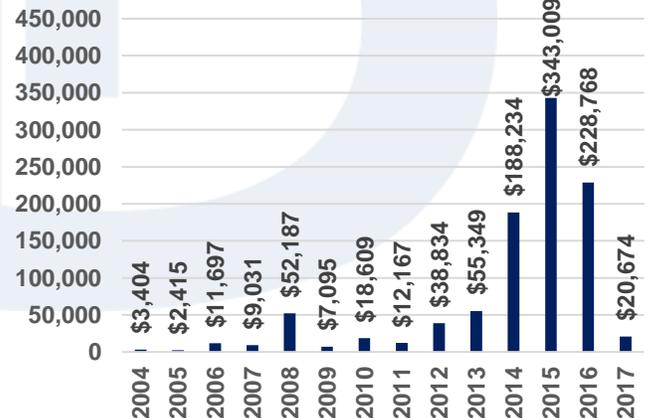
Multiple Sclerosis deal history. The data below shows recent deal activity in the MS space.

Figure 7: Multiple Sclerosis – Number of deals



Source: GlobalData

Figure 8: Total value of deals per year (USD million)



Multiple Sclerosis clinical trials data. The data below shows the clinical trials by phase and the major sponsors/companies undertaking these trials. There are a significant number of Phase II, Phase I and pre-clinical studies.

MMJ's Phase I completed. In Phase I, MMJ reported results were positive with consistent results among all 14 completers. The results demonstrate a safety and tolerability profile with no significant side effects, higher bioavailability of active compounds in comparison to Sativex and 8 hours' exposure time in the blood.

Phase II in progress. In May 2017, MMJ announced it received Helsinki (IRB of Sheba Clinical Site) and Ministry of Health (MOH) approvals to conduct its Phase II clinical study into the safety and efficacy of its PTL201 capsules in treating spasticity related symptoms of multiple sclerosis (MS) patients.

Phase II study design. The study will be undertaken at MS Center encompasses treatment facilities for 2000 patients at the Sheba Hospital. The Phase II study is a double-blind, randomized, placebo-controlled, parallel-group, single center study to evaluate the safety, tolerability, and efficacy of orally administered PTL201 containing THC and CBD in 70 MS patients with spasticity-related symptoms.

(3) Childhood Epilepsy overview...

Epilepsy is a brain disorder characterized by spontaneously occurring seizures. Seizures result from abnormal electrical discharges in the brain and vary in their manifestations, from the brief staring spells that are characteristic of absence seizures to full-body convulsions known as tonic-clonic seizures, which can last for minutes to hours (Sebe and Baraban, 2010). Although up to 10% of people worldwide have one seizure during their lifetime, a person is only considered to have epilepsy when they have had two or more unprovoked seizures (WHO, 2009).

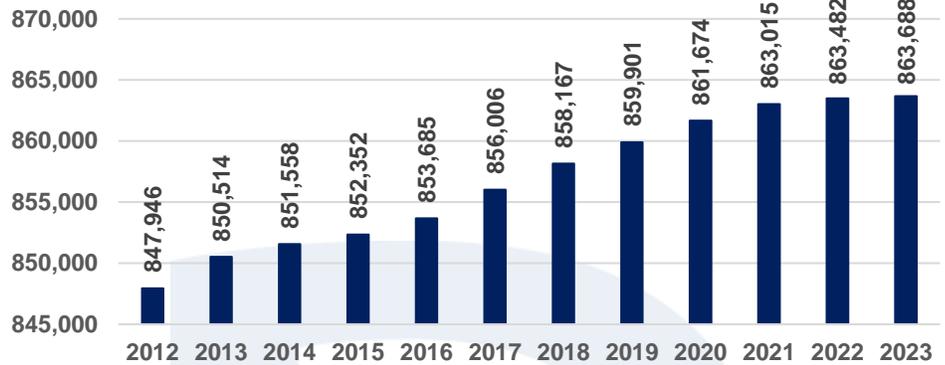
Childhood epilepsy market opportunity. According to GlobalData, in 2012 the estimated global prevalence of childhood epilepsy (for children between the ages of 0-14 years old) was 847,946 cases globally. GlobalData estimates the prevalence growth CAGR of ~0.17% between 2012 and 2023. Approximately 30% of epileptic patients are refractory. MMJ's clinical trial in refractory pediatric epilepsy is underway. This trial commenced in February 2016.

Figure 9: Incidence of Childhood Epilepsy

Data Type	AgeGroup	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	AGR 2012-2023 (%)
Prevalent Cases (N)	0-14 Years	847,946	850,514	851,558	852,352	853,685	856,006	858,167	859,901	861,674	863,015	863,482	863,688	0.17
Prevalence (%)	0-14 Years	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-

Source: GlobalData

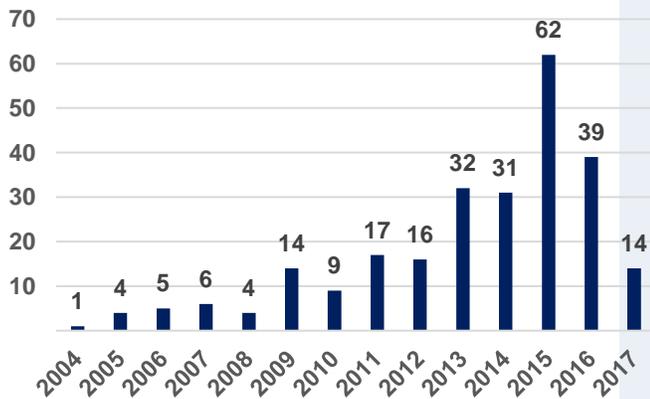
Figure 10: Actual and forecast of childhood epilepsy incidents between 2012 and 2023



Source: GlobalData

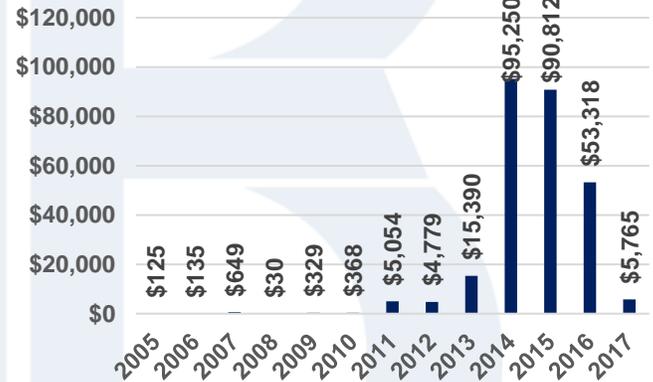
Childhood epilepsy deal history. The data below shows recent deal activity in the childhood epilepsy space.

Figure 11: Childhood Epilepsy – Number of deals



Source: GlobalData

Figure 12: Total value of deals per year (US\$ million)



Childhood epilepsy clinical trials data. The data below shows the clinical trials by phase and the major sponsors/companies undertaking these trials.

Figure 13: Current pipeline in clinical trials (Phase I, II & III)– Childhood Epilepsy

Drug Name	Company Name	Indication	Stage
perampanel (Fycompa)	Eisai Co Ltd	Lennox-Gastaut Syndrome	Phase III
cannabidiol (Epidiolex)	GW Pharmaceuticals Plc	Dravet Syndrome (Severe Myoclonic Epilepsy of Infancy); Infantile Spasm (West Syndrome); Lennox-Gastaut Syndrome; Seizures	Phase III
cannabidiol	Insys Therapeutics Inc	Dravet Syndrome (Severe Myoclonic Epilepsy of Infancy); Lennox-Gastaut Syndrome; Seizures	Phase III
MP-102	Marathon Pharmaceuticals LLC	Infantile Spasm (West Syndrome)	Phase III
cannabidiol	Insys Therapeutics Inc	Childhood Epilepsy; Infantile Spasm (West Syndrome); Opium (Opioid) Addiction	Phase II
fenfluramine hydrochloride (Brabafen)	Zogenix Inc	Lennox-Gastaut Syndrome	Phase II
cannabidiol	MMJ PhytoTech Ltd	Childhood Epilepsy	Phase II
ganaxolone	Marinus Pharmaceuticals Inc	Epilepsy; Lennox-Gastaut Syndrome; Post-Traumatic Stress Disorder (PTSD)	Phase II
CPP-115	Catalyst Pharmaceuticals Inc	Complex Partial Seizure; Infantile Spasm (West Syndrome); Post-Traumatic Stress Disorder (PTSD)	Phase I
JBPOS-0101	Bio-Pharm Solutions Co Ltd	Infantile Spasm (West Syndrome); Status Epilepticus	Phase I
NRP-2945	CuroNZ Ltd	Lennox-Gastaut Syndrome	Phase I
sulthiame	Marathon Pharmaceuticals LLC	Childhood Epilepsy	Phase I
TAK-935	Takeda Pharmaceutical Company Ltd	Dravet Syndrome (Severe Myoclonic Epilepsy of Infancy); Epileptic Encephalopathy; Lennox-Gastaut Syndrome	Phase I

Source: GlobalData

MMJ’s Cannabidiol (PTL-101) is under development for the treatment of refractory pediatric epilepsy. It is administered orally. The therapeutic candidate constitutes natural gelatin pellets under 2mm that protect the active compound cannabidiol.

Phase I completed. In Phase I, MMJ demonstrated the effective delivery profile of CBD compound to trial subjects. Results of Phase I study highlighted the favourable bioavailability of the capsules in comparison to Sativex.

Phase II in progress. In February 2017, MMJ announced PTL commenced following Health Authorities’ approval, the Phase II clinical study into the safety and efficacy of its PTL101 capsules in treating refractory epilepsy in children. The Phase II study is an open-label, single-center clinical study to evaluate the safety, tolerability and efficacy of oral administration of PTL101 as an adjunctive treatment to refractory epileptic children.

Phase II study design. MMJ’s study “A Phase II, Open-label, Single-center Clinical Study to Evaluate the Safety, Tolerability and Efficacy of Oral Administration of PTL101 (Cannabidiol) as an Adjunctive Treatment for Pediatric Refractory Epilepsy”. This is an interventional, phase II, open label, single group assignment, dose escalation, dose titration, treatment and single-centered study to assess the safety, tolerability and efficacy of oral administration of PTL101 (cannabidiol) for the treatment of pediatric refractory epilepsy. Subjects will receive PTL101 capsules at 50 or 100 mg CBD per capsule once or twice daily over 10-weeks, at an initial dose of 50 mg, which will be escalated up to 25 mg/kg/day or up to 450 mg/day during a two-week titration period until reaching a stable dose. During the 10-week maintenance treatment period, the dosage will be delivered in two daily doses. During the study the care giver will fill a seizure diary daily. A total of 15 subjects are planned to be enrolled in this study.

Research – Sales & Trading

Listed Canadian Cannabis Peers...

Company	Current Price	Share Price Performance				Market Cap (\$m)	Description
		1-day	1-month	6-month	1-year		
ABCANN GLOBAL CORP	0.84	0.0%	-7.7%	250.0%	290.7%	\$84	ABCann Global Corporation produces plant-based medicines. The Company offers medical marijuana and cannabis products. ABCann serves customers worldwide.
AURORA CANNABIS INC	2.70	3.8%	9.3%	13.4%	126.9%	\$991	Aurora Cannabis Inc. through operates in the medical marijuana industry. The Company, through its subsidiaries, is a licensed producer of medical marijuana, and is an active participant in the Cannabis market.
APHRIA INC	6.39	1.6%	9.4%	-0.8%	103.5%	\$887	Aphria Inc. produces, supplies, and sells medical marijuana. The Company offers cannabis oil with dried marijuana. Aphria operates in Canada.
ABATTIS BIOCEUTICALS CORP	0.20	-2.5%	44.4%	25.8%	333.3%	\$32	Abattis Bioceuticals Corp. researches, develops and manufactures natural botanical formulations to prevent or treat influenza strains in birds, humans and other mammals.
CANNABIX TECHNOLOGIES INC	0.59	0.0%	-1.7%	-1.7%	126.9%	\$51	Cannabix Technologies Inc., is a Vancouver, B.C. based technology company. The Company is a developer of a Marijuana breathalyzer. A drug impairment recognition system.
CANNABIS WHEATON INCOME CORP	0.93	3.3%	25.7%	2836.8%	2132.0%	\$167	Cannabis Wheaton Income Corp. operates as a cannabis streaming company. The Company invests and supports cannabis cultivation companies. Cannabis Wheaton Income serves customers worldwide.
CANNAROYALTY CORP	2.34	1.7%	-0.4%	-11.7%	NA	\$98	CannaRoyalty Corp. operates as an investor in the legal cannabis sector. The Company focuses on building and supporting a diversified portfolio of growth-ready assets in key segments of the cannabis sector, including research, consumer brands, devices, and intellectual property. CannaRoyalty serves customers in the United States and Canada.
EMBLEM CORP	1.70	2.4%	-6.6%	-32.0%	507.1%	\$121	Emblem Corp. is a fully integrated licensed producer of medical marijuana in Canada. The Company focuses its strategy across three verticals of marijuana production, patient education and a range of pharmaceutical formulations. Emblem serves the healthcare sector in Canada.
EMERALD HEALTH THERAPEUTICS	1.19	-0.8%	-0.8%	-1.7%	108.8%	\$111	Emerald Health Therapeutics, Inc. produces pharmaceutical grade medical cannabis. The Company extracts and markets cannabis oils and capsules. Emerald Health Therapeutics operates in Canada.
GOLDEN LEAF HOLDINGS INC	0.20	0.0%	-7.1%	-40.9%	-43.5%	\$36	Golden Leaf Holdings, Inc. operates as a holding company. The Company, through its subsidiaries, produces, cultivates, extracts, refines, and packages oil form cannabis plants for medical uses. Golden Leaf Holdings markets its products worldwide.
HARVEST ONE CANNABIS INC	0.65	0.0%	10.2%	NA	NA	\$58	Harvest One Cannabis Inc. operates as a global cannabis company. The Company develops cannabis medicines for treatment of various diseases. Harvest One Cannabis serves medical and recreational cannabis markets worldwide.
IANTHUS CAPITAL HOLDINGS INC	2.70	0.4%	-3.6%	0.0%	22.7%	\$43	iAnthus Capital Holdings, Inc. operates as a holding company. The Company, through its subsidiaries, provides financing and related management and advisory services to state-licensed operators engaged in the cultivation, manufacturing, and dispensing of cannabis in states throughout the United States. iAnthus Capital Holdings offers debt and equity financing.
INVICTUS MD STRATEGIES CORP	1.12	0.9%	-11.1%	-21.1%	273.3%	\$88	Invictus MD Strategies Corp. is a private Canadian bio-pharmaceutical reporting issuer.
LIBERTY LEAF HOLDINGS LTD	0.09	5.9%	0.0%	-35.7%	63.6%	\$8	Liberty Leaf Holdings Ltd. provides medicinal and recreational cannabis products. The Company operates in Canada.
MARICANN GROUP INC	1.40	5.3%	-9.7%	NA	NA	\$102	MariCann Group Inc. operates as an integrated producer and distributor of marijuana for medical purposes. The Company offers a variety of medical cannabis products in oil and flower forms. MariCann Group serves patients in Canada.
MAPLE LEAF GREEN WORLD INC	0.39	1.3%	-2.5%	NA	NA	\$54	Maple Leaf Green World Inc. grows and markets tree seedlings for sale to the Government of China.

Source: Company; Bloomberg

Research – Sales & Trading

Listed Canadian Cannabis Peers (Con't)

Company	Current Price	Share Price Performance				Market Cap (\$m)	Description
		1-day	1-month	6-month	1-year		
CRONOS GROUP INC	2.42	0.4%	6.1%	-15.1%	206.3%	\$329	Cronos Group Inc. operates as an investment company. The Company invests in medical marijuana producing companies. Cronos Group offers its services in Canada.
NATURALLY SPLENDID ENT LTD	0.19	8.8%	5.7%	-33.9%	-32.7%	\$15	Naturally Splendid Enterprises Ltd. develops natural superfood product lines. The Company is focused on a line of hemp-based products available in a retail network of stores throughout British Columbia and Alberta, Canada.
ORGANIGRAM HOLDINGS INC	2.65	16.7%	18.8%	12.8%	58.7%	\$274	Organigram Holdings Inc is a licensed producer of medical marijuana. The Company, through its subsidiary, produces condition specific medical marijuana for patients. Organigram Holdings operates in Canada.
PUF VENTURES INC	0.46	3.4%	30.0%	42.2%	184.4%	\$20	PUF Ventures Inc. is involved in acquisitions, joint ventures, and marketing. The Company offers medical marijuana products and electronic cigarettes, as well as owns and operates real estate projects. PUF Ventures serves customers in Canada.
QUADRON CANNA TECH CORP	0.21	-6.8%	-2.4%	-36.9%	NA	\$10	Quadron Cannatech Corporation manufactures and supplies automated cannabis extraction and processing equipment. The Company offers fractional distillation and refining, soft gelatin encapsulation, formulation, and other related cannabis processing equipment. Quadron Cannatech serves customers in North America.
RADIANT TECHNOLOGIES INC	0.51	2.0%	4.1%	-30.1%	209.1%	\$92	Radiant Technologies Inc develops, markets, and provides microwave-assisted natural product extraction, purification and isolation methods, using microwave assisted processing.
WILDFLOWER MARIJUANA INC	0.42	-5.7%	-15.3%	53.7%	167.7%	\$18	Wildflower Marijuana Inc. is a Canada-based cannabis company. The Company focuses on developing and designing branded products in the cannabis and healthcare sectors.
THC BIOMED INTL LTD	0.56	14.3%	62.3%	-30.9%	27.3%	\$58	THC BioMed Intl Ltd. offers biotech and pharmaceutical services. The Company provides research, development, life sciences, plant innovation, and other services. THC BioMed Intl serves customers in Canada.
HYDROTHECA RY CORP/THE	1.49	8.8%	4.2%	120.7%	120.7%	\$114	The Hydrothecary Corporation operates as a medical marijuana company. The Company produces and distributes marijuana for medical purposes. Hydrothecary serves customers in Canada.
TINLEY BEVERAGE CO INC/THE	0.28	-1.8%	14.3%	9.8%	366.7%	\$20	The Tinley Beverage Company Inc. produces and distributes beverages. The Company offers hemp-infused beverages and supplements. Tinley Beverage markets its products in Canada.
VALENS GROWWORKS CORP	0.79	-7.1%	-12.2%	-43.6%	558.3%	\$47	Valens GroWorks Corp. operates as a biotechnology company. The Company regulates, research, develops, and cultivates cannabis. Valens GroWorks serves to the healthcare sector in Canada.
VERITAS PHARMA INC	0.31	-6.2%	-6.2%	-43.5%	8.9%	\$12	Veritas Pharma Inc. operates as a pharmaceutical company. The Company operates in Canada.
CANOPY GROWTH CORP	10.27	2.1%	17.2%	-3.7%	158.7%	\$1,756	Canopy Growth Corporation, through its subsidiaries, is a producer of medical marijuana. The Company's group of brands represents distinct voices and market positions designed to appeal to an array of customers, doctors and strategic industry partners.
WEEDMD INC	0.72	4.3%	-12.2%	105.7%	140.0%	\$44	WeedMD Inc. manufactures health care products. The Company supplies medical marijuana. WeedMD serves customers in Canada.
Average		1.9%	5.4%	114.4%	248.8%		

Source: Company; Bloomberg

Research – Sales & Trading

Listed Australian Cannabis Peers...

Company	Current Price	Share Price Performance				Market Cap (\$m)	Description
		1-day	1-month	6-month	1-year		
AUSCANN GROUP HOLDINGS LTD	0.51	1.0%	-12.7%	-18.9%	186.1%	\$140	AusCann Group Holdings Ltd develops cannabis based medical products. The Company produces and sells cannabinoid medicines for application in anti-convulsion, neuroprotectant, anti-inflammatory, anti-nausea, glaucoma, pain management, and appetite stimulation areas.
BOTANIX PHARMACEUTICALS LTD	0.05	0.0%	-3.8%	-12.1%	37.8%	\$28	Botanix Pharmaceuticals Limited operates as a medical dermatology company. The Company develops prescription treatments for serious skin diseases, including acne, psoriasis, and atopic dermatitis. Botanix Pharmaceuticals conducts business worldwide.
CRESO PHARMA LTD	0.52	1.0%	4.0%	-26.4%	NA	\$47	Creso Pharma Limited provides cannabis derived therapeutic grade nutraceutical products. The Company develops, registers, and commercializes pharmaceutical-grade cannabis and hemp-based products and treatments. Creso Pharma serves customers in Australia.
ESENSE-LAB LTD- CDI	0.18	5.9%	5.9%	-47.8%	NA	\$11	eSense - Lab Ltd. operates as a technology and research and development company. The Company specializes in the commercialization of the phytochemical profiling of plants. eSense - Lab combines genetics, mRNA, protein expression, and phytochemical profiles to generate a comprehensive model of targeted plants.
MEDLAB CLINICAL LTD	0.58	-2.5%	-26.3%	-33.9%	47.4%	\$103	Medlab Clinical Limited operates as a nutritional early phase drug development company. The Company offers research and product development in the field of chronic kidney disease, obesity, depression, pain management, and muscular-skeletal health. Medlab Clinical develops bacteria based medicines.
MMJ PHYTOTECH LTD	0.33	0.0%	-18.5%	-32.0%	34.7%	\$69	MMJ PhytoTech Limited develops medical cannabis delivery systems. The Company offers its services to regulated medical cannabis markets. MMJ PhytoTech serves customers worldwide.
MGC PHARMACEUTICALS LTD	0.04	0.0%	-4.3%	-44.3%	4.8%	\$48	MGC Pharmaceuticals Ltd produces and distributes specialty pharmaceutical products. The Company offers grows, harvests, and extracts medical cannabis. MGC Pharmaceuticals markets its products globally.
STEMCELL UNITED LTD	0.03	-6.3%	-56.7%	-86.2%	61.1%	\$11	Stemcell United Ltd is a bio-technology company. The Company focuses on the growth, reproduction, culture and extraction of stem cells for medicinal, health and beauty applications using proprietary technology.
HYDROPONICS CO LTD/THE	0.27	0.0%	-10.0%	NA	NA	\$28	The Hydroponics Company Limited (THC) develops and delivers medicinal cannabis. The Company manufactures and distributes hydroponics equipment, materials, and nutrients, as well as offers hydroponic greenhouse designing and construction services. THC serves customers worldwide.
ZELDA THERAPEUTICS LTD	0.08	3.9%	-9.0%	12.5%	224.0%	\$61	Zelda Therapeutics Ltd is a biotechnology company. The Company studies the use of medicinal cannabis to treat a variety of ailments. Zelda Therapeutics is based in Australia
Average		0.3%	-13.1%	-32.1%	85.1%		

Source: Company; Bloomberg

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