



**Sohn Conference Hong Kong presented by  
Karen Leung Foundation  
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Oasis**

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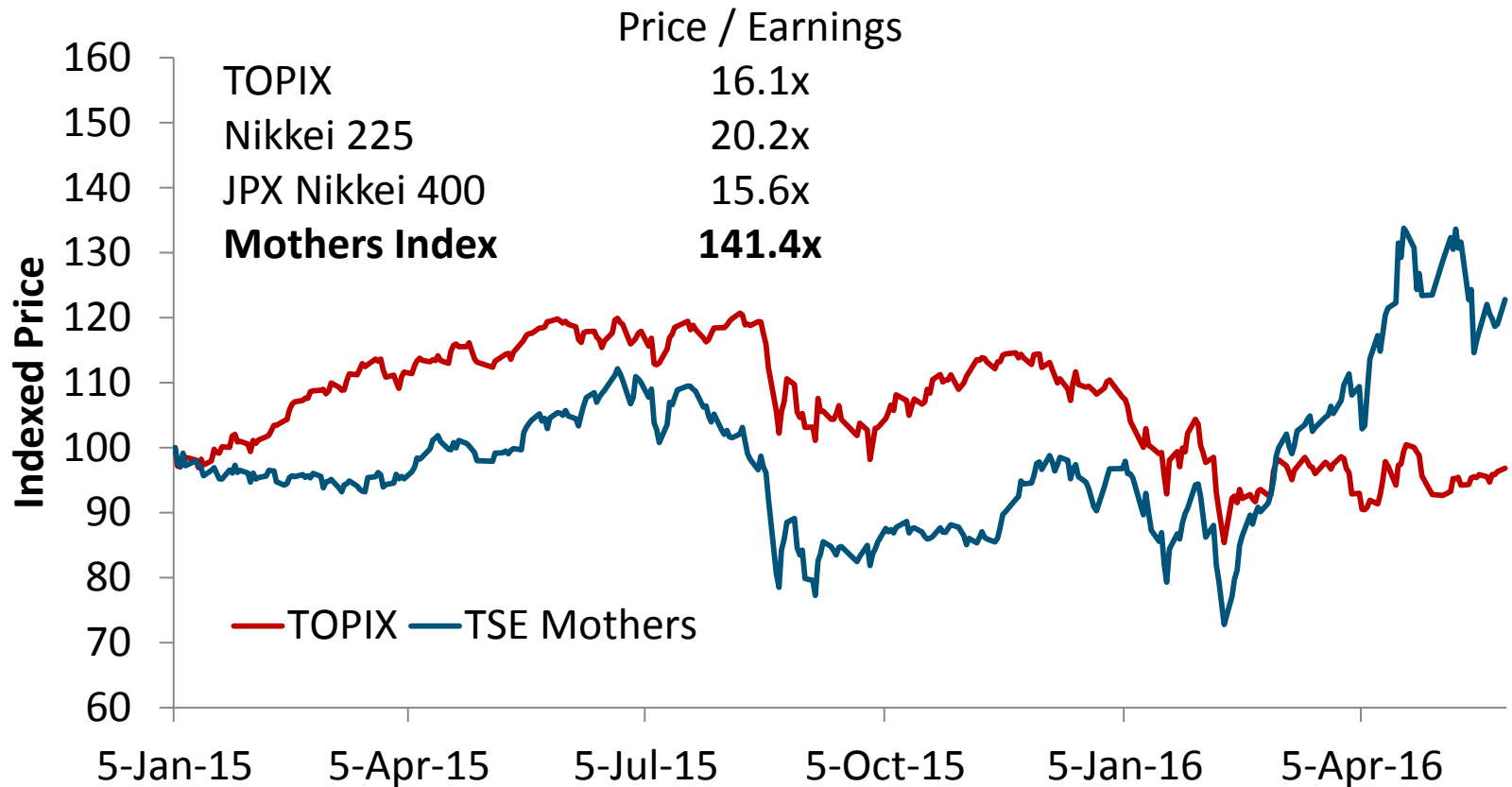
# Our journey in Japan...

**Good Companies + Great Products + Moats + Deep Value =**



**What's missing? INNOVATION**

# Market overpays for innovation in Japan...



**TOPIX is down 11% YTD, MOTHERS up 29% YTD**

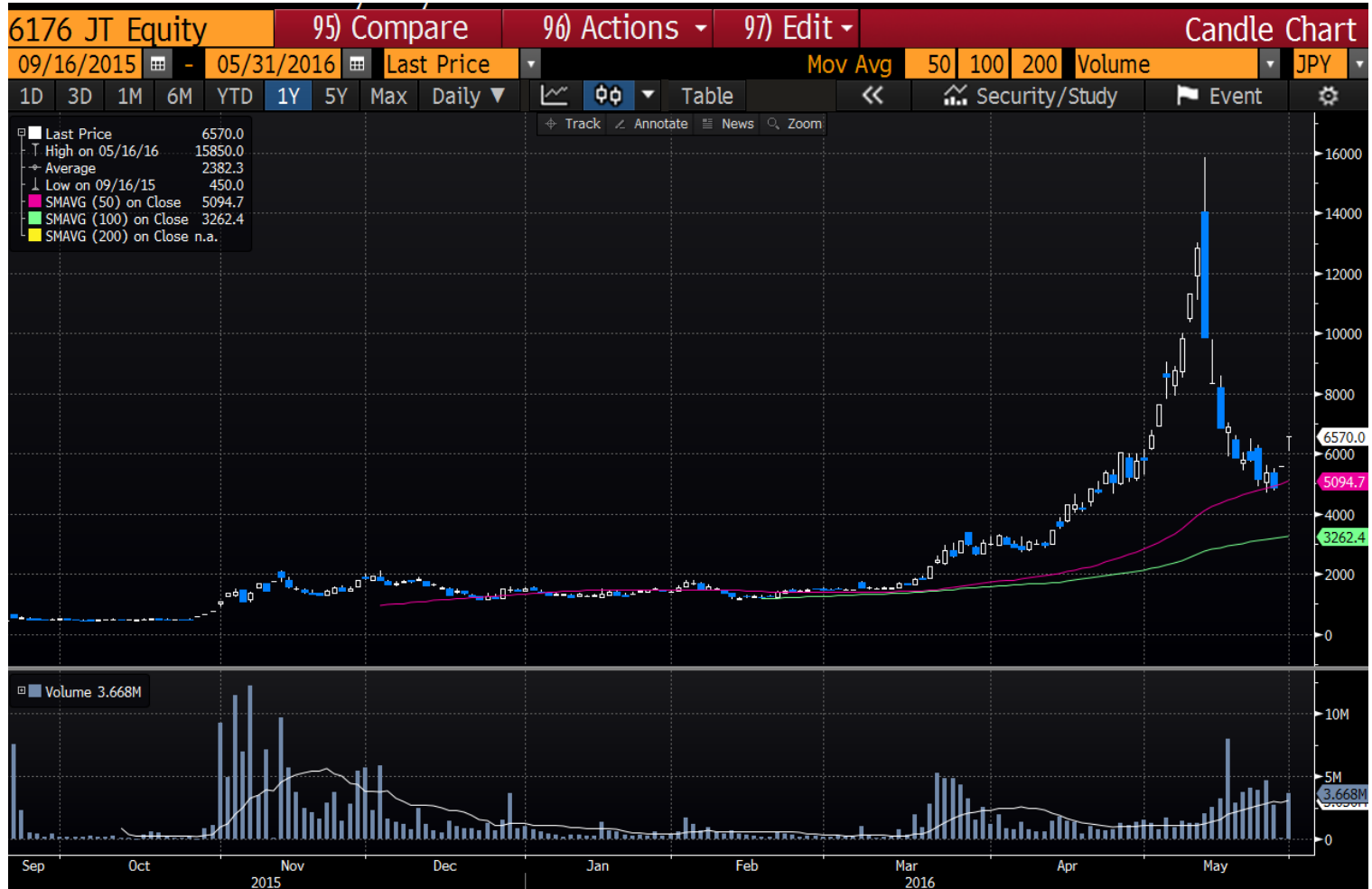
...including this one (up 5x from its IPO price)



# Many concept names have already crashed...



# Like this one...

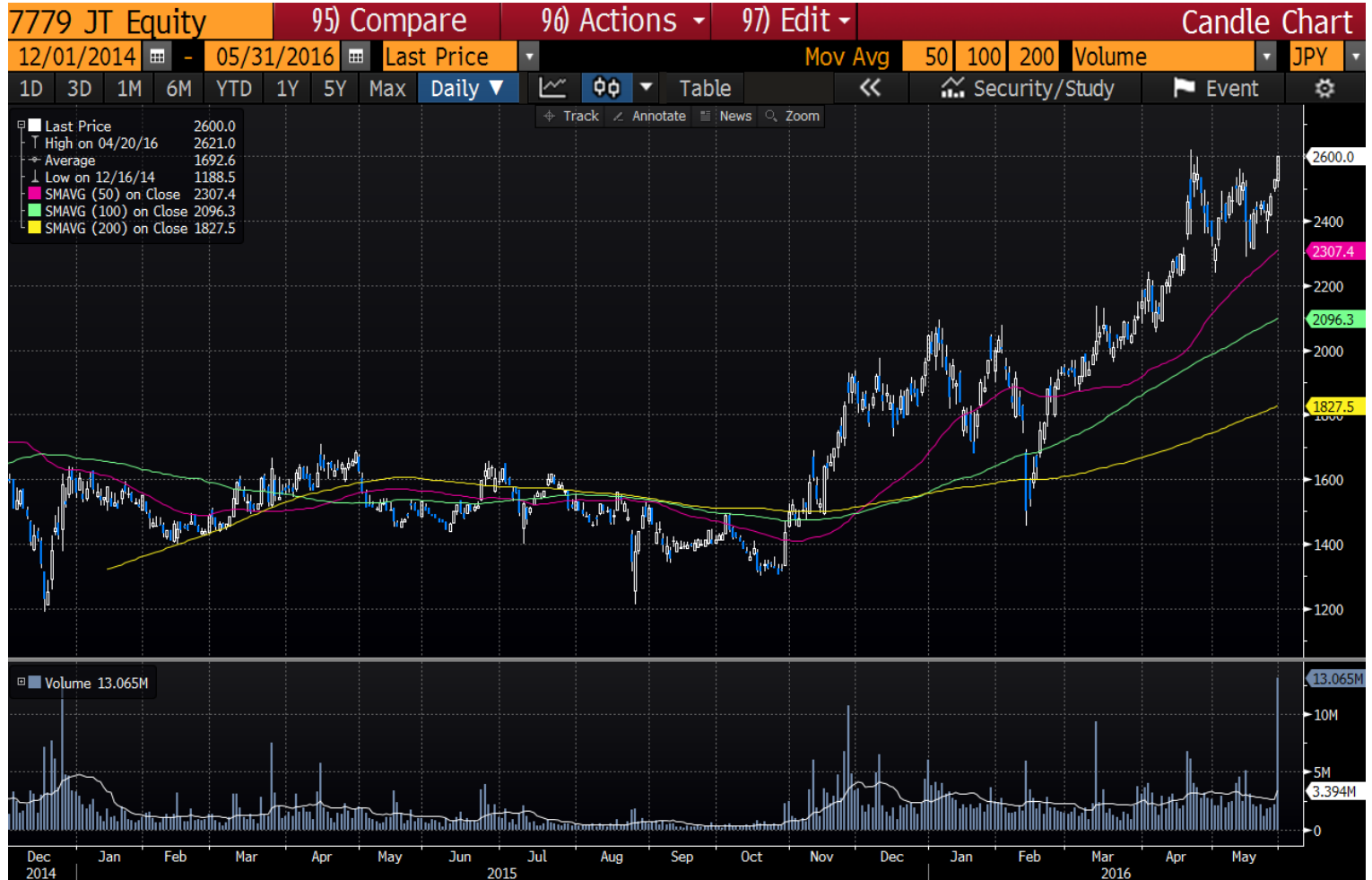


# And another one...





# ...back to our company (up 5x from its IPO price)

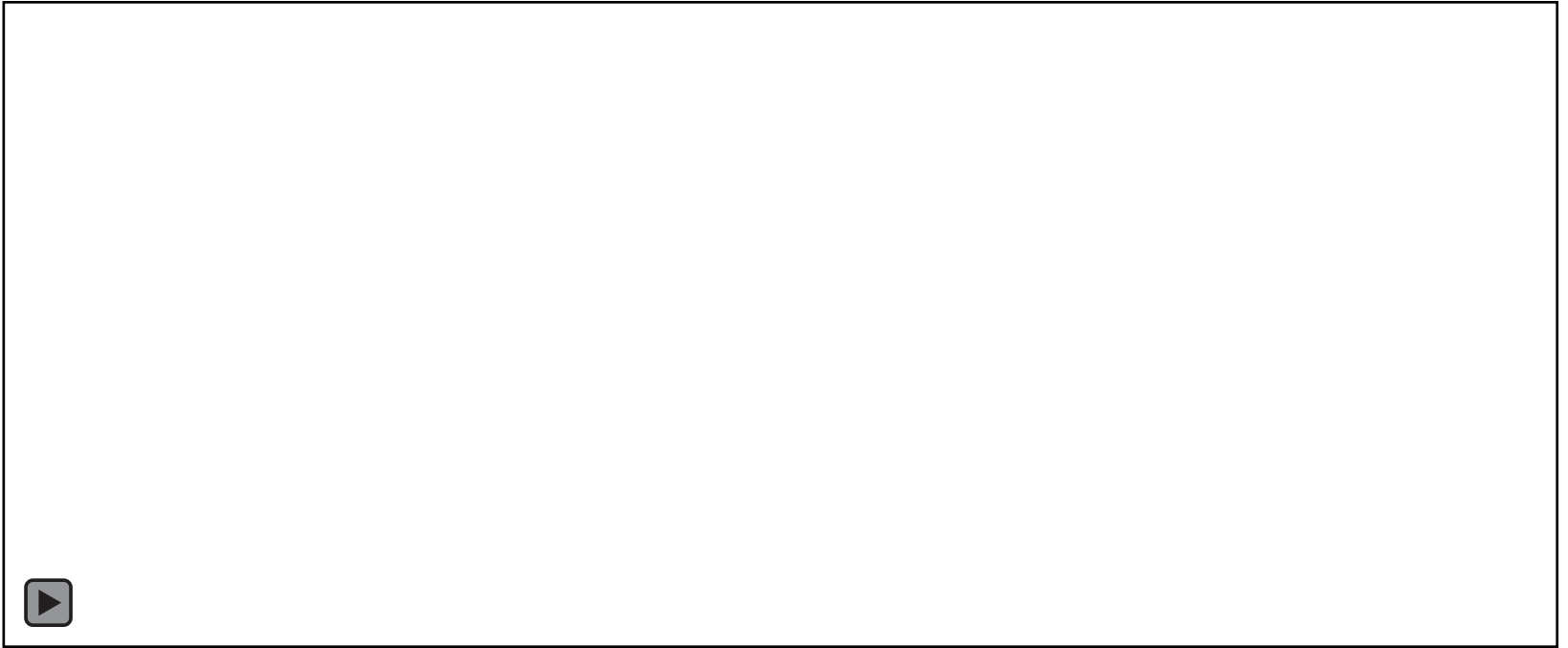


# Who is this company?

<i>In US\$ millions</i>	Peer A	Peer B	Peer C	JapanCo
Listing	US	US	EU	Japan
Enterprise Value	\$89.5M	\$79.2M	\$3.9M	\$4,466.8M
R&D Spend (last FY)	\$5.9M	\$6.5M	\$0.7M	\$9.0M
R&D Spend (since inception)	\$18.8M	\$10.4M	\$0.7M	\$28.4M

**All of these companies are similar and create competing products!**

# Sound familiar?



# Overview of Cyberdyne

- Cyberdyne researches and develops equipment designed to improve physical function of patients, support care workers and assist everyday life for disabled people
- The main product is a cyborg-type robot called Hybrid Assistive Limb (“HAL”)
- The Company was founded in 2004 by Professor Yoshiyuki Sankai and is based in Japan

## Market Statistics

*All figures in Y billions unless otherwise indicated*

Share Price (Y)	2,600
Common Shares O/S	129.1
Class B Shares O/S	77.7
Market Cap	537.7
Cash	40.8
Debt	19.9
Enterprise Value	516.8

### EV / Revenue

2017E	156.4x
2018E	85.1x

### EV / EBITDA

2017E	634.1x
2018E	245.1x



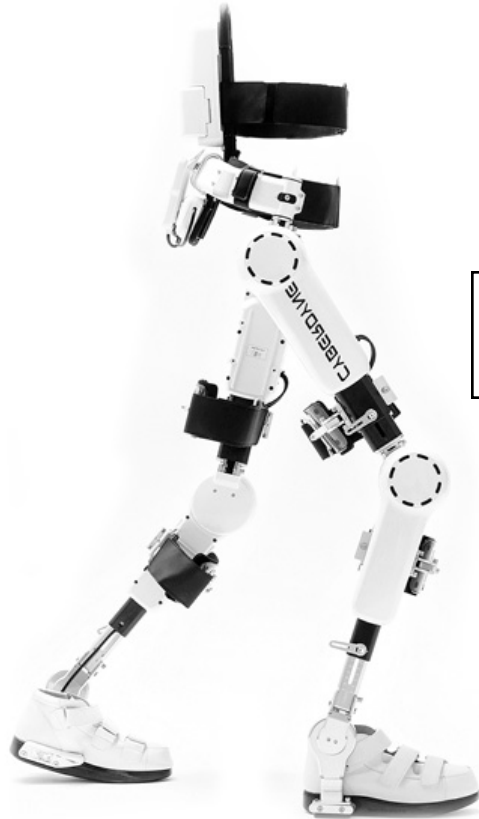
**Cyberdyne is creating big waves in the press**

**Robotics Firm With Evil Name Wins Investors**

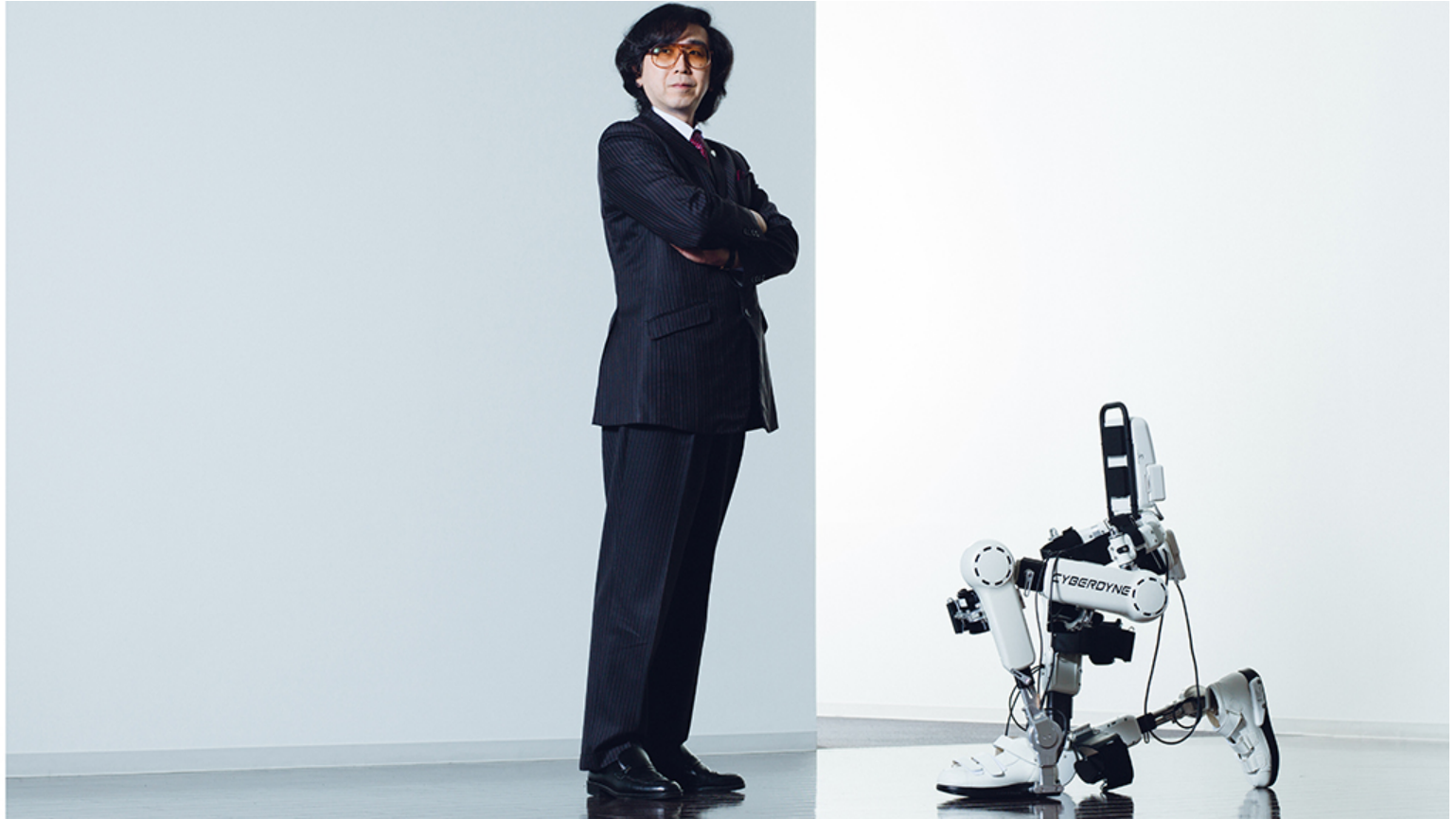
**Japan Mints First Robot Billionaire**

**Japan beats the US to it - Cyberdyne Hal  
robotic exoskeleton to help paralyzed**

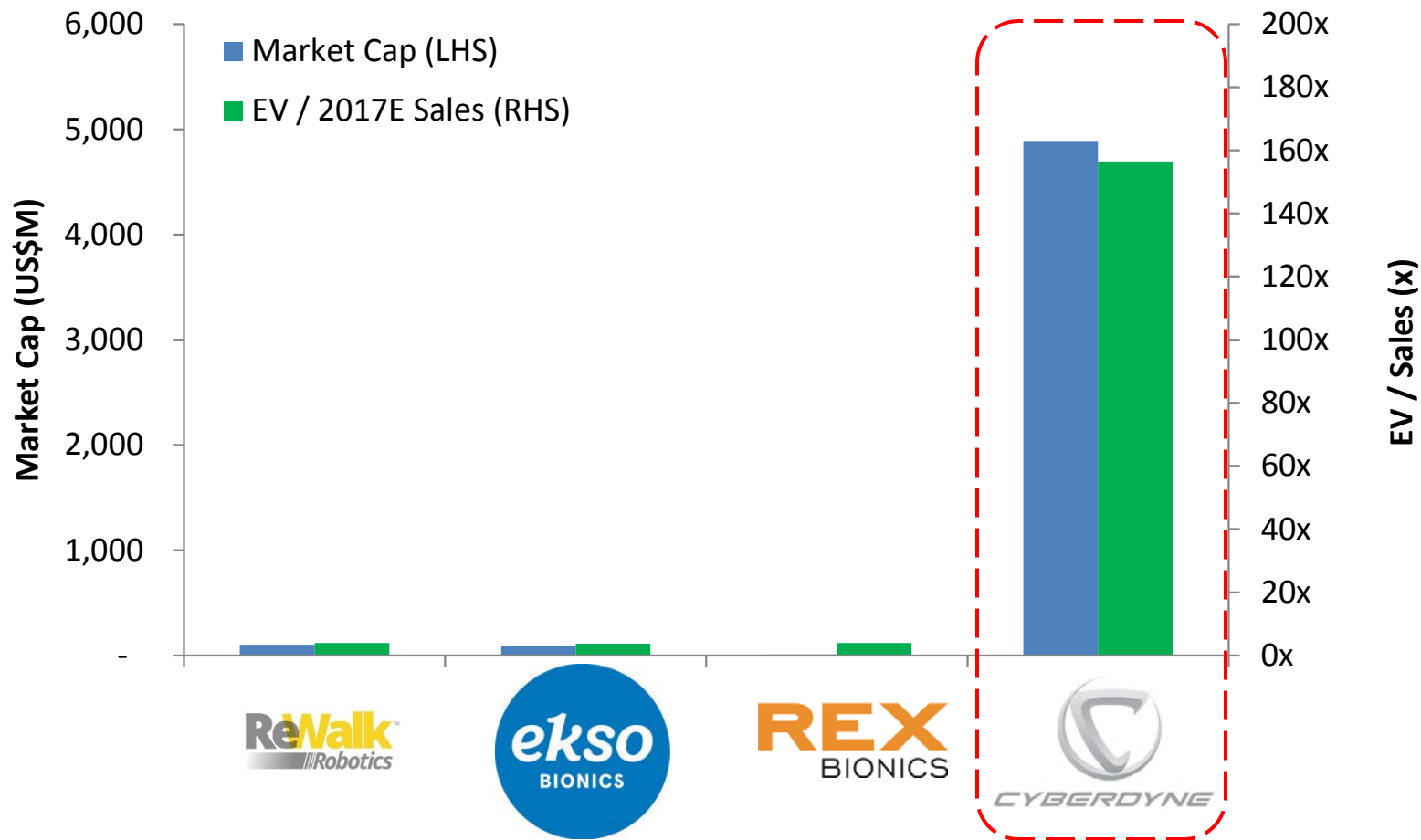
# Their products? Introducing...HAL



# The Professor...



# Cyberdyne commands a premium valuation over its peers





# But will Cyberdyne really take over?



# Is the market really that big?

- “Estimate over **26mn potential patients** for medical-use HAL; also see global growth of HAL within nursing care field”
  - » IPO Banker – Initiating Report (Jul-14)

# We aren't so sure...

Total Addressable Market

*\*Worldwide stroke, spinal cord injury, multiple sclerosis and Parkinson's disease*

26.0 million



Key Geographies (US, EU, Japan)

13.2 million



Spinal / Stroke Injuries

10.5 million



Those Needing Walking Assistance

*\*1/3 of stroke victims unable to walk without assistance*

3.5 million

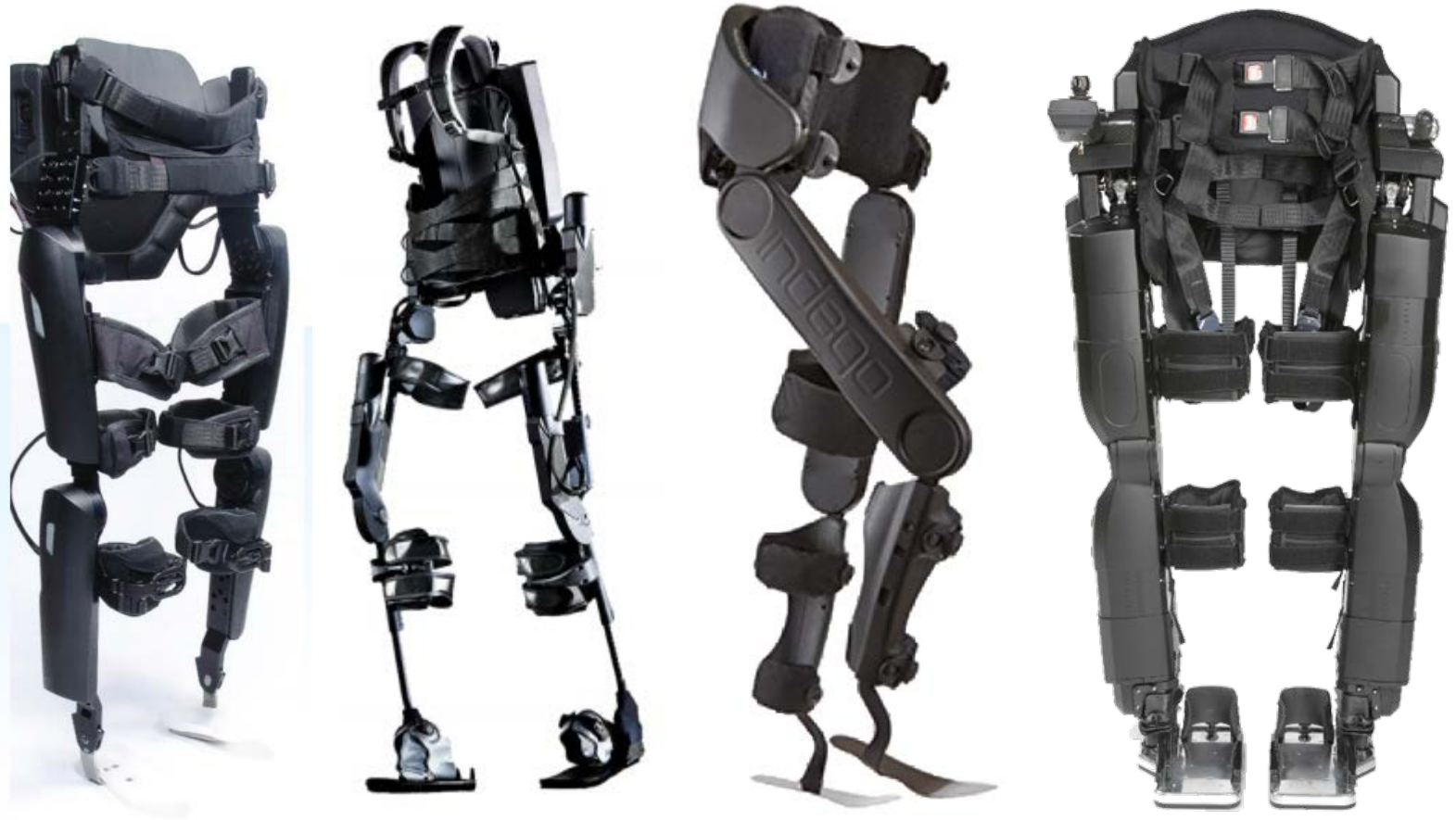
- Actual number is likely much smaller due to suitability of product for body type / injury / duration of therapy requirements
  - ReWalk markets penetration rate of 1-10% of US spinal cord



# How much is actually addressable in Japan?

- Conversations with industry sources have been revealing:
  - More likely that only 2-3% of addressable medical market in Japan would use the machine
    - Already gave up
    - Financial constraints
    - Accessibility of machines
  - Hospital intake will be low due to extremely high fixed costs associated with additional professional hiring requirements to support HAL users
  - Non-medical care market size is very limited and buyers are purchasing primarily for PR reasons to draw customers
    - Technology does not allow complex activities

This market is heavily competed...



OASIS

# ...with companies rapidly looking to expand

## Medical Usage

					
FDA	✓	✓	✓	✗	✗
CE Mark (EU)	✓	✓	✓	✓	✓

## ...across all of its segments



U.S. Navy To Test And Evaluate Lockheed Martin Industrial Exoskeletons



TOYOTA

Toyota builds robot exoskeleton to help the paralysed walk

**HONDA**

Honda begins leasing Walking Assist Exoskeleton

**Panasonic**

Panasonic has revealed details of the **robotic** exoskeletons it believes will help workers and the elderly complete every day tasks.



HYUNDAI

*Hyundai Creates Exoskeleton Robot Suit Thing for Humans*

**Raytheon**

Raytheon's Sarcos XOS 2 military exoskeleton just does the heavy lifting

# Competitors are cashed up and spending on R&D

*In US\$ millions*



**HONDA**

**Panasonic**



**HYUNDAI**

**Raytheon**

**BAE SYSTEMS**

Cash	Last FY R&D Spend
\$1,452M	\$751M*
\$48,736M	\$8,800M
\$16,538M	\$5,542M*
\$1,104M	\$450M
\$22,315M	\$1,894M
\$2,645M	\$763M
\$3,823	\$1,831M

*Last disclosed R&D spend*



## But what about the military segment?

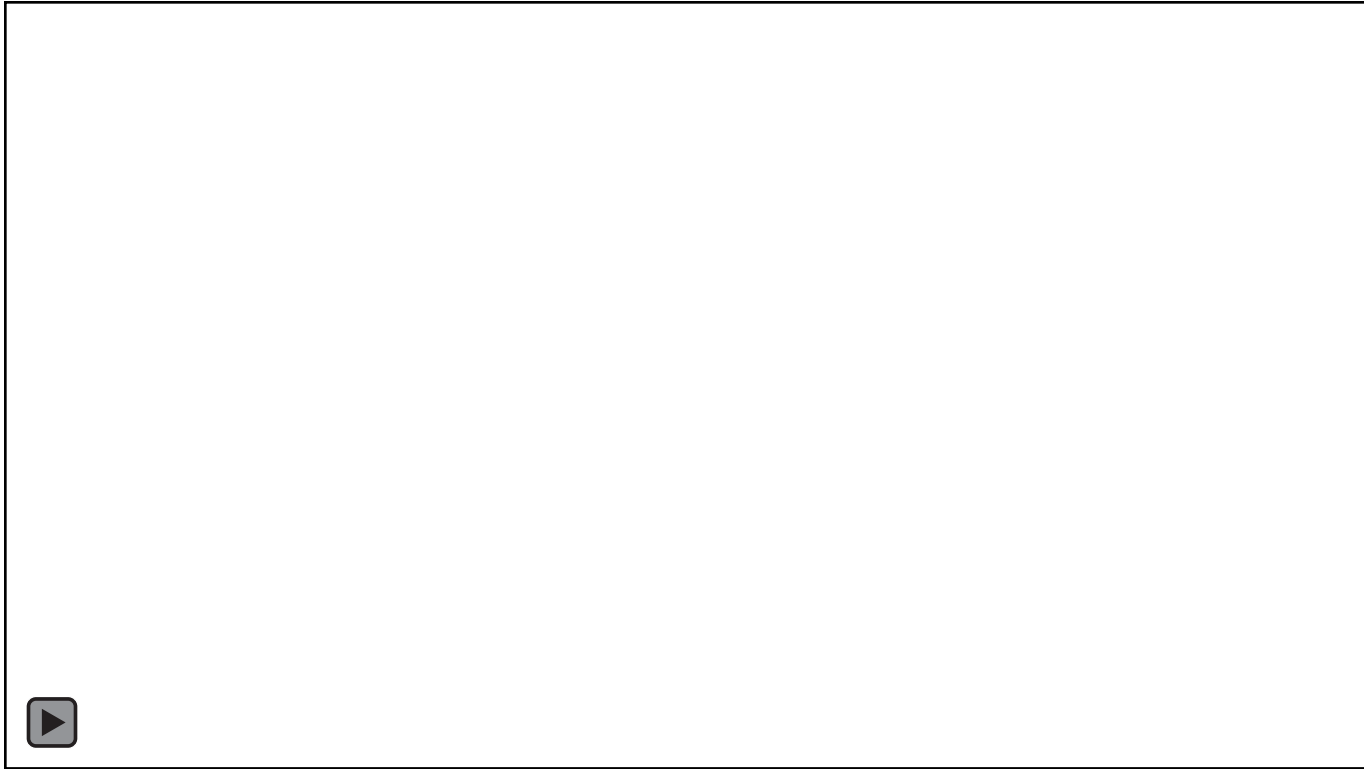


# How affordable is this product...

## *Rental fees*

	initial installation fee	rental fee [Each column exhibits a monthly fee.]			
		6 months	1 year	3 years	5 years
double-leg	550,000yen	188,000yen	178,000yen	168,000	158,000
single-leg	400,000yen	139,000yen	132,000	125,000	118,000

**I'm afraid they can't do that...**



# Will insurance companies pay?





“One application of robot-assisted therapy is improvement of gait function in patients with stroke. Both end-effector and the exoskeleton devices have proven to be effective complements to conventional physiotherapy in patients with subacute stroke, but there is no clear evidence that robotic gait training is superior to conventional physiotherapy in patients with chronic stroke or when delivered alone”

**Robot-assisted Therapy on Stroke Rehabilitation (Journal of Stroke – August 2013)**

“In patients with long-term upper-limb deficits after stroke, robot-assisted therapy did not significantly improve motor function at 12 weeks, as compared with usual care or intensive therapy. In secondary analyses, robot-assisted therapy improved outcomes over 36 weeks as compared with usual care but not with intensive therapy”

**Robot-assisted Therapy for Long-Term Upper-Limb Impairment after Stroke (New England Journal of Medicine – May 2010)**

# Industry uptake has been poor

Metrics in # units	2014	2015	LTM
	74	73	92
	~70	59	54
	n/a	7	7
	~220	134	134

*\*Cyberdyne HAL sales for lower limb type treatment (excludes lumbar support)*

“Achilleas Dorotheou, head of Parker’s Human Motion & Control unit, said the overall health of an injured person has to improve from greater mobility for a private insurance company to pay for the device. “That will take time. **We’re not claiming this business will be hundreds of millions of dollars a year,**” he said.”

*Parker Hannifin’s Robotic Exoskeleton Gets FDA OK for Personal Use (Wall Street Journal – March 2016)*

# This product has seemingly been demonstrated forever...



**Mar 2, 2007**

HAL(Hybrid Assistive Limb) from Cyberdine



cyberpunkreview

**Subscribe** 96


716,423 views

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Uploaded on Mar 2, 2007

HAL 5 or Hybrid Assistive Limb 5 is a robot suit (aka artificial powered exoskeleton) developed by Yoshiyuki Sankai who is the professor of Tsukuba University of Japan.



...and Cyberdyne has been  
“ramping up” in perpetuity

**April 2009**

Cyberdyne said to be mass producing  
\$4,200 HAL robotic suit

- Engadget

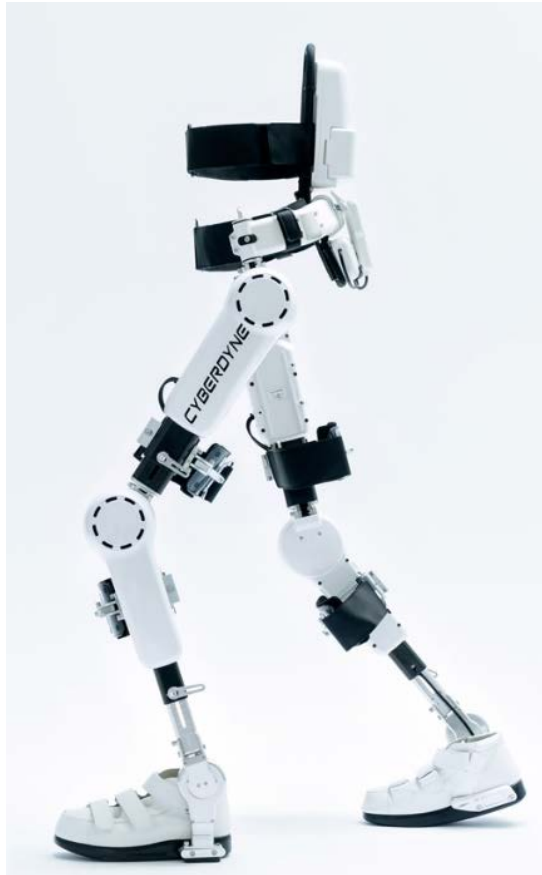
**August 2015**

Cyberdyne Inc. Set To  
Mass Produce HAL  
Robot Suit

- Gadget Review

# Where is the growth really coming from?

What market thinks:



What's actually happening:





## Despite all of this, Cyberdyne is priced for perfection...

- Cyberdyne is trading high on current estimates...

	2017	2018
EV / Revenue	156.4x	85.1x
EV / EBITDA	634.1x	245.1x

- And using peak sales (current sales of Y1.2B) from initiating reports at IPO:

	Broker 1	Broker 2	Broker 3
Peak Sales	Y79.8B	Y56.8B	Y58.7B
Year Projected	2024	2025*	2024
Implied Multiple	6.5x	9.1x	8.8x

*Broker 2 estimate average revenue between 2021 to 2025*

# Cyberdyne is trading at absurd multiples...

Figures in US\$M



Enterprise Value	\$89.5M	\$79.2M	\$3.9M	\$4,698.0M
Sales	\$5.2M	\$15.5M	\$1.0M	\$11.5M
EV / Sales	17.2x	5.1x	4.0x	408.5x

# Cyberdyne is trading at absurd multiples...(cont'd)

Figures in US\$M



Enterprise Value	\$89.5M	\$79.2M	\$3.9M	\$4,698.0M
Units Sold (annual)	92	54	7	134*
<b>EV / Units Sold</b>	<b>\$1.0M</b>	<b>\$1.5M</b>	<b>\$0.6M</b>	<b>\$35.1M</b>

\*Cyberdyne HAL sales for lower limb type treatment (excludes lumbar support)

# Cyberdyne is trading at absurd multiples...(cont'd again)

Figures in US\$M



Enterprise Value	\$89.5M	\$79.2M	\$3.9M	\$4,698.0M
Employees	87	67	2	154
EV / Employees	\$1.0M	\$1.2M	\$2.0M	\$30.5M

# Valuation based exclusively on a very uncertain future

Fig. 4: Cyberdyne [7779]: DCF valuation

	Sales	Operating profits	Aftertax ope profits	Depreciation	Capex	Change in working capital	FCF	Discount rate	Present value	Value per share
	¥mn	¥mn	¥mn	¥mn	¥mn	¥mn	¥mn		¥mn	¥
16/3	1,265	-1,292	-866	280	1,355	-164	-2,105			
17/3E	2,720	-220	-147	750	1,000	-81	-479	1.091	-439	-2
18/3E	5,370	700	469	810	1,200	-800	-721	1.190	-606	-3
19/3E	9,800	3,540	2,372	870	1,350	-1,100	792	1.298	610	3
20/3E	13,470	5,750	3,853	920	1,500	-1,200	2,073	1.416	1,463	7
21/3E	17,890	9,510	5,702	980	1,650	-1,400	3,632	1.545	2,351	12
22/3E	23,690	12,280	8,228	1,040	1,800	-1,800	5,668	1.685	3,363	17
23/3E	30,630	16,870	11,303	1,100	1,950	-2,400	8,053	1.839	4,380	22
24/3E	40,180	23,430	15,698	1,150	2,100	-3,300	11,448	2.006	5,708	28
25/3E	53,570	32,930	22,063	1,210	2,250	-3,800	17,223	2.188	7,871	39
26/3E	68,780	43,680	29,266	1,270	2,400	-3,500	24,636	2.387	10,321	51
27/3E-30/3E	2,314,000	1,477,140	989,684	12,670	25,800	-13,400	728,862	0.000	177,613	874
Terminal value	484,290	294,380	197,235	1,840	3,900	-100	2,146,035	5.698	376,650	1,853
<b>Total present value of FCF</b>									607,661	2,989
+ Marketable securities or cash & deposits that can be sold (current market value)									39,959	197
- Interest-bearing debt									0	0
= FCF-based intrinsic value									647,621	3,186

Figure 4. DCF model for Cyberdyne: Set target price of JPY16,000

Cyberdyne ( 7779 )		15/03	16/03	17/03	18/03	19/03	20/03	21/03	22/03	23/03	24/03	Terminal Value
Sales	JPY mn	1,200	2,700	5,300	9,200	14,700	22,300	30,600	40,100	49,100	58,700	
OP	JPY mn	-700	0	1,300	4,100	7,900	13,000	18,400	24,800	30,800	36,600	
Aftertax operating profit	JPY mn	-420	0	780	2,460	4,740	7,800	11,040	14,880	18,480	21,960	
Depreciation	JPY mn	240	460	780	1,300	2,010	2,810	3,940	4,700	5,740	6,540	
Capex	JPY mn	350	500	700	900	1,200	1,500	1,900	2,300	2,800	3,300	
Change in working capital	JPY mn	-230	-520	-680	-1,010	-1,360	-1,800	-2,100	-2,280	-2,350	-2,340	
Aftertax cash flows from operating activities	JPY mn	-700	-560	180	1,850	4,190	7,310	10,880	15,000	19,070	22,960	
PV	JPY mn	-691	-453	135	1,264	2,602	4,125	5,503	6,999	8,098	8,952	257,662
PV per share	JPY	-37	-24	7	67	137	218	295	370	427	468	13,613
Total PV	JPY											15,541
Financial assets per share	JPY											229
Stock value	JPY											15,770

Tax rate	40.0%	Target price	16,000
Permanent growth rate	1.0%		
Risk free rate	1.0%		
Risk premium	9.0%		
WACC	10.0%		

Figure 14. Cyberdyne: DCF valuation

	Per share (¥)	Total (¥bn)
Free cash flow total	6,390	346.8
+ Surplus funds	83	4.5
= Shareholder value	6,473	351.3

(¥bn)	14/3	15/3E	16/3E	17/3E	18/3E	19/3E	20/3E	21/3E	22/3E	23/3E	24/3E	Terminal Value E
Sales	0.5	1.0	2.6	8.6	19.0	30.6	45.5	60.9	73.2	79.5	79.8	79.8
Operating profit	-1.2	-1.1	-0.1	3.7	10.5	18.0	27.8	37.8	45.5	48.8	47.6	47.6
Net operating profit after tax	-0.7	-0.7	-0.1	2.3	6.5	11.2	17.2	23.4	28.2	30.2	29.5	29.5
Depreciation	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Capital expenditure	0.2	3.2	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4
Net working capital increase	0.1	0.3	0.8	3.1	5.3	5.9	7.6	7.8	6.3	3.2	0.1	0.0
Free cash flow	-0.8	-3.9	-1.1	-1.0	1.1	5.2	9.5	15.6	21.9	27.0	29.4	556.7
Discount rate (%)	1.0	1.1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.9
Present value		-3.7	-1.0	-0.8	0.8	3.7	6.4	9.8	12.9	14.9	15.2	288.3

Assumptions	
Number of shares outstanding (fully diluted, mn)	54.27
Market value (¥bn)	178.0
Interest-bearing debt (¥bn)	0.0
Beta	0.80
Tax Rate (%)	38.0
Perpetual growth rate (%)	1.5
10-year bond yield (%)	2.00
Risk premium (%)	6.00
Capital cost of equity (%)	8.80
Weighted average cost of capital after tax (%)	6.60

Source: Company data, Citl Research.

Research analysts all show ~80-90% of Cyberdyne's valuation come in future cash flows from 2024 and beyond

# Conclusion



We believe Cyberdyne is one of the most overvalued companies in Japan

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