



**RADIANT®**

**Creating Value from Natural  
Actives Extraction**

**November 2016**

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# What do we do?



Radiant manufactures natural ingredients for global customers across a range of industries, including Food and Beverage, Nutrition, Supplements, Pharmaceuticals and Cosmetics. Radiant has also entered the cannabinoids market seeking to capture value from the recent opportunities associated with more favorable regulations for marijuana and hemp.

Using a proprietary, patented technology, Radiant's products are superior in quality and purity while manufactured at significantly lower cost than incumbent methods thanks to superior yields and efficiency.



# Large Opportunity Across Multiple Verticals



Pharmaceutical<sup>1,2</sup>  
\$219B

+



Personal Care<sup>3</sup>  
\$34B

+



Food & Nutritional<sup>4</sup>  
\$10B

+



Cannabinoids<sup>5</sup>  
\$10B

- > \$250B market for ingredients from natural sources
- Consumer demand for natural ingredients in each vertical is high.
- Radiant's extraction technology is patented, and proven at commercial scale.
- Technology outperforms conventional methods in terms of cost, speed, and purity.
- High margins (50%+), on recurring revenue.
- Diverse customer base that includes Fortune 100 companies in multiple verticals.

1) Natural Ingredients for Pharmaceuticals and for the Food Industry. Published by SIPPO and CBI, Zurich 2005

2) Pharmaceutical Price Controls and Innovation Incentives: A Fifty-year U.S. Debate Coming to a Head? Medical Progress Today, October 2011

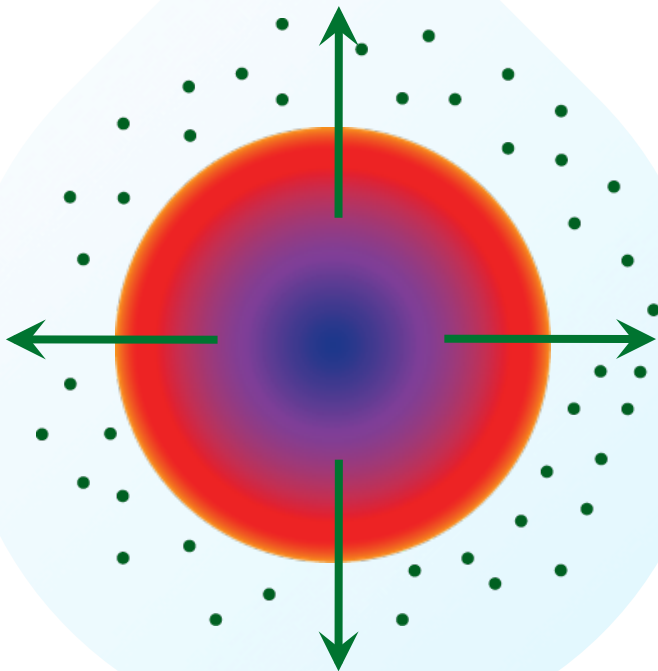
3) Regulatory: FDA Unveils Biosimilars Guidance. The Burrill Report, February 2012

4) Life Sciences and Materials Sciences. DSM at a glance. Royal DSM N.V., Fact book, February 2011

5) <https://www.equities.com/news/report-the-cannabis-biotech-pharma-market-could-surpass-20-billion-by-2020>

# The Core Radiant Solution

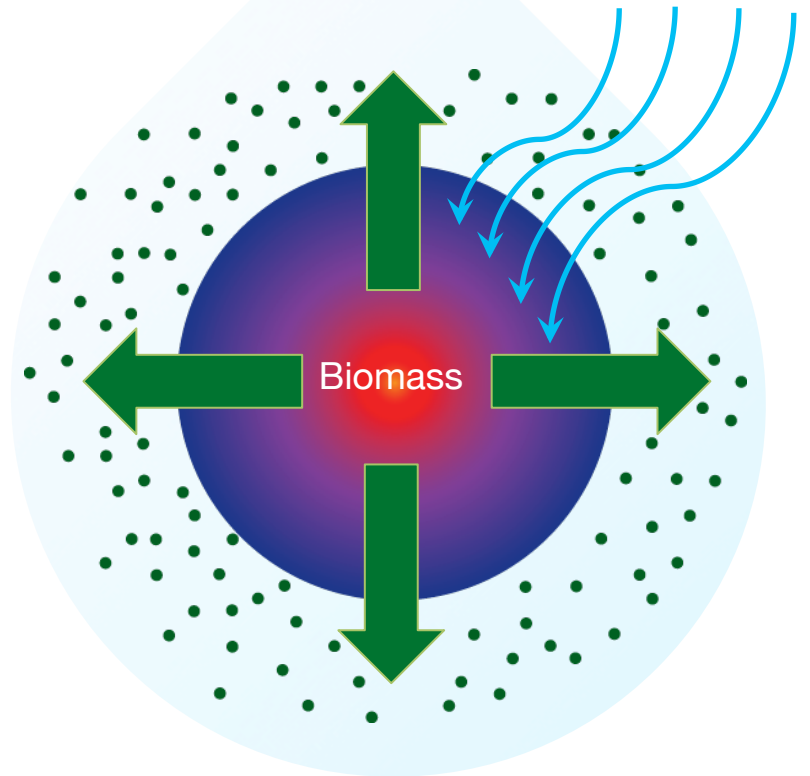
Solvent phase



Conventional solvent extraction is a diffusion-driven process: relies on concentration gradients

MAP™

Microwaves



MAP™ causes instant in-core heating creating a pressure-driven process

# Technology Highlights



Microwave Assisted Processing (“MAP”) outperforms conventional extraction in every important parameter:



Reduces extraction times from hours to minutes.



Delivers higher active ingredient purity.



Increases recovery of actives from often scarce biomass.



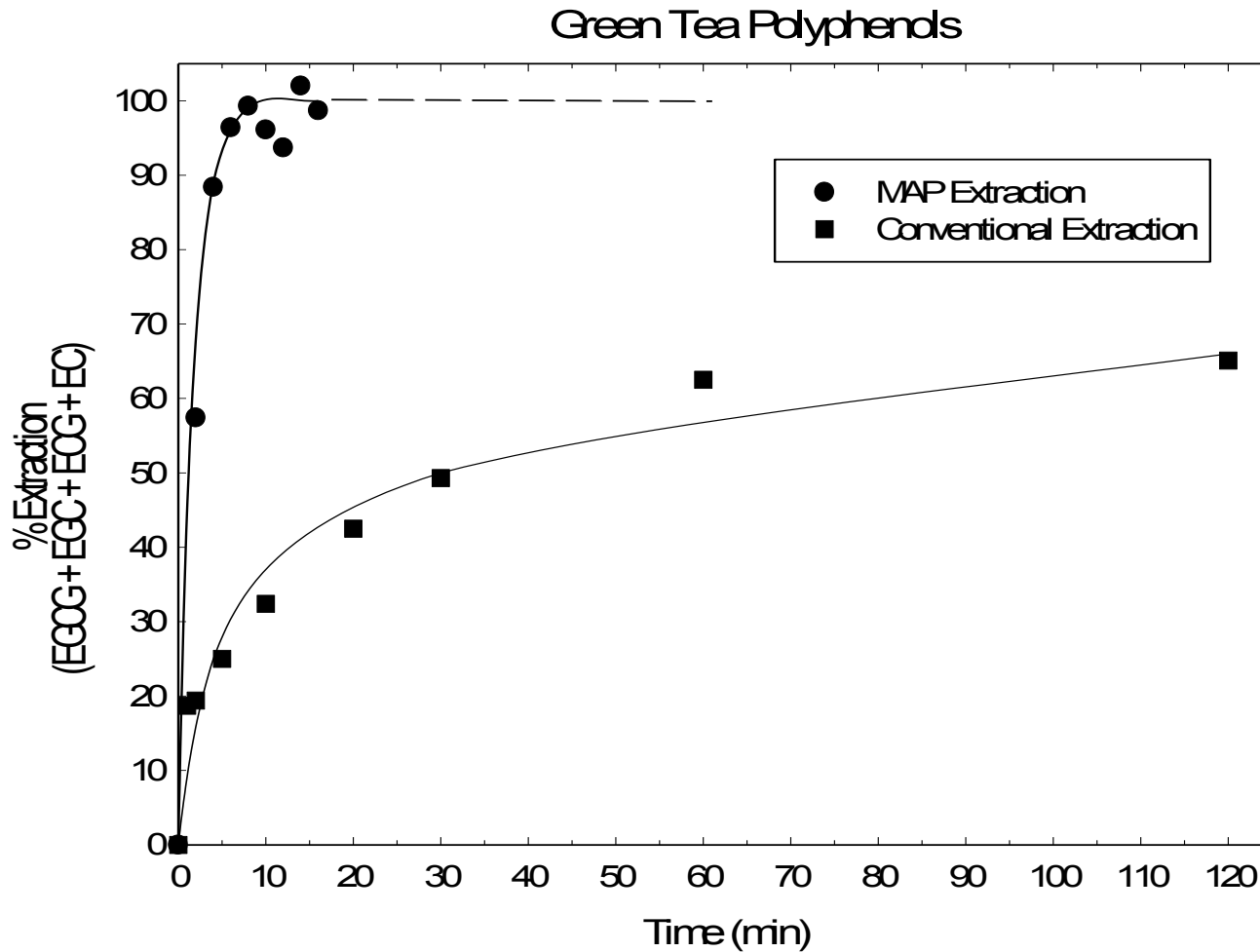
Uses significantly less solvent, energy.

**significantly reduces overall product cost**

## Proven, Patented Technology across a Large Product Pipeline

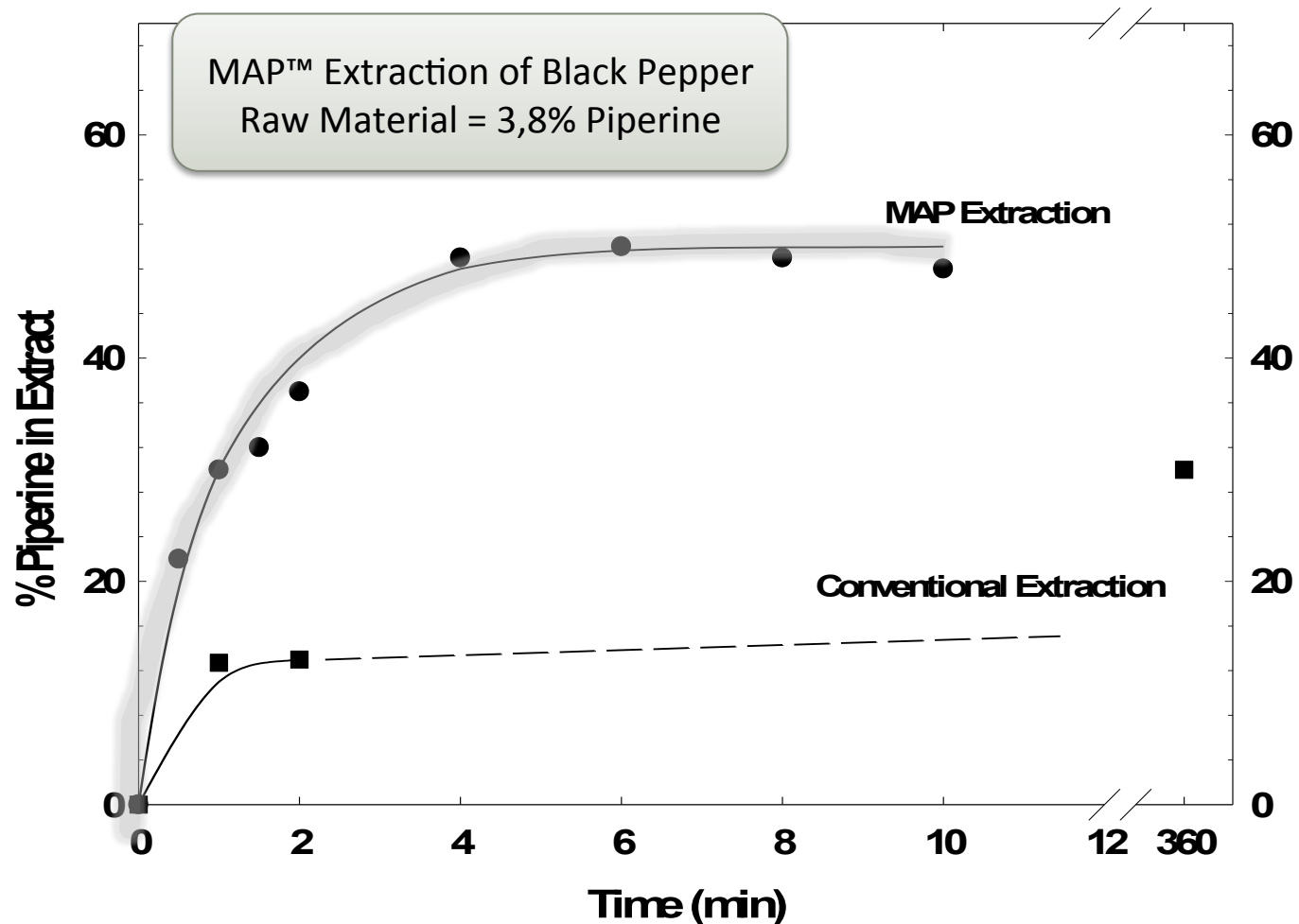
- Over 40 cases of successful extraction in every commercially relevant class of natural product.
- Holder of three process patents in the extraction of natural compounds.

# Example: Green Tea Polyphenols



# Example: Alkaloids

## *Piperine from Black Pepper*



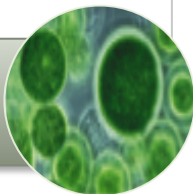


# Technology Applications

- Over 40 feasibility studies completed for every commercially-relevant class of natural products

- Essential Fatty Acids (borage oil)
- PUFAs
- Saw palmetto
- Edible vegetables oils (flax, canola, soybean)

## Lipids



- Flax ► Lignans (SDG)
- Sennosides
- Rosavins
- Terpene acid glycosides

## Glycosides



- Cyclopamine
- Black pepper ► Piperine
- Opiates

## Alkaloids



- Green tea ► Polyphenols
- Rosemary herb ► Carnosic acid
- Blueberries ► Anthocyanins
- Seaweed ► Polyphenols
- Vanilla beans ► Vanillin

## Phenolics



- Microalgae ► Carotenoid
- Taxus ► Paclitaxel
- Paprika ► Carotenoid
- Marigold ► Carotenoid
- Hemp ► Cannabinoids

## Terpenes



- Rice protein ► Residual oil

## Proteins



# Edmonton Production Plant



- Commissioned in 2014
- 5 metric ton per day throughput, 20,000 square feet, GMP compliant, NHPD licensed
- Many commercial runs completed successfully (Contract Manufacturing and Proprietary Products)

Facility



Proprietary MAP™ Extractor



# Revenue Model



Proprietary  
Products

- Based on production advantages provided by MAP™ Radiant creates extracts that in terms of cost, purity or both, displace incumbent ingredients.



Manufacturing  
Agreement

- From its Edmonton MAP™ plant, Radiant engages in a contract manufacturing agreement with a natural products supplier.



Technology  
license or joint  
venture

- Where production volume exceeds capacity in Radiant's Edmonton plant, a technology transfer agreement is provided, or a joint venture plant is constructed.
- Radiant generates revenue from the design and provision of MAP™ equipment, and a technology royalty. In a joint venture, Radiant would also share in net cashflows.

# Sample Economics

## MAP™ vs Conventional Extraction



### Basis:

Biomass processed (kg):	30,000
Biomass Cost (\$/kg):	\$3.75
Active Conc. In Biomass (%):	4%
Final Product Purity (%)	50%
Final Product Pricing (\$/kg):	\$330

### MAP vs Conventional:

	Conventional	MAP	Impact of MAP
Solvent req't (L/kg):	9.5	5	~ 50% reduction in solvent req'd
<u>% Recovery of Active:</u>			
Extraction:	75%	85%	Improved extraction recovery
Purification:	81%	81%	
<b>Total:</b>	<b>61%</b>	<b>69%</b>	
Plant Days Req'd:	30	16	~50% reduction in plant time req'd

### Revenue:

Final Product Yield (kg):	1454	1647	Due to improved overall recovery
<b>REVENUE:</b>	<b>\$479,655</b>	<b>\$543,609</b>	

### COGS

Biomass:	\$112,500	\$112,500	
Facility / Labour Costs:	\$120,000	\$64,000	Due to reduced plant time req'd
Materials / Disposal:	\$71,250	\$37,500	Due to reduced solvent req'ts
<b>COGS:</b>	<b>\$303,750</b>	<b>\$214,000</b>	<b>30% reduction in COGS</b>
<b>Gross Margin:</b>	<b>\$175,905</b>	<b>\$329,609</b>	
<b>% Gross Margin:</b>	<b>37%</b>	<b>61%</b>	<b>24% Margin increase</b>

# A World of Opportunities



- Higher purity of extracts
  - Can double or triple purity of the market reference without involving any purification step. Means lower manufacturing cost, higher margins
- Higher recovery of actives
  - MAP™ pressure driven extraction process = less remains in the plant and more is recovered in the extract. No need for multiple extraction steps increases costs
- Higher yield
  - Higher purity and recovery = Higher overall yield or output = Sustainability
- Myriad of possibilities
  - Different extraction conditions (parameters on MAP™ extractor) can change the flavour profile of a beverage to meet specific customers' taste
- A richer color and a bolder taste
  - MAP™ extracts a broader spectrum of molecules vs conventional extraction. Lots of possibilities for perfumers, food technologists and other industries
- Removing undesired compounds, keeping the best
  - Get rid of less desired compounds to retain everything else in the spent biomass

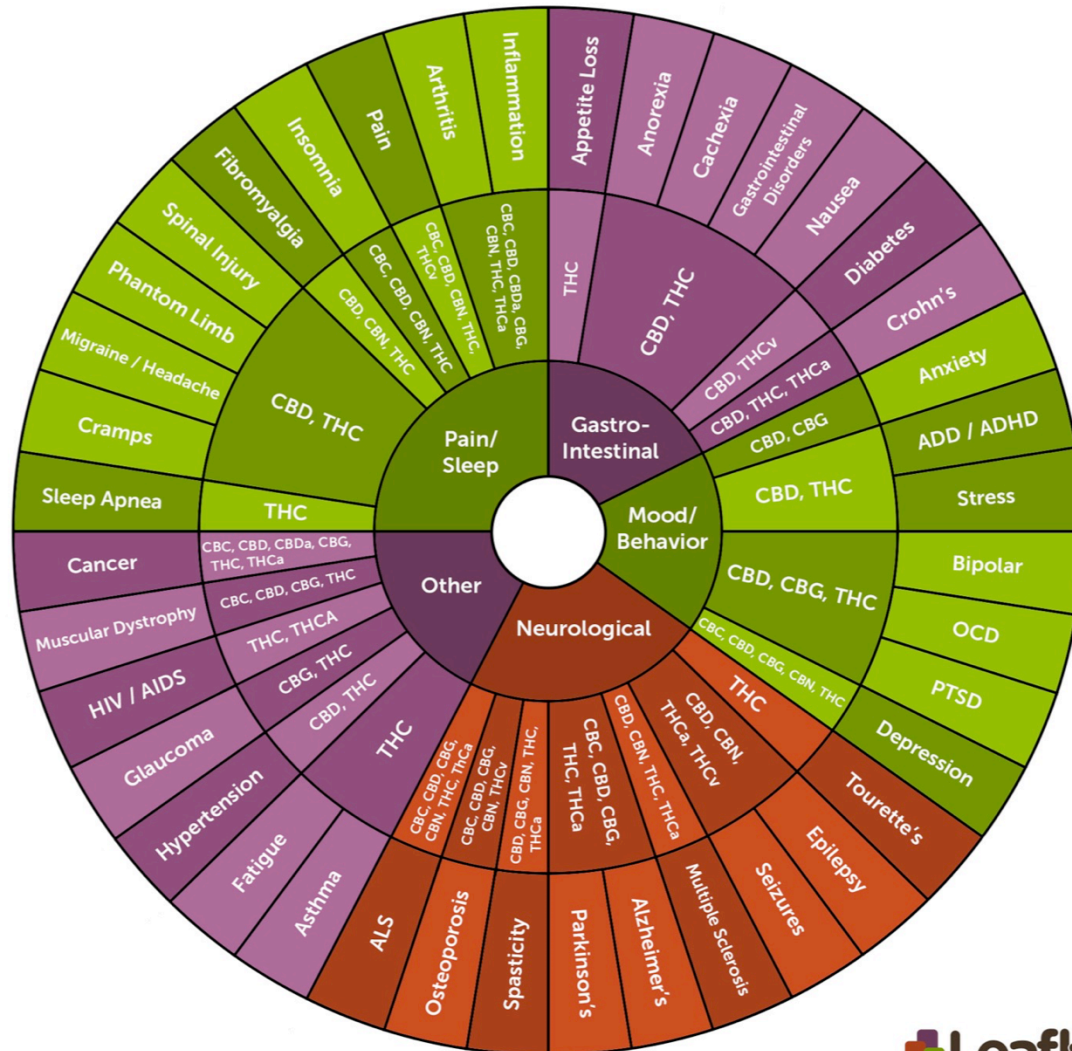


# The Cannabinoids Opportunity



- To date, 27 U.S. States and Washington, D.C. have legalized Medical Marijuana, and similar laws have been passed in Canada.
- According to the Marijuana Business Daily's Marijuana Business Factbook 2015, sales of legal medical marijuana grew from \$1.6 billion in 2013 to \$2.7 billion in 2014. They believe that with the additional states to legalize medical marijuana in 2016, the size of the market should grow to over \$10 billion by 2018.
- The diverse pharmacology of cannabinoids provides significant potential for therapeutics across many indications and disease areas that form the core of specialty pharmaceutical drugs.
- The Cannabinoids industry requires various standardized extracts at high purity level and derived from specific strains that can be smoked, vaporized, ingested, or topically applied. This is where Radiant comes into play.

# Cannabinoids and their Health Benefits



# Applications for Cannabinoids



- The cannabinoid industry for medical and recreation purposes is rapidly increasing thanks to a favorable change in regulation in North America.
- Cannabinoids represent the main molecules of interest for their proven health benefits. They are found in both marijuana and hemp.
- Current research has revealed over 100 different cannabinoids so far, but THC is the most well known. THC is credited with causing the marijuana high. Regulators typically limit the concentration of THC in cannabis
- The therapeutic benefits of cannabis extracts are also linked to various other non-psychoactive cannabinoids, including cannabidiol (CBD)
- According to the Hemp Industry Association, about \$500 million worth of hemp product is imported every year in the USA.

# Current Industry Issues with Extraction



- Relatively low yields from extraction leaving valuable cannabinoids in the raw material
- Lack of validated, high-throughput, commercial-scale extraction technologies
- Many are using artisan methods, not scalable
- Supercritical CO2 is expensive, batch extraction and yield is not optimized
- Main drivers for success are efficient, low costs, high purity, standardized extracts

# Radiant's Approach to the Cannabinoids Market



- Radiant is focused on developing highly concentrated and standardized Cannabinoids extracts including Marijuana and Hemp-based extracts to serve the Cannabinoids Medical market.
- Potential to offer a range of cannabis extracts containing varying profiles of the different cannabinoids – something that is possible with MAP™ by simply varying microwave conditions during processing.
- Radiant is very active in developing partnerships with North American suppliers of hemp and marijuana biomass to develop cannabinoids-rich extracts meeting the legal maximum THC levels.
- Having a lead over competitors with an existing GMP approved and easily scalable industrial facility from NNHPD (Health Canada) which is expected to be the regulatory body that will administer the Marijuana program.
- Poised to be a partner of choice to the cannabinoids industry active in the Marijuana-Infused Products, Marijuana Concentrate products and brands.



# Radiant's Competitive Advantages



- Radiant has world-class expertise in extracting more actives from plants and significantly increase the yields and purity at lower costs compared with competitive extraction technologies.
- Because of the favorable regulation in Canada and its unique positioning, Radiant has requested proper accreditation and permits from the Canadian Government for conducting research and the eventual commercial production of standardized cannabinoids extracts.
- Radiant is partnering with researchers, growers and companies having complementary skills to advance its leadership and establish itself as a North America leader in the development of standardized cannabinoid extracts from both marijuana and hemp.

# Experienced Management Team



## **Denis Taschuk, CA, President, CEO & Director**

+25 years of experience including public company management/strategy, new market development, manufacturing, finance and tax

Previously CEO of JAG Flocomponents LP and CFO of Cytovax Biotechnologies Inc.

## **Prakash Hariharan, MBA, Chief Financial Officer**

Formerly one of Canada's leading portfolio managers when at Front Street Capital. Worked at Dominion Bond Rating Services. Holds a Financial Engineering degree, an MBA and a degree in Chemical Engineering.

## **Mike Cabigon, Chief Operating Officer**

10+ years P&L management experience in venture and private-equity backed businesses, with up to \$300MM in revenue responsibility and over 1,100 employees.

## **Steven Splinter, PhD, Chief Technology Officer**

Radiant Founder with +19 years experience with microwave-assisted chemistry. Expert in interfacial chemical phenomena – Ph.D. in Engineering Science in 1994

## **Stéphane Gagné, MBA, VP Sales & Marketing**

+20 years of experience in the fields of cosmetics, nutritional supplements, pharmaceutical products and active ingredients, previously with Atrium Biotechnologies, Aeterna-Zentaris. Holds 2 Bachelors and one Master Degrees

# Capital Markets Profile



## Radiant Technologies Inc (RTI) - TSX Venture Exchange

Share Price (November 25, 2016)	0.15
Shares Outstanding	80.4 MM
Market Capitalization	\$12.1
Public Since	June, 2014
Founded	2001

# Contact Information



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