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Medical Device

# Centralized Procurement Policy Accelerates Medical Device Industry Concentration

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—In-depth report of minimally invasive medical industry

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## Highlights

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MicroPort is a leading provider of innovative and advanced medical devices in China, with products covering ten major businesses including life sciences (cardiovascular and structural heart diseases, electrophysiology, and heart rate management, orthopedics and soft tissue repair, aortic and peripheral vascular diseases, cerebrovascular and neuroscience, and endocrine management), surgery and medical robots, urology, gynecology, respiration, digestion, cosmetic medicine, rehabilitation, in vitro diagnosis and imaging.

### **MicroPort's coronary products have the leading edge globally. China's new policies of centralized procurement and the continuous improvement in penetration allow its coronary business to support continuous growth of the group**

MicroPort iterates its coronary products continuously and covers the high, medium and low-end market in China with its leading technologies. MicroPort has a production market of coronary products close to 10 billion yuan domestically. The centralized procurement policy further enhances the company's position in the industry. MicroPort's overseas market looks promising as the company's well-developed global channels over years provide great opportunities. The stable cash flow of its coronary business provides stable support for the development of new businesses.

### **MicroPort CardioFlow has an absolute leading advantage in cardiovascular interventions in China. The company also has promising prospects in China's untapped heart valves replacement market**

After years of research and development, Endovastec and MicroPort NeuroTech have become leaders in their own industries. In recent years, they have released a substantial volumes of products, with growth exceeding 30%. Their overall market size is second only to MicroPort's coronary business. Endovastec dominated the aortic sector with its unique products. It cut into the peripheral vascular intervention through its drug balloons. MicroPort NeuroTech, China's only neurological intervention manufacturer of a significant scale, has entered a phase of increasing volume. MicroPort CardioFlow entered the period of market introduction after separate financing. It has huge growth potential in China's heart valve market worth 5 billion yuan.

### **MicroPort is reaping benefits from its overseas acquisitions and channel integration in orthopedics and cardiac rhythm management (CRM)**

MicroPort became a member of leaders in orthopedics and cardiac rhythm management in China after acquiring Wright's joint reconstruction business in 2013 and LivaNova's cardiac rhythm management business in 2017. The revenue of the two acquired businesses accounts for more than 55% its total. The advanced technologies of the two companies made its products very competitive in the Chinese market. MicroPort has gradually improved its performance by introducing products in the domestic market and overseas integration. Through the two overseas mergers and acquisitions, the company has also accumulated a great deal of experience in overseas mergers and acquisitions and global market channel resources.

# Business Outlines

## **A. MicroPort—the leading company of interventional products**

A1. Key players in the sector

A2. MicroPort's business operation

## **B. Cardiac and vascular intervention**

B1. Coronary vascular intervention - Firehawk

B2. Aortic intervention - Endovastec

B3. Neuro intervention - MicroPort NeuroTech

B4. Cardiac valves - MicroPort CardioFlow's VitaFlow®

## **C. Orthopedics and cardiac rhythm management**

C1. Orthopedic joint products - Goral™

C2. Cardiac Rhythm management: "Xinyue™"

## **D. Electrophysiology, medbots and assisted reproduction**

D1. Electrophysiology: Columbus®

D2. Medbots: Toumai™

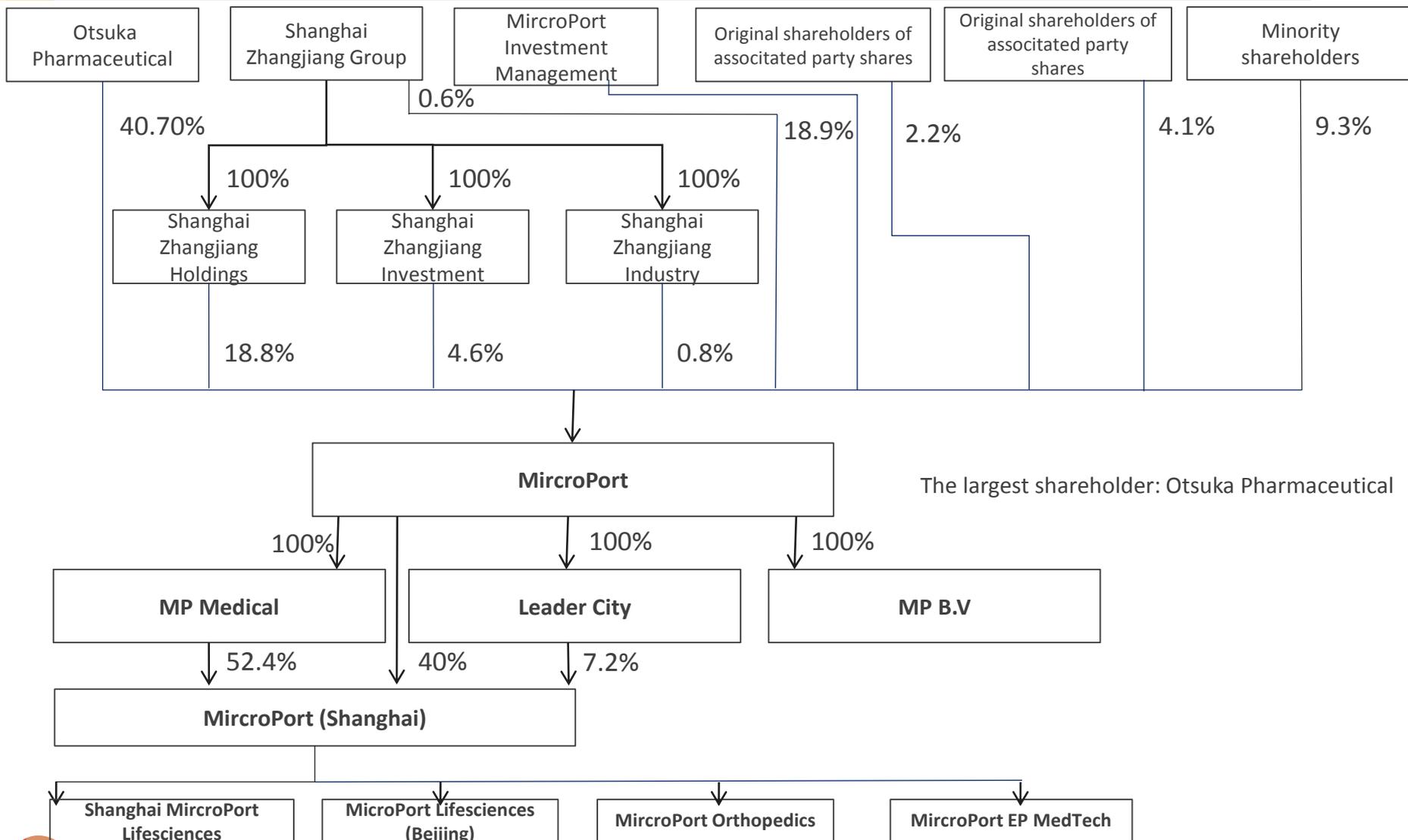
D3. Assisted reproduction: Lotus™



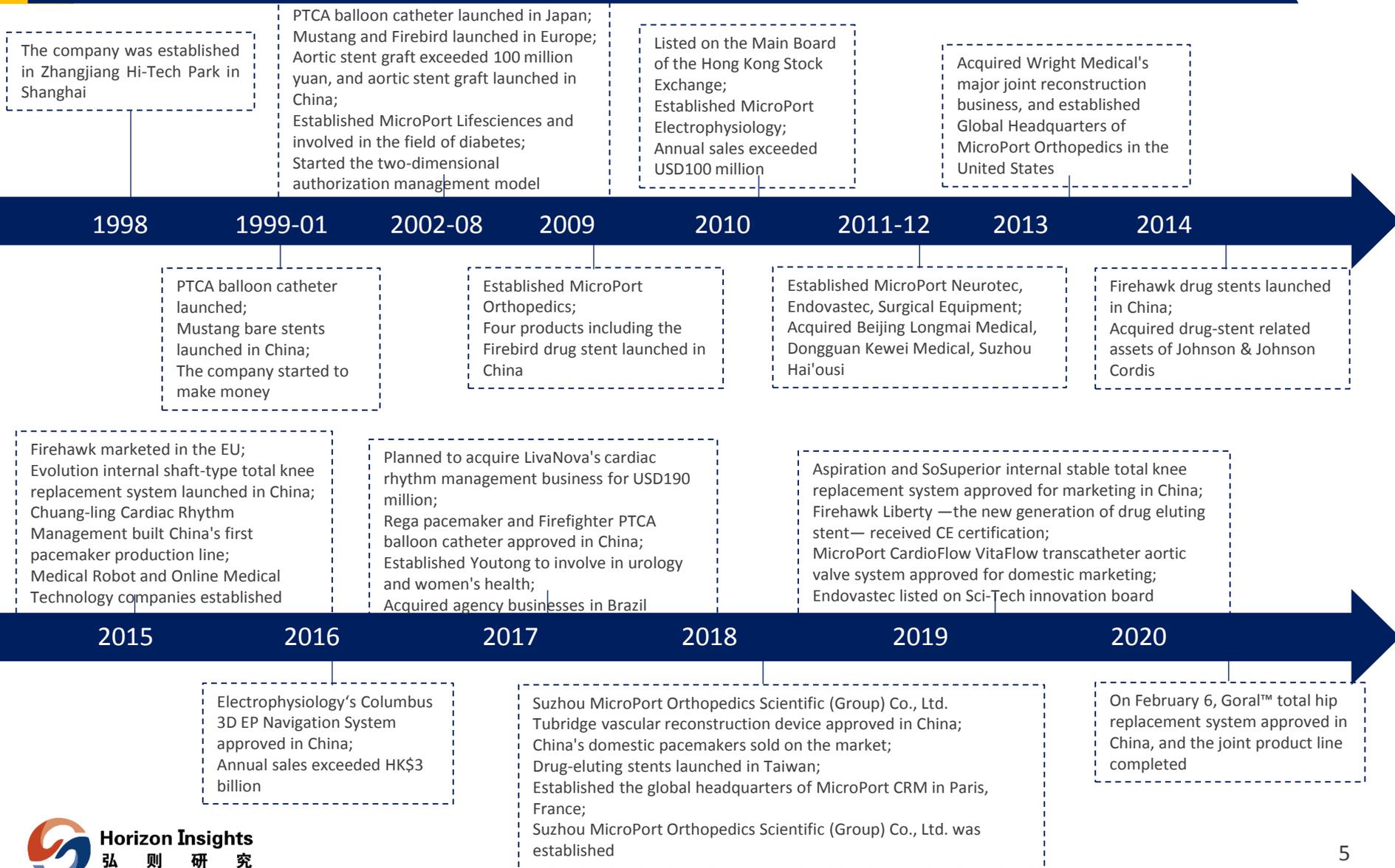
A

# MicroPort — Leader of interventional products

# Dispersed equity and professional manager management model



# MicroPort focuses on R&D and continues to expand product categories



# Cardiovascular and cerebrovascular products help the company achieve its leading position; cardiac valve and orthopedic products are beginning to gain traction

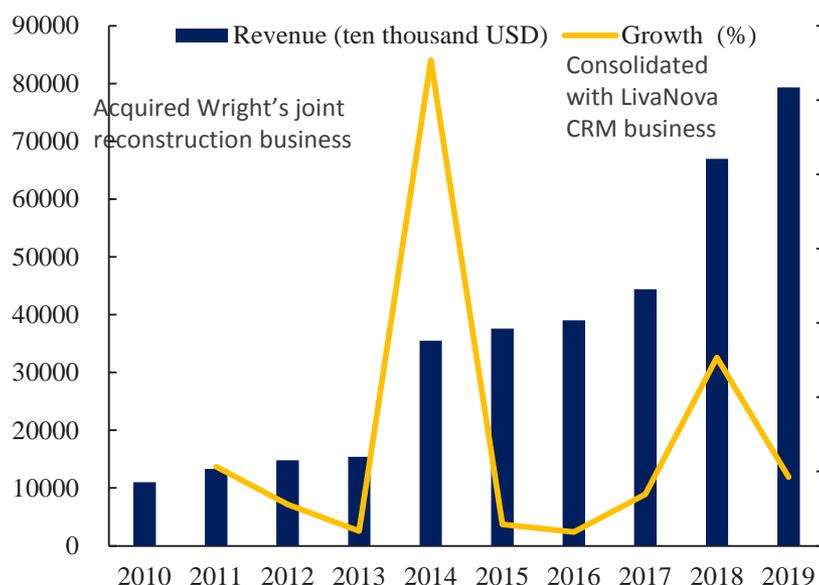
- Imports in the sectors in which MicroPort's major sub-businesses have been involved account for more than 50%. Most of the sectors have a market size of above 5 billion yuan. MicroPort has great potential in these markets.
- MicroPort's products belong to class III medical devices. This type of equipment is difficult to research and develop and consumes a lot of resources, so the barriers for small and medium-sized enterprises to enter are high.
- Each subsidiary is in a leading position in China, forging ahead with R&D and significant product advantages.

Company	MicroPort Group	MicroPort Endovastec	MicroPort NeuroTech	MicroPort CardioFlow	MicroPort Orthopedics	MicroPort CRM	MicroPort Electrophysiology
Business	Coronary intervention products	Aortic and peripheral arterial intervention products	Neuro intervention stent	Cardiac valve	Orthopedic implant	Cardiac rhythm management products	Cardiac electrophysiology intervention products
Indications	Put into the human body to solve the problem of vascular occlusion in cardiovascular diseases	Placed in the human body to solve aortic dissection, aortic aneurysm, peripheral artery diseases and venous diseases	Nervous system diseases, including cerebral aneurysms, intracranial atherosclerosis, carotid artery diseases, and other neurological diseases	Placed in the human body to solve valvular heart disease due to aortic valve stenosis and aortic valve regurgitation	The general term for a large group of implants for bone repair, replacement, supplement and filling in the human body, which are mainly divided into three categories: spine, trauma, and joint	Electronic therapeutic apparatus implanted into the human body for heart diseases such as bradycardia, sudden cardiac death, heart rate failure, etc.	For arrhythmia, supraventricular tachycardia, and radiofrequency ablation of atrial fibrillation, etc.
Group holdings (%)	100	46.34	83	57.37	100	100	45.1
Representative products	Firehawk coronary rapamycin target eluting stent	CRONUS surgical stent system	Tubridge vascular reconstruction device	VitaFlow transcatheter aortic valve system	Goral™ hip replacement system femoral head	Raga series implantable cardiac pacemaker	Columbus 3D EP Navigation System
Rank in the field	1 <sup>st</sup> in China	1 <sup>st</sup> in China	1 <sup>st</sup> in China	Top 2 in China	Top 3 in China	Top 2 in China	1 <sup>st</sup> in China
Domestic competitors	Lepu Medical	LifeTech Scientific	N/A	Venus Medtech	Weigao, Double Medical, Kinetic, Chunlizhengda Medical, AK Medical	Lepu Medical, LifeTech Scientific	N/A
Domestic market size	10+ billion yuan	5 billion yuan	Billions yuan	5 billion	28+ billion yuan	5 billion yuan	Billions yuan
Import proportion	30%	Aorta: 70% Periphery: stent-100% Balloon-0%	95%	High	Spine: 60% Joints: 70%	95%	>95%

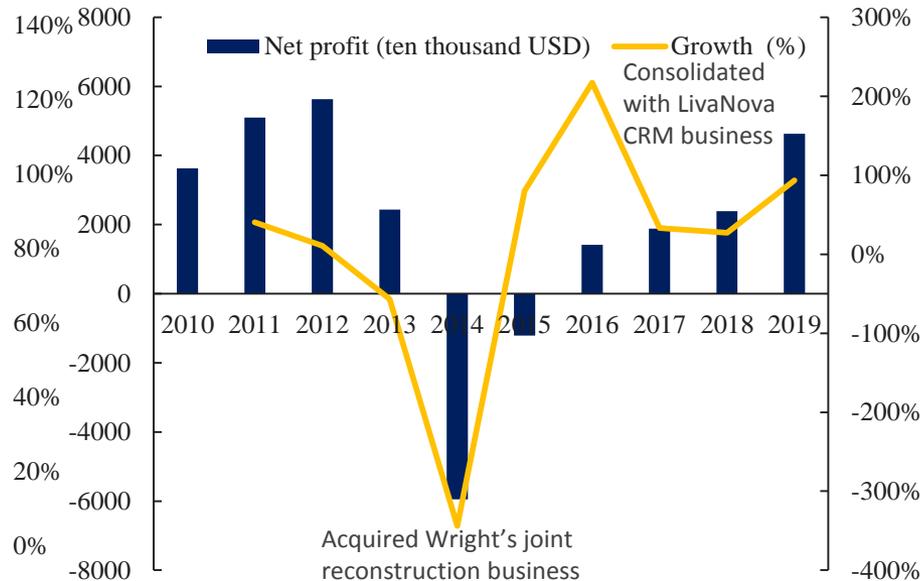
# MicroPort has accumulated valuable experience in cross border mergers and acquisitions from its business expansion

- In 2019, MicroPort's revenue growth was nearly 20%. Due to the rapid growth of orthopedic business in China, the profit increased by approximately 90% YoY. The gross margin stabilized at around 70%.
- Around 2014, MicroPort acquired Wright's joint reconstruction business and related assets in the US, becoming the world's sixth largest global company in hip and knee joint reconstruction.
- Around 2018, MicroPort acquired LivaNova's cardiac rhythm management business, becoming a leading company in the CRM field in China.

MicroPort's revenue



MicroPort's net profit

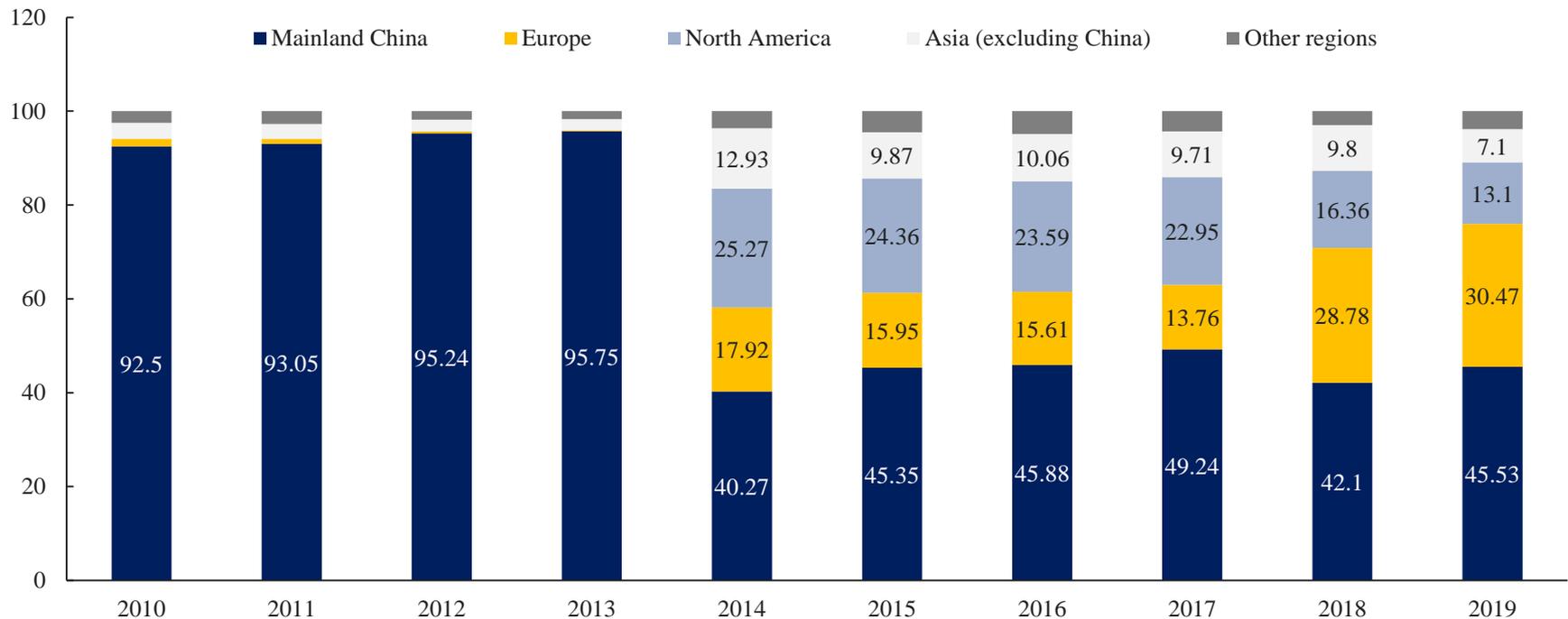


# MicroPort established a global channel network through acquisitions, increasing overseas sales share to more than 50%

After 2014, MicroPort's overseas business accounted for a larger proportion than its domestic business:

- In 2013, it acquired Wright Medical's large joint reconstruction business, and established MicroPort Orthopedics' global headquarters in the United States to expand the North American market.
- In 2017, it acquired local agencies in Brazil to open up the South American market.
- In 2018, it established MicroPort CRM's global headquarters in Paris, France, to explore the European market.

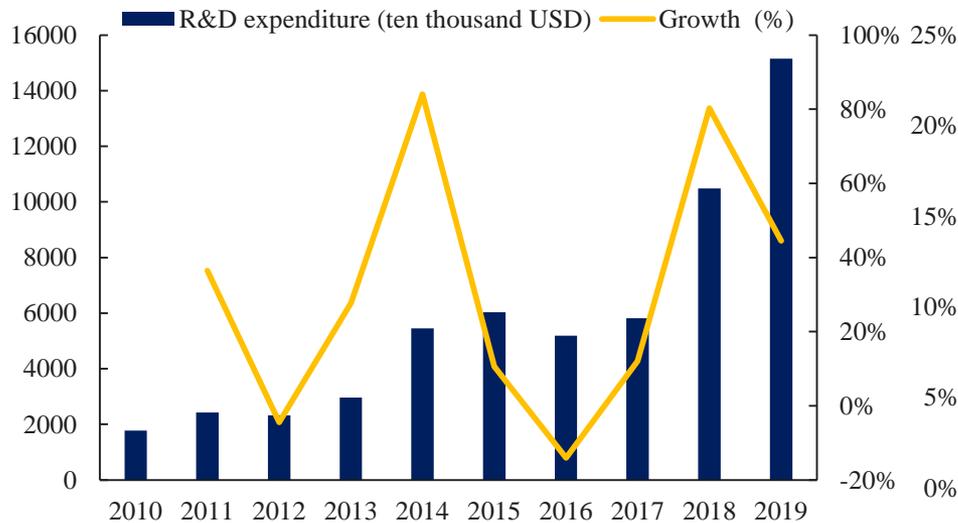
Proportion of revenue by region



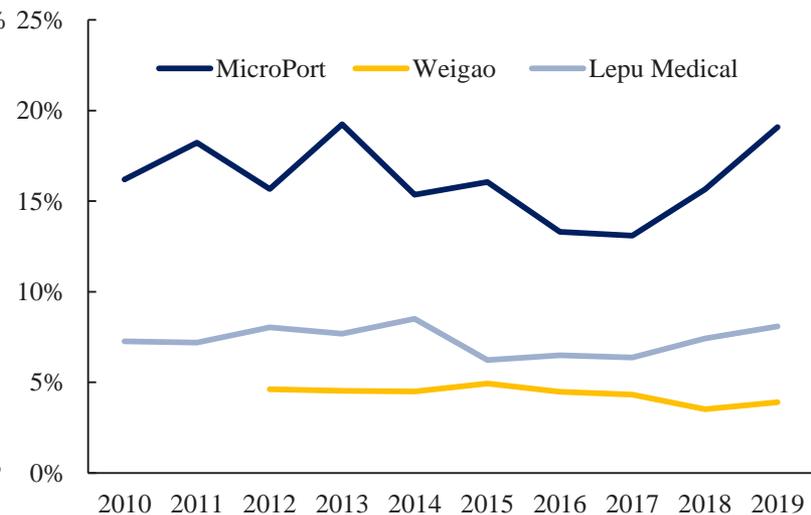
# High R&D investment guarantees domestic leading position

- MicroPort has high R&D investment with a compound growth rate of over 30% in recent years.
- MicroPort's R&D investment accounts for more than 15% of revenue per year, far exceeding other peers.

### R&D expenditures



### Share of R&D expenditure by company



Sources: Wind, Horizon Insights

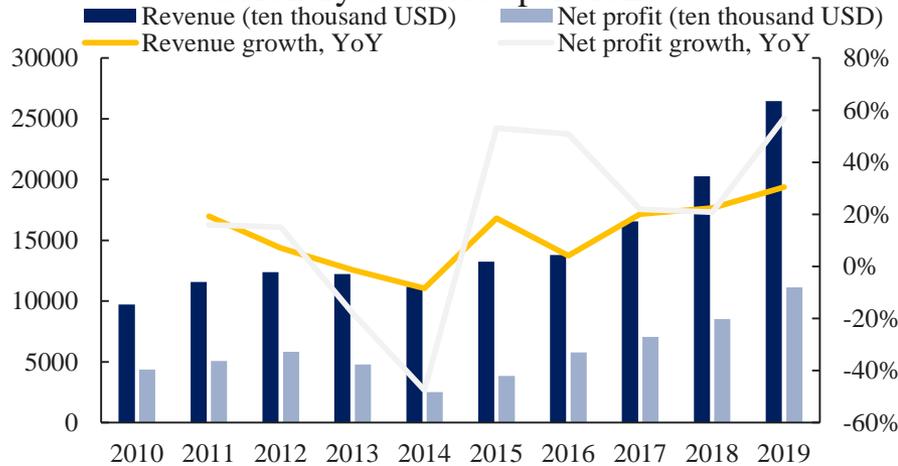
## All business lines will launch innovative products in the next few years

- As of 2019, a total of 18 medical devices of the company have passed the application for special examination of innovative medical devices (“green channel”), ranking first in the medical device industry for 5 consecutive years.
- All subsidiaries have products that have entered the green channel for innovative medical devices and have strong innovation capabilities.
- In 2019, a total of three products entered the green channel for innovative medical devices.

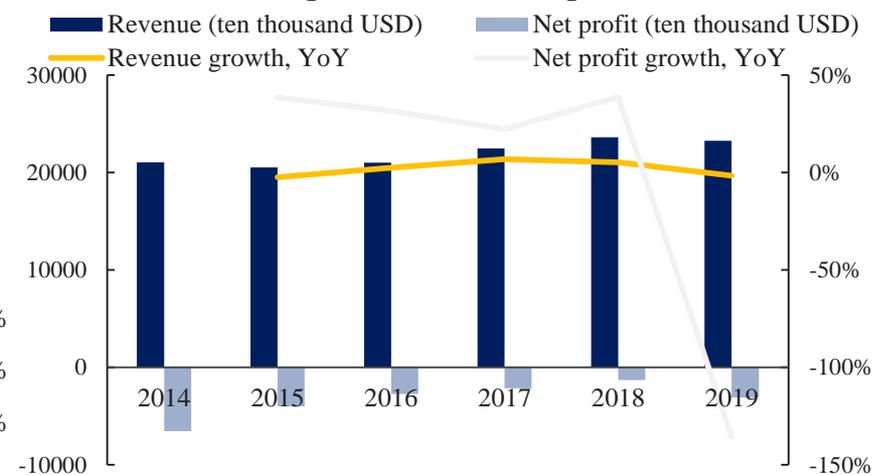
Subsidiary	Innovative product list in recent years
MicroPort Electrophysiology	Pressure sensing magnetic positioning perfusion radiofrequency ablation catheter
Endovastec	Straight tube thoracic aorta stent graft system
Endovastec	Abdominal aorta stent graft system
MicroPort Electrophysiology	Renal artery radiofrequency ablation catheter
MicroPort Group	Transcatheter aortic valve system
MicroPort Group	Bioabsorbable rapamycin target eluting coronary stent system
MicroPort NeuroTech	Vascular reconstruction device
Endovastec	Drug balloon catheter (trade name: Reewarm PTX)
MicroPort Group	Bifurcated Aortic Stent Graft System (trade name: Castor)
MicroPort Electrophysiology	3D EP Navigation System

# Coronary intervention business is a cash cow; the acquired orthopedics and cardiac rhythm management businesses are seeing reduced losses

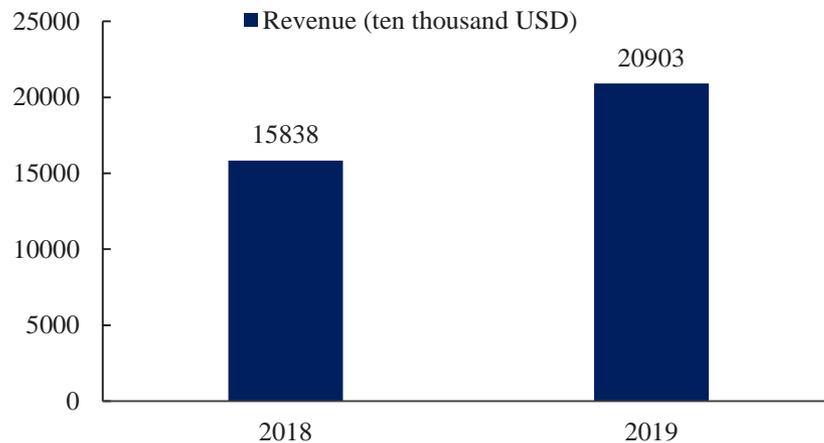
## Coronary business operations



## Orthopedics business operations



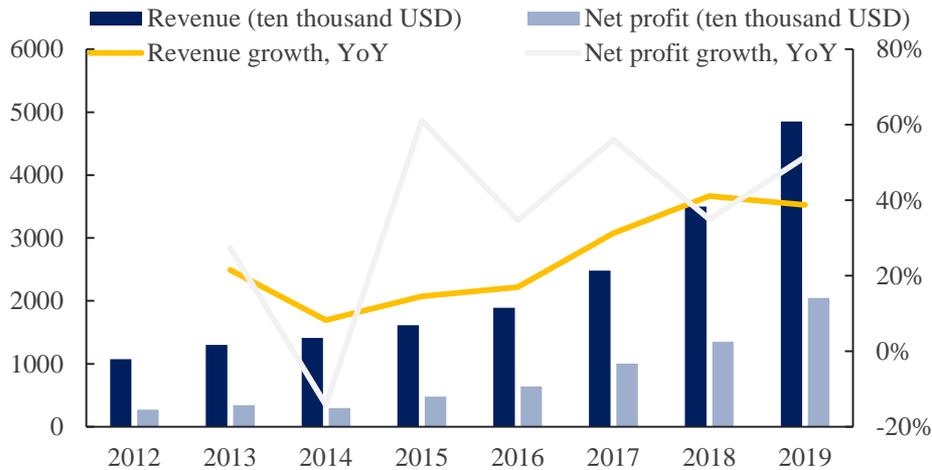
## CRM revenue



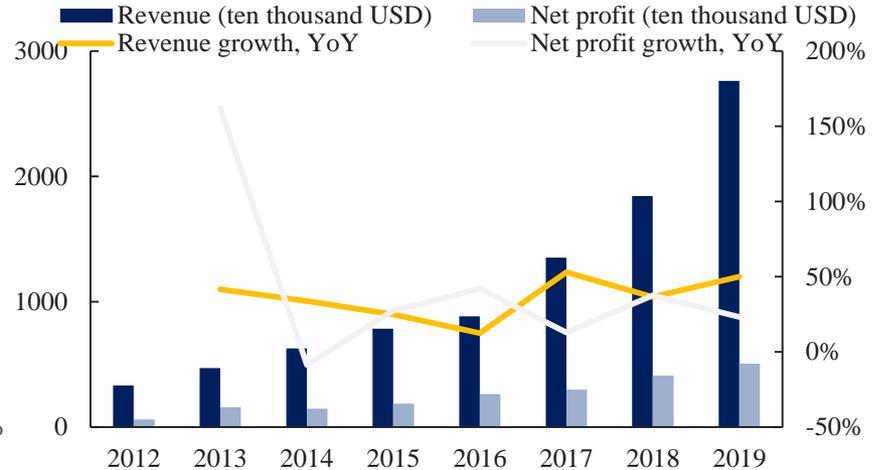
- Coronary Intervention's business revenue in 2019 was about 1.85 billion yuan. Both revenue and net profit have increased.
- Orthopedics' business revenue has increased year by year. China region revenue grows at 45%. The loss has narrowed year by year, and is expected to turn into profit within 2-3 years.
- CRM's business revenue in 2019 was around 1.45 billion yuan.

# Endovastec and MicroPort NeuroTech have been in a stage of rapid profit growth; MicroPort CardioFlow began commercialization

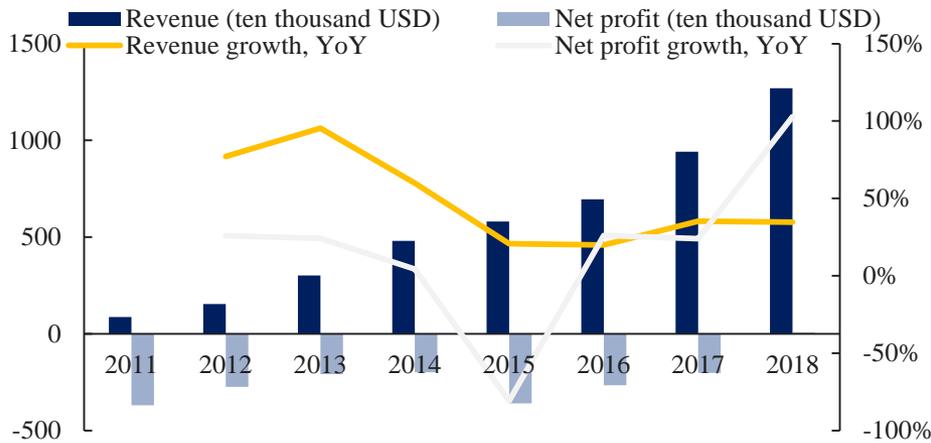
## Aortic and peripheral vascular intervention businesses



## Neuro intervention business



## Electrophysiology business



- MicroPort Endovastec's aortic and peripheral vascular intervention businesses have maintained revenue growth and net profit growth of more than 30% and 35% respectively during the past three years. The importance of the above businesses are increasing year by year. MicroPort Endovastec was among the first batch of companies listed on Sci-Tech innovation board in 2019. This implies a good market prospect for MicroPort Endovastec.
- MicroPort Neurotec (neural intervention business) has maintained a growth in revenue and net profit of more than 40% in the past two years. There are no enterprises of the same type in China. MicroPort Neurotec has great potential to replace imports in this segment.
- MicroPort's CardioFlow, Electrophysiology, Surgical Robots and other businesses are all leading the Chinese markets with promising prospects.



B

# Cardiovascular Intervention

## B. Cardiovascular Intervention

### **B1. "Firehawk" dominates the coronary vascular intervention**

B1.1 Coronary intervention industry

B1.2 Introduction to MicroPort's coronary artery business

B1.3 Industry comparison

### **B2. Endovastec in aorta and periphery intervention**

B2.1 Aortic and peripheral intervention industry

B2.2 Introduction to MicroPort's aortic and peripheral intervention services

B2.3 Industry comparison

### **B3. MicroPort NeuroTech in neuro intervention**

B3.1 Neuro intervention industry

B3.2 Introduction to MicroPort's neuro intervention

B3.3 Industry comparison

### **B4. MicroPort CardioFlow's "VitaFlow®" for cardiac valves**

B4.1 Cardiac valve industry

B4.2 MicroPort's heart valve business

B4.3 Industry comparison



B1

**"Firehawk" dominates the  
coronary vascular  
intervention segment**

## MicroPort is leading in the coronary artery business

- **The global market of the coronary artery business is close to 10 billion US dollars, and the Chinese market is close to 10 billion yuan, with a growth rate of more than 15%.** The PCI surgery penetration rate in China is less than 1/4 of that in developed countries. It will increase by around 15% in the next few years. There are mainly drug stents on the market. After 2023, degradable stents and drug balloons are expected to enter the market on a large scale. At present, the Chinese coronary stent market exceeds 6 billion yuan, with a high localization rate. The auxiliary device market is above 3 billion yuan with a low localization rate.
- **Centralized procurement policy will further increase the market concentration; Overseas businesses and auxiliary consumables provide room for growth.** China has a mature coronary stent market, with domestically produced stents accounting for 70-80%. MicroPort and Lepu Medical are the two leading companies with a market share of more than 25%. Centralized procurement policy will further increase the market concentration, benefiting leading enterprises further. In the auxiliary device market, imports account for more than 80% because there are only a few Chinese manufacturers with low market share. Thus, the potential for future import replacement is high. At present, coronary products of Chinese manufacturers are globally competitive with much room for growth because their overseas businesses only account for small shares.
- **MicroPort's high-end coronary products have significant advantages, and its global channels provide opportunities for introducing new products.** MicroPort's revenue and net profit growth have maintained steady and rapid growth over years. Its products, technologically leading in China, cover high, medium and low-end markets. The high-end Firehawk target eluting stent provides a guarantee for high growth of the coronary artery business. Firecondor has entered the product introduction period this year. Firesorb degradable stent is now in clinical stage. The global channels that the company has operated for years provide great opportunities for its new products to enter the global market.

# Coronary stent technology is constantly updated; outlook for FireCondor and Firesorb is promising

- **Firehawk:** The only Chinese medical device listed in the world's top medical journal "The Lancet," and the world's first and only target eluting stent system; the only clinical stent product that scored 100 in the selection of outstanding domestic medical equipment by China's National Health Commission; the only product that has been proven by large-scale head-to-head clinical trials to have the same clinical effect as the world's mainstream stents. It improves blood vessel permeability by lowering the stent beam, reduces drug side effects and coating side effects by target eluting and degradable drug coating. It has far better performance than other Chinese stents.
- **Firesorb:** Following Firehawk's target elution design, it is expected to have advantages in treatment of thrombosis in the future. It significantly lowers the stent beam for better endothelial optimization and less risk of disintegration falling off.

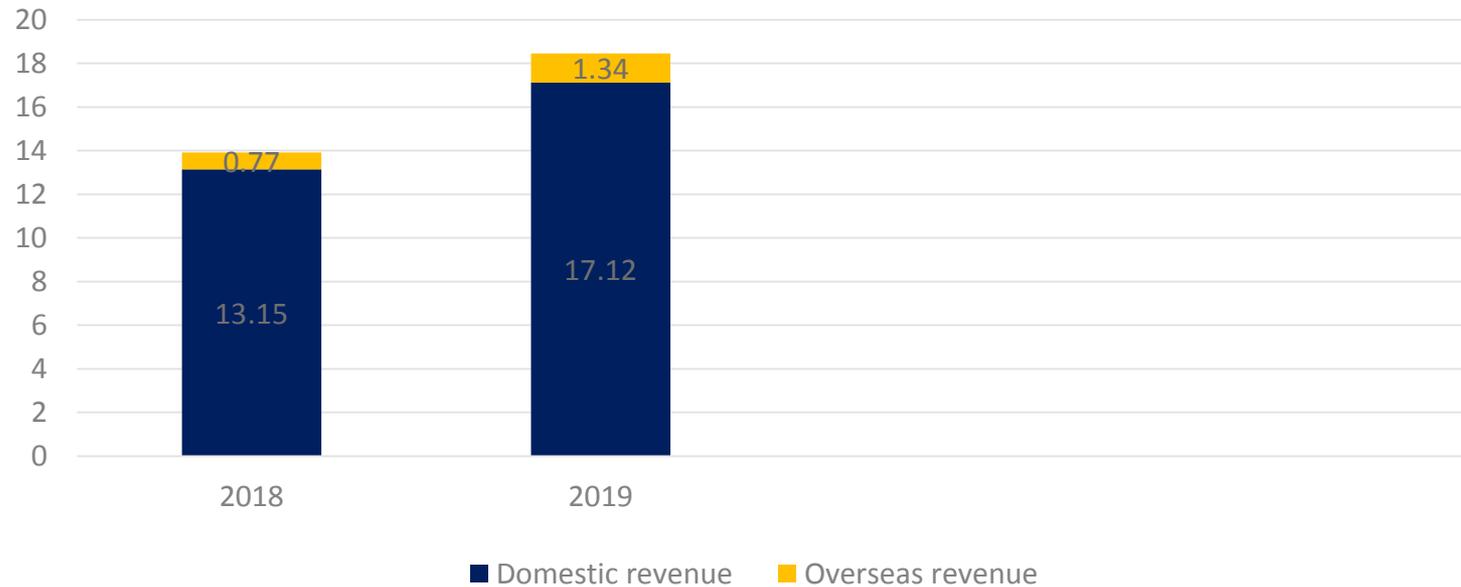
Product	Approval time	Stent substrate	Elution drug	Coating	Lowest price	Market share
Firebird	June 2004	316L stainless steel	Rapamycin	Ethylene-vinyl acetate	Withdrawn from the market	
Firebird2	Jan. 2008	L605 cobalt-chromium alloy	Rapamycin	Styrene butene	7500	18%
Firehawk	Jan. 2014	L605 cobalt-chromium alloy	Rapamycin	Racemic polylactic acid PDLL1 (degradable)	13300	6%
FireCondor	May 2019	L605 cobalt-chromium alloy	Rapamycin	Polylactic acid DL-PLA (degradable)	/ Improved the system based on Firehawk	
Waltz	Dec. 2019	Cobalt-based alloy	Bare metal stent		/	/
Firesorb	2023(Estimated)	L-polylactic acid (PLLA)	Rapamycin	Poly-DL-lactic acid (PDLLA)	Around 35,000 yuan (forecast)	/

Sources: Company annual report, Public information, Horizon Insights

# Firehawk contributed significantly to the gradual increase of coronary's overseas revenue

- In 2019, MicroPort Coronary's overseas revenue was around 134 million yuan, accounting for about 7% of Coronary's revenue.
- The increase in overseas revenue was mainly driven by the high growth (exceeding 50% on average in recent years) of Firehawk's overseas sales.
- Since Firehawk has been included in medical insurance in France and Belgium in 2019, product sales are expected to accelerate in the future.

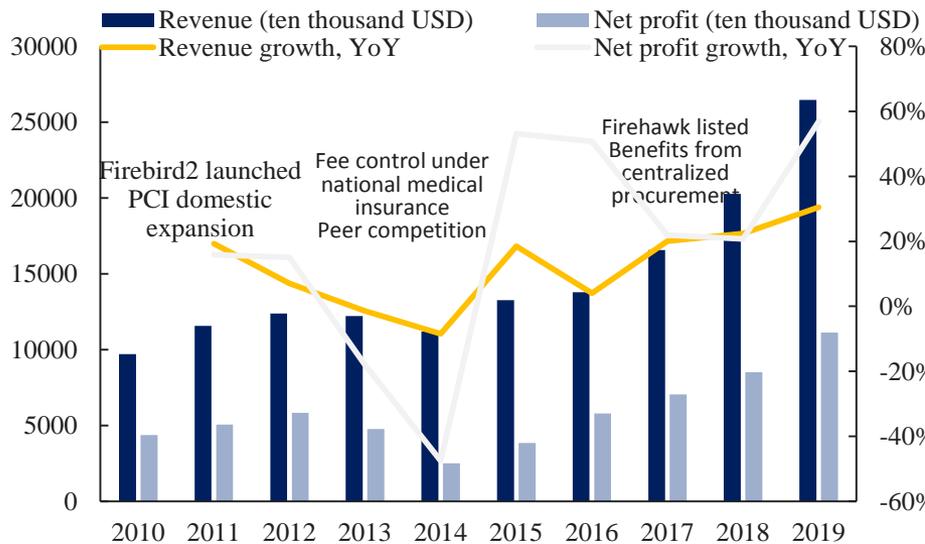
Coronary's domestic and overseas business revenue



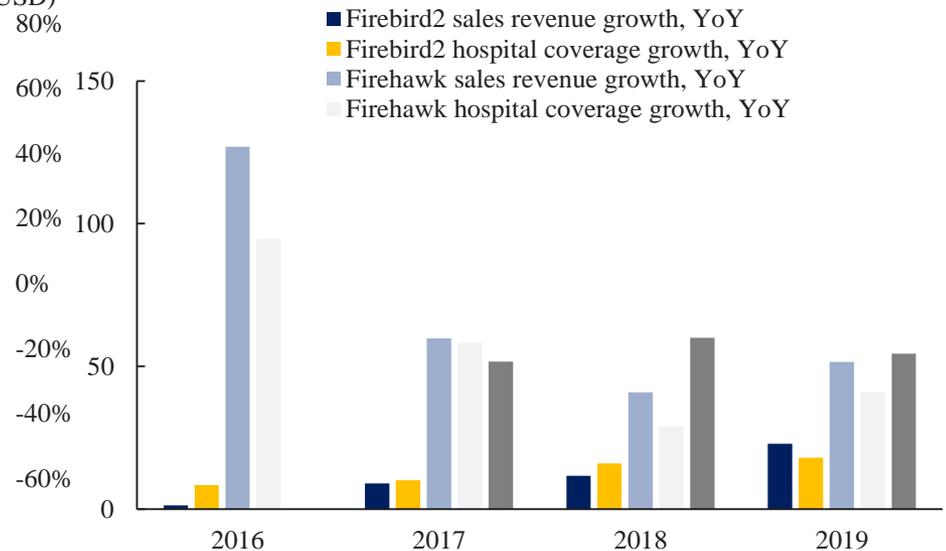
# Increasing penetration and technological updates will support future growth of the coronary artery business

- MicroPort's coronary intervention business has maintained an average net profit growth of more than 30% in recent years.
- In the past 10 years, MicroPort's coronary artery business has maintained steady growth in revenue and net profit, contributing the most to the Group's revenue.
- Firebird2 has maintained single-digit growth in recent years, and is expected to grow significantly post centralized procurement policy. Balloon product sales revenue also increased significantly.
- Firehawk has maintained an average growth of more than 70% in the past three years. Because of its "world's first and only target eluting stent system," this growth rate is expected to be maintained in the future.
- Firesorb has higher safety and effectiveness than other degradable stents, so it is expected to become the company's future revenue growth point.

### Coronary business operations



### Product sales & hospital coverage



Sources: Company annual reports, Horizon Insights

## Comparing MicroPort & Lepu's Coronary Artery Products

MicroPort can quickly scale up volume and surpass its peer (Lepu) despite the fact most of MicroPort's products came to market late and are more expensive; Microport's performance is more superior. The coronary artery field heavily emphasizes product quality over price.

- **MicroPort's Nano:** A metal drug stent without polymer coating. The nanometer pores on the surface of the nail are used to load rapamycin. It is designed to improve thrombosis in the long term, and the actual effect remains to be seen.
- **Lepu's NeoVas:** A counterpart of Abbott's Absorb degradable stent with the same frame design. At present, there are strict restrictions on product indications, and specific results need further market feedback.
- **Firesorb degradable stents** currently receive excellent clinical feedback and are superior to other degradable stents. It is expected that they will quickly occupy China's domestic high-end market after being marketed.

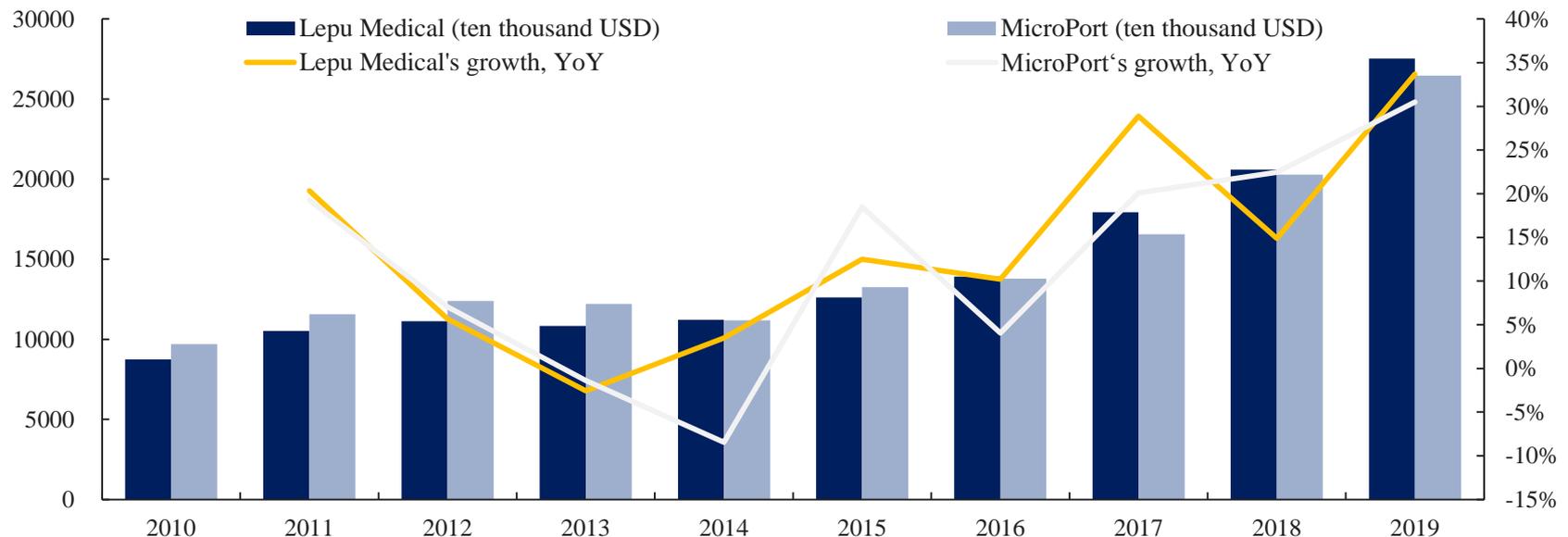
Company	Product	Approval time	Stent substrate	Elution drug	Coating	Lowest price	Market share	MicroPort's counterpart product
Lepu Medical	Partner	Nov. 2005	316L stainless steel	Rapamycin	Polymer coating, non-degradable	7500	7	Firebird2
	GuReater	Jan. 2013	L605 cobalt-chromium alloy	Rapamycin	PEVA/PBMA coating, degradable	8400	6	Firehawk
	Nano Plus	Jan. 2011	316L stainless steel (branch)	Rapamycin	No polymer coating	10900	10	Firehawk
	NeoVas (degradable)	Feb. 2019	L-poly(lactic acid) (PLLA)	Rapamycin	Racemic poly(lactic acid) PDLLA	34500	1	Firesorb

Sources: National Medical Products Administration, Public information, Horizon Insights

# The overall growth of the coronary artery business fluctuated due to policy changes

- Both Lepu Medical and MicroPort are China's leaders in cardiovascular stents with similar revenues and market shares.
- The gradual enforcement of centralized procurement policy and the upgrading of technologies are expected to further increase leading companies' market shares. The future coronary revenues of the two companies are expected to maintain relatively high growth.
- NeoVas, the fourth generation of biodegradable stents from Lepu Medical, was launched in 2019, and was expected to bring 200-300 million yuan in revenue that year. MicroPort's Firesorb degradable stent is expected to be available around 2023. However, the strict restrictions on the applicable population of degradable stents will affect revenues of the two companies, and results need further observation.

Cardiac stent revenues of MicroPort & Lepu Medical



Sources: Wind, Horizon Insights

# Future drivers: market expansion, centralized procurement and technology updates

- Market expansion: the popularity of PCI surgeries will bring new market
- Centralized procurement: the centralized procurement policy will cause leading companies to increase volume and prices
- Technology Update:

(1) The current technological upgrades of mainstream drug stents helps the company maintain its existing market share; the company's new and current products form a comprehensive product portfolio to cover different groups in the market.

(2) The upgrade of products generation provides the company with new growth points:

Surgery is somewhat invasive to blood vessels and will cause damage to them. The subsequent repair of the blood vessels will again lead to restenosis. If it can be treated without stimulating intimal hyperplasia or plaque growth, patients will enjoy more long-term benefits. Degradable stents can play this role.

## (1) Technical upgrade of existing products

Company	Existing product	Upgraded product
MicroPort	Firebird2	Firebird2 upgraded
	Firehawk	FireCondor (conveying system upgraded)

## (2) Intergenerational product update and replacement

Company	Product	Approval time	Stent substrate	Elution drug	Coating	Lowest price	Market share
MicroPort	Firesorb	2023 (estimated)	L-polylactic acid (PLLA)	Rapamycin	Racemic polylactic acid PDLLA	Around 35000yuan (forecast)	/
LifeTech Scientific	NeoVas	Feb. 2019	L-polylactic acid (PLLA)	Rapamycin	Racemic polylactic acid PDLLA	34500	1
LifeTech Scientific	IBS	2023-2024	Iron nitride	Rapamycin	Polylactic acid	/	/



B2

# Endovastec: Aortic and peripheral intervention

# Rapid localization in the aortic sector and the start of import replacement in the peripheral sector

- **The market size of aortic and peripheral blood stents is close to 5 billion yuan, with the fastest growth in the cardiovascular intervention sector.** The aortic (1 billion yuan in size) and peripheral vascular intervention (3 billion yuan in size) markets have grown at a rate of more than 15% in recent years. The total market size of the two sectors is expected to reach 10 billion yuan in 5 years. At present, products of the two fields on the Chinese market are mainly metal bare stents and balloons. The product development will follow the path of coronary intervention, upgrading toward drug stents, degradable stents, and drug balloons. A peripheral drug stent and a peripheral drug balloon have been launched in China.
- **Rapid localization has begun in the aortic sector, while import replacement has just started in the peripheral sector.** The immature Chinese aortic and peripheral markets are mainly dominated by import manufacturers with only a few local players such as Endovastec and LifeTech Scientific. Aortic market: Endovastec ranks first among Chinese enterprises with a market share of more than 25%, and second to Medtronic in China. Peripheral market: Import manufacturers occupies the largest market by providing most peripheral stents, and peripheral balloons are mainly manufactured by Chinese players. The future potential for Chinese manufacturers to replace imports is tremendous.
- **Endovastec quickly grabbed the aorta market with unique new products, and deployed its drug balloon technology in the peripheral market .** Endovastec, a subsidiary of MicroPort, has a long history of developing technology. Its revenue and net profit growth have exceeded 40% in recent years based on several market-exclusive products. In the next few years, Endovastec is expected to maintain a high growth and start to replace imports because it has advanced technology and few local competitors. Its peripheral drug balloon Reewarm PTX will also be available this year and is expected to occupy most of the peripheral drug balloon market and provide new business growth points for Endovastec. After it was spun-off from MicroPort and listed on the Sci-Tech Innovation Board, Endovastec gained independent financing and more effective and direct investment in products and businesses.

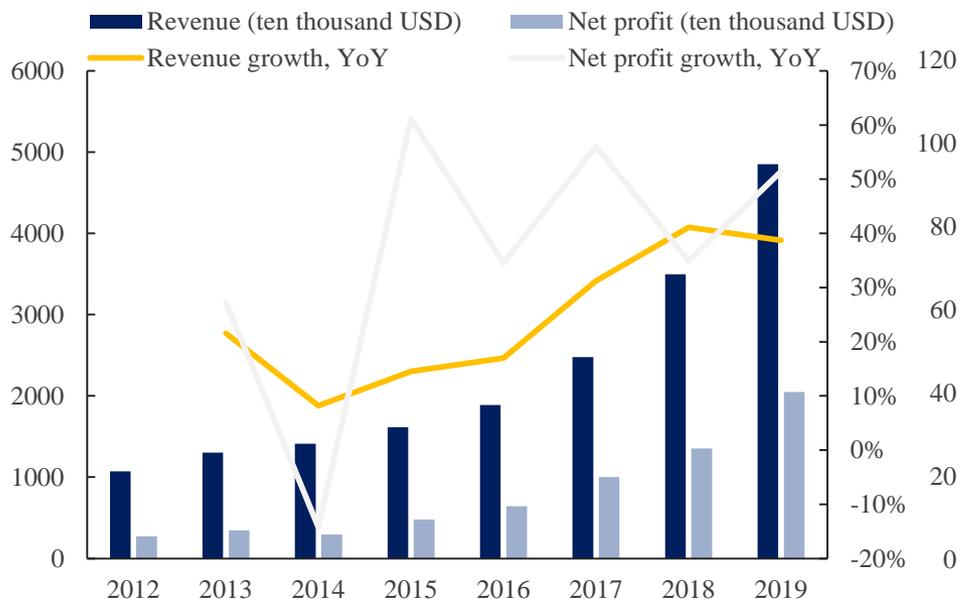
# Aortic products are exclusive; drug balloons will be the focus of peripheral intervention

Product	Key innovations	Marketed products	Products in research
Aortic stent	Thoracic aortic stent	Castor Branched Aortic Stent-Graft System	Multi-branch thoracic aorta stent graft system, Hercules stent graft system, Talos thoracic aorta stent graft system
		Hercules Thoracic Stent-Graft System	
	Abdominal aortic stent	Hercules Bifurcated Stent Graft System	Multi-branch abdominal aorta stent graft system
		Aegis Bifurcated Aortic Stent Graft System	
Minos Abdominal Stent Graft System			
Peripheral vascular intervention products		CROWNUS Peripheral vascular stent system	Peripheral balloon dilatation catheters (including drug balloon dilatation catheters, high-pressure balloon dilatation catheters, and new-generation drug balloon dilatation catheters), iliac vein stent systems, and other venous interventional medical devices (including vena cava filters and venous thrombectomy systems)
		Reewarm PTA Balloon Dilatation Catheter	
Stent Graft System in Surgical Operation		CRONUS Stent Graft System in Surgical Operation	/

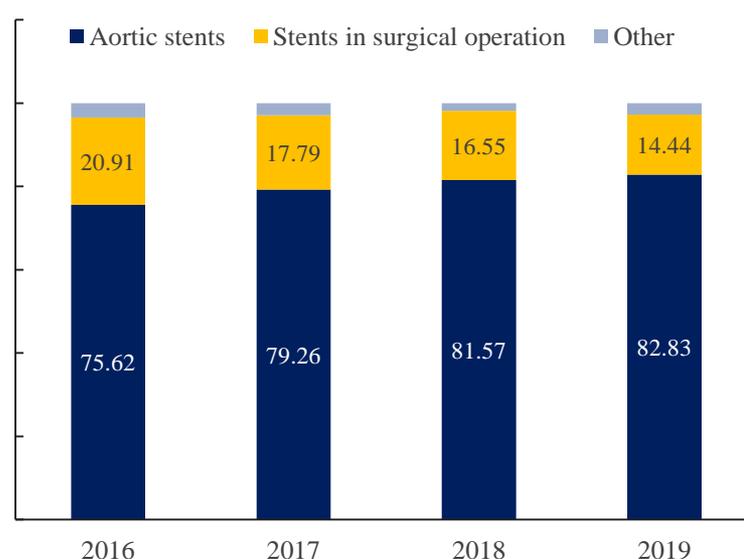
# The average growth in recent years has exceeded 40%, profiting from the rapid volume increase of Castor stents

- Endovastec's revenue and net profit have grown by about 40% and 45% on average in the past three years. Both were much higher than the industry average. And the share of Microport's revenue increased every year.
- Endovastec's aortic stent products accounted for about 80% of its main business revenue, with a gradual increasing trend.
- The company's CRONUS, a stent system in surgical operation, is the only intraoperative stent system approved for using in thoracic aortic dissection surgery in China. The revenue from CRONUS increased steadily, though its share decreased slightly.

Endovastec's operations



Revenue share by product



Sources: Endovastec annual report, Horizon Insights

# The technology and design are more suited for the Chinese patients

- **Technology:** The company's two thoracic aortic stents have the thinnest diameter in the Chinese market and are better suited for Asian people.
- **Design:** Variable height wave band design, more conforming to the natural shape of blood vessels, and better tightness.
- **Application scenario:** The products are suitable for cases with small diameter access vessels. Castor extended TEVAR indication to aortic arch lesions for the first time.
- **Friendly operation:** Crossing arch with soft sheath technology can reduce the stimulation and damage to blood vessels when the stent system crosses the arch.

Category	Company		Technology application		Process			Application scenario		Operational friendliness	
			Outer diameter	Stent shape	Stent structure	Technique	Coating material	Access vessel diameter	Application site	Delivery system	Deployment
Aortic stents - Thoracic aorta stent graft system	Medtronic	Valiant	22-25F	Straight	Contour band	Suture	PET	7-8mm	Descending thoracic aorta	Crossing arch with hard sheath	Rotate + pull back
		Valiant Navion	18-22F	Straight	Contour band	Suture	PET	6-7mm	Descending thoracic aorta	Crossing arch with hard sheath	Rotate + pull back
	LifeTech Scientific	Ankura	20-22F	Straight	Contour band	Hot melting	ePTFE	7mm	Descending thoracic aorta	Crossing arch with hard sheath	Rotate + pull back
	Endovastec	Hercules Low Profile	18-20F	Straight	Variable height band	Suture	PET	6-7mm	Descending thoracic aorta	Crossing arch with soft sheath	Rotate + wire
		Castor	24F	Bifurcated	Variable height band	Suture	PET	8mm	Descending thoracic aorta and left subclavian artery	Crossing arch with soft sheath	Pull back + wire

# Endovastec leads the industry with a diverse product portfolio and advanced technology

- Some of LifeTech Scientific's products are similar to Endovastec's products for aortic and peripheral vascular intervention, but Endovastec's compound annual growth is higher.
- Endovastec's average annual gross margin is higher than the industry average, and is increasing year by year.
- Endovastec's annual average R&D expense ratio is still higher than the industry average in the context of rapid revenue growth.

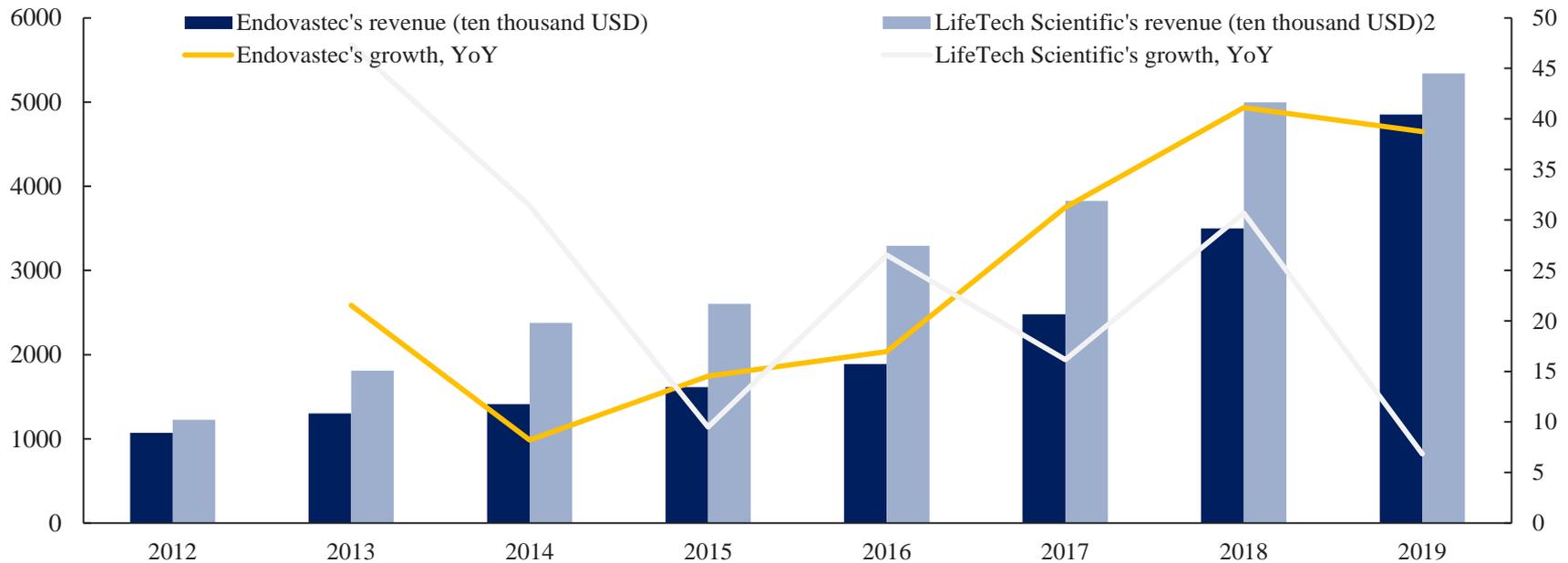
Item	2016-2019 average annual compound growth of stent revenue	2016-2019 average annual gross margin of comparable companies	2016-2019 proportion of average R&D expenses of comparable companies
LifeTech Scientific	17.7%	81.3%	17.1%
Endovastec	38.3%	78.1%	24.8%
Industry average	/	73.93%	9.10%

Sources: Wind, Horizon Insights

# Endovastec's aorta business is expected to top the industry in the future; periphery business will start high-speed growth

- Endovastec's products are more diverse than LifeTech Scientific's.
- As China's leading companies in aortic and peripheral vascular intervention, the two companies have had the same growth trend in the past two years, but Endovastec has been faster.
- Endovastec is more likely to maintain rapid growth in the future due to the uniqueness and cutting-edge technology of its products.
- Endovastec's Reewarm PTX peripheral drug balloon is about to be launched, which is expected to bring new revenue growth points for the company.

Revenues of Endovastec and LifeTech Scientific



Sources: Wind, Horizon Insights

# Future drivers: market expansion, cost-effectiveness and technology updates

- **Market expansion:** The popularity of aortic and peripheral vascular interventional surgeries will bring more business growth
- **High cost performance:** The high cost performance of Chinese companies' products of the same type promotes import replacement and revenue growth.
- **Technology update:** The development trend from bare stents to drug stents and drug balloons provides the company with new business growth points.

## Intergenerational product replacement

Existing products	Upgraded products
Bare stent/balloon	Drug stent
	Drug balloon

Source: Horizon Insights



B3

# MicroPort NeuroTech in neuro intervention

# Neural intervention products of the company are at the forefront among those of Chinese manufacturers, and are expected to benefit from import replacement

- **The neurological intervention in China has a market of about several billions of yuan in size with an increase of around 8.3% in recent years.** This scale is smaller compared with market sizes of coronary and aortic and peripheral vascular interventions. At present, the main products in the market are stent grafts, spring coils and liquid embolic glue. Similar to how other cardiovascular stent products have developed, the neurological intervention sector will transition to drug-eluting stents and even degradable stents in the future. As neurological intervention doctors are increasing in China, the number of surgeries for patients with corresponding indications will accelerate.
- **Neuro intervention is still dominated by imported products as there are few Chinese manufacturers.** Neuro intervention surgeries have higher technical requirements for the products because they are more risky than other cardiovascular interventions. Basically, the Chinese market mainly relies on imports and has only a few small local players. MicroPort spent years of research and development and began to introduce its products to China's domestic market.
- **MicroPort Neurotec, a member of top Chinese manufacturers, has been growing rapidly in recent years with its unique new products. It is expected to benefit from import replacement in the future.** In the past two years, MicroPort Neurotec's revenue and net profit have grown by more than 40% and 30%, respectively, increasing its share in the MicroPort's revenue gradually. MicroPort NeuroTech products are technologically leading among Chinese manufacturers. APOLLO stent, Willis stent and Tubridge vascular reconstruction device have received highly positive market feedback, with growth exceeding 30% in recent years. MicroPort Neurotec is expected to maintain a high growth in the future and replace imports gradually since there are no other manufacturers of the same size in China. The world's first drug-eluting stent suitable for the treatment of vertebral artery stenosis has also entered the green approval channel and is expected to bring new revenue growth points for the company in the future.

# Many Neural intervention products are unique in China

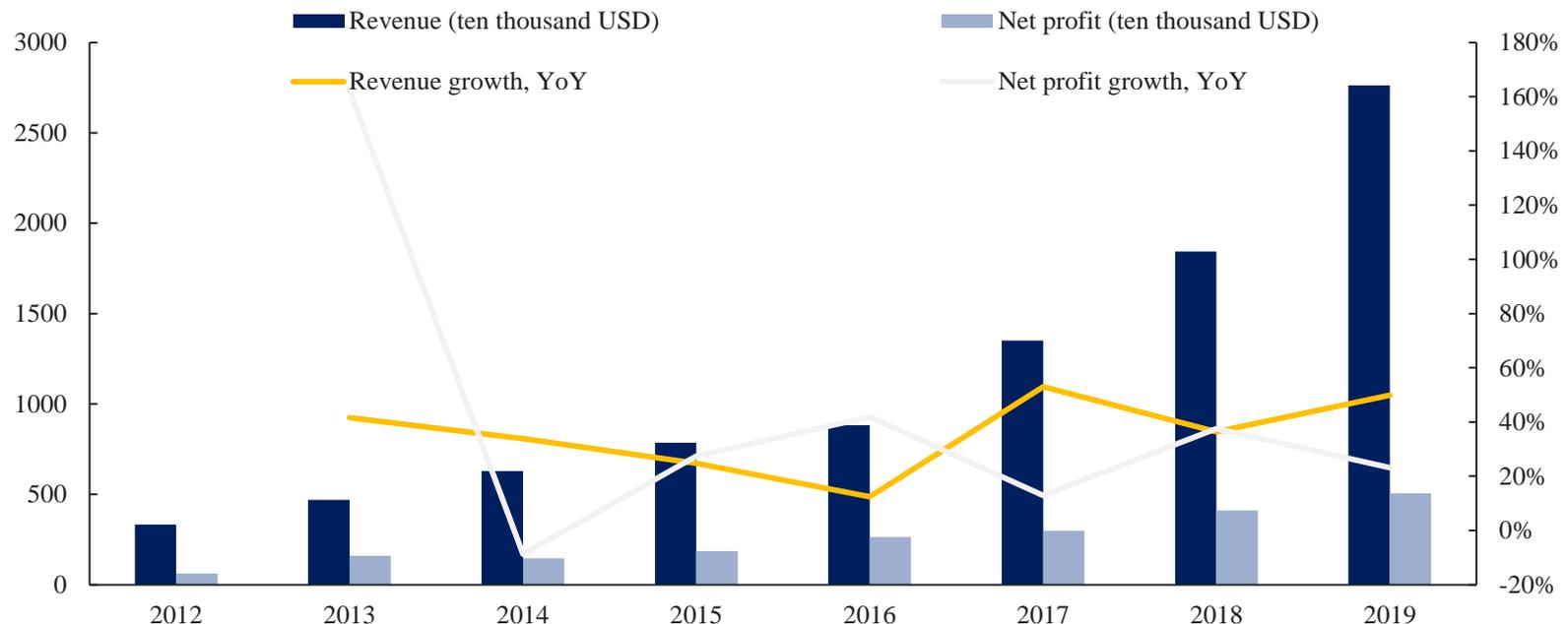
- Tubridge vascular reconstruction device is the first domestically-produced blood flow guiding device approved in China for the treatment of intracranial aorta aneurysms and giant aneurysms.
- The company also acts as an agent of ASAHI, a nerve guide wire product, to improve its product line.

Product	Time to market	Features
APOLLO Intracranial Artery Stent System	2004	<b>The only stent product in China for treating intracranial artery stenosis.</b> The design of the stent perfectly combines the supporting force and flexibility to suit the anatomical characteristics of intracranial blood vessels. The conveyor is a fast-exchangeable balloon dilatation catheter, which has excellent connectivity. It is extended to 1450mm and can pass through complex and tortuous intracranial blood vessels to reach the lesion. The stent adopts a "reinforced ring" sine wave open design to maintain the radial support of the stent; a pair of "n-shaped" connecting rods present a spatial "u-shaped" connection, and each pair of connections is staggered at an axial 90 degree to ensure excellent flexibility of the stent during dilatation and effectively compensates for axial shrinkage; low metal surface coverage and large and uniform eyelet design ensure penetration and opening; special "mirror" polishing technology provides better stent surface quality.
WILLIS intracranial artery stent graft	2013	<b>The only stent product in China for the treatment of intracranial aneurysms.</b> The product adopts the concept of aneurysm artery vascular reconstruction, which can isolate and occlude the intracranial aneurysm, retain the patency of the aneurysm artery, restore the normal hemodynamics of the lesion area, realize the anatomical reconstruction of the aneurysm artery, and achieve the purpose of treating aneurysms. One-time blocking, effective isolation; eliminating space-occupying effect; tightly adhering to the vessel wall; using ultra-thin expanded polytetrafluoroethylene and cobalt-chromium alloy, with a total thickness of only 0.13mm; sine wave open design to suit tortuous intracranial blood vessels ; unique reinforced ring structure to enhance the radial support of the stent.
Tubridge vascular reconstruction device	2018	<b>China's only domestic blood flow guide device approved for market.</b> This product is specially designed for dealing with large and huge aneurysms that are most difficult to treat. By using the principle of hemodynamics, this product can significantly improve the blood flow in the aneurysm and reduce the impact of blood flow on the aneurysm. so that, the endothelial cells will grow along the stent to gradually repair aneurysmal neck and cure aneurysms, thereby eliminating the "intracranial time bomb". 1. 48/64 NiTi alloy wire braided structure design. Flexibility: unique braided design structure, which can provide a smooth push even in tortuous vessels; Super-elasticity: suitable for intracranial arterial vessels with variable diameters to provide better wall-attachment and support; Deformability: "Push-pull technology" can realize local mesh density change to provide better "blood flow guiding"; 2. Easy release. Withdraw catheter for immediate release; 3. Recyclability. Recycle and release for ≤3 times; 4. Visibility. Two platinum-iridium metal strands wrapped around the entire stent provide good visibility and accurate and controllable positioning of the stent.
Fastrack microcatheter system	2019	The product contains micro-catheter and plastic needle, which can be used to deliver instruments during interventional treatment of neurovascular diseases. The product has a semi-rigid proximal rod and a highly soft distal end. The head end has an X-ray opaque mark and good plasticity. It can easily deliver the therapeutic instrument to the target site and release it accurately.
Vertebral artery rapamycin target eluting stent	In the green approval channel	<b>The world's first drug-eluting stent for the treatment of vertebral artery stenosis.</b>

# The growth of MicroPort NeuroTech has exceeded 30% in the past two years, mainly driven by the growth of APOLLO and Willis

- The average growth of MicroPort Neurotec's revenue and net profit in the past two years has stayed above 40% and 30% respectively, far higher than the industry average

## Neuro intervention business



Sources: Company annual reports, Horizon Insights



B4

# MicroPort CardioFlow's "VitaFlow<sup>®</sup>" for heart valves

# MicroPort CardioFlow is expected to win the emerging markets in the future with cost-effective products with advanced technology

- **TAVR's current domestic market is less than 1 billion yuan, but has the potential to double in the future.** TAVR surgery has a short history in China. In 2019, there were only ~2,000 such operations, with a terminal market size of less than 1 billion yuan. However, the market has grown rapidly in recent years, with growth doubled every year. The size is expected to reach RMB 5 billion in the next 5 years. TAVR surgery costs are high, leading to high product profit margin. Late, recoverable cardiac valve products will be developed.
- **China's TAVR market is at an early development stage, with only domestic products available for choice.** Local manufacturers whose products reach the market first can seize the empty market, train doctors to use their products, and establish market loyalty. In the future, a market landscape similar to that of coronary artery sector may take shape: domestically manufactured products account for 70-80% of the market, two leaders with a market share of more than 25% respectively.
- **MicroPort CardioFlow is expected to experience rapid growth driven by cost-effective product with advanced technology.** In 2019, the Group separately disclosed the MicroPort CardioFlow business for the first time, showing a revenue of US\$3.12 million. However, in recent years, its businesses were in the red as a result of continuous increases in R&D investment. MicroPort CardioFlow uses the more durable Bovine pericardium in its products, which are technologically superior to those of its domestic competitors and have a higher cost performance. Thus, it is expected that in the next few years, it will achieve rapid business growth by occupying new markets and seizing market shares from other companies. Then it will achieve profitability within years. MicroPort CardioFlow's second generation of reusable aortic valves is expected to be available next year. Its current market valuation is 1.1 billion US dollars. MicroPort CardioFlow is expected to be listed in the second half 2020.

## VitaFlow valve system has better durability and higher cost performance

- The valve in the VitaFlow valve system is the first self-dilatation bovine pericardium bioprosthesis approved for marketing in China. It has better durability. The self-dilatation makes it easier for doctors to study it. More importantly, the product is more cost-effective and thus more acceptable for patients.
- VitaFlow, used together with the company's independently developed Alwide valve balloon dilatation catheter and Alpass introducer set, greatly improves the efficiency and safety of surgery.

Product	Time to market	Features
VitaFlow transcatheter aortic valve	2019	Aortic Valve: 1. Hybrid Density Self-expanding Nitinol Frame: high density cells design provides high radial force at annulus level and above, benefits severely calcified and bicuspid valves; low density cells design for better alignment with flexible frame. 2. PET Skirt: inner and outer skirt can reduce PVL. 3. Bovine Pericardial Leaflets: bovine pericardial leaflets with anti-calcification treatment for better durability. 4. Supra-annular Design: optimizes coaptation in non-circular anatomies, delivers large EOAs, low gradients. 5. Large cells: enable coronary access
VitaFlow Transcatheter aortic delivery system	2019	Delivery system: 1. Ease-to-use motorized handle: guidewire manipulation while deploying the delivery catheter; 2. Reinforced inner and outer shaft: ensures precise and stable deployment; 3. Low profile valve capsule: reduces vascular complications; 4. Manual handle: as back up option
Alwide valve balloon dilatation catheter	2019	1. Low resistance: can improve dilatation accuracy; 2. High burst pressure: can be used to expand severely calcified sites; 3. Rapid filling/retraction: can reduce rapid pacing time 4. Imaging marker: have enhanced lubricity and trackability
Alpass introducer set	2019	1. Anti-bending; 2. Good trackability: suitable for tortuous blood vessels; 3. Precise positioning: the imaging marker better indicates the position of the instrument

# MicroPort CardioFlow runs at a loss and is expected to be spun off for listing in 2020

- **Business conditions:** MicroPort CardioFlow's revenue in 2019 was US\$3.12 million. However, in recent years, due to continuous increase in R&D investment, its businesses are in the red.
- In March 2019, MicroPort CardioFlow introduced C round of financing, and the Group's shareholding ratio dropped to 56.627%.
- A new round of strategic investment was completed in April 2019, with a valuation of US\$1.1 billion currently. The company is expected to spin off and go public in 2020.
- VitaFlow II transcatheter aortic valve system has undergone clinical trials and is expected to be launched in 2021. Then, it can make a significant contribution to the company.

Sources: Company annual report, public information, Horizon Insights

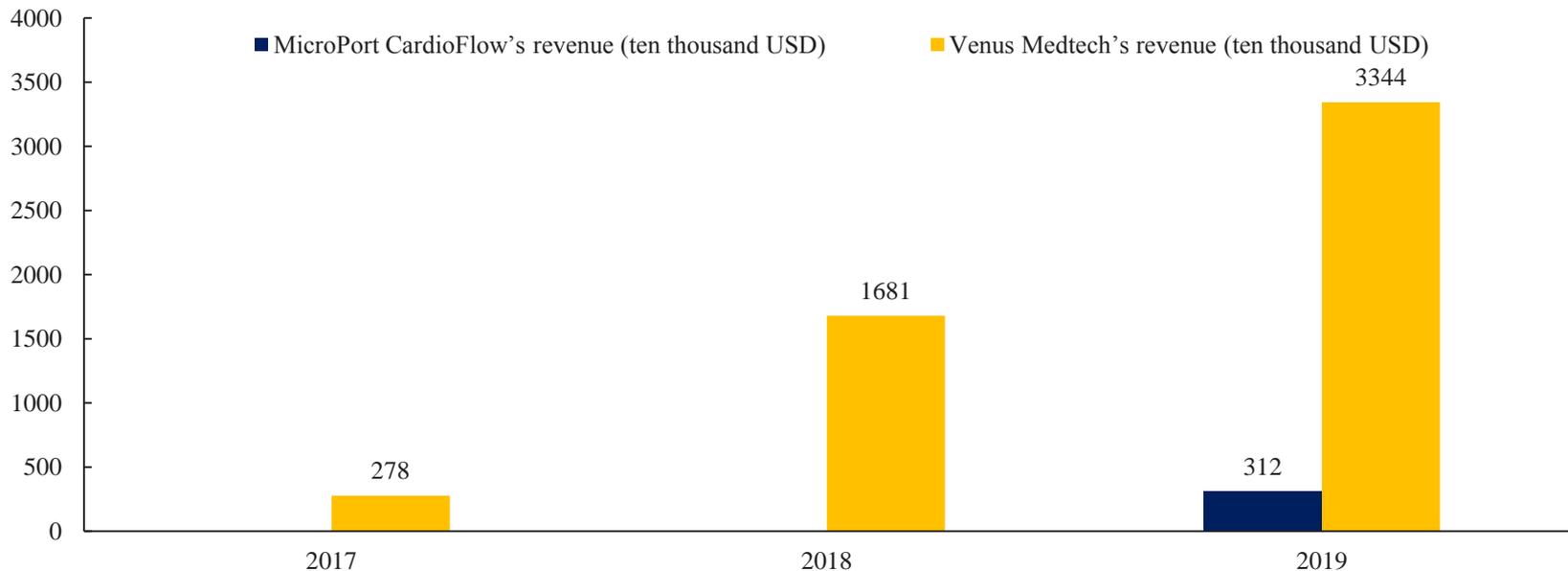
# MicroPort CardioFlow products have better pericardial material durability and lower 30-day mortality

Company	Products in research	Phase	Approach	Dilatation mechanism	Pericardial material	Anti-PVL design	Recyclability	30-day mortality rate	Success rate
Venus Medtech	VenusA-Valve	Launched	Transfemoral artery	Self-dilatation	Porcine Pericardium	+	-	5.0%	95.0%
	VenusA-Plus	Registered	Transfemoral artery	Self-dilatation	Porcine Pericardium	+	+	N/A	N/A
	VenusA-Pilot	Pre-clinical	Transfemoral artery	Self-dilatation	Porcine Pericardium	+	+	N/A	N/A
Suzhou Jiecheng Medical	J-Valve	Launched	Cardiac apex	Self-dilatation	Porcine Pericardium	+	-	4.8%	93.3%
MicroPort CardioFlow	VitaFlow-Valve	Clinical	Transfemoral artery	Self-dilatation	Bovine pericardium	+	-	0.9%	N/A
	VitaFlow II-Valve	Clinical	Transfemoral artery	Self-dilatation	Bovine pericardium	+	+	N/A	N/A
Edwards	SAPIEN XT	Clinical	Transfemoral artery/Cardiac apex	Balloon inflation	Bovine pericardium	-	-	N/A	N/A
	SAPIEN 3	Clinical	Transfemoral artery/Cardiac apex	Balloon inflation	Bovine pericardium	+	-	N/A	N/A
	TaurusOne	Clinical	Transfemoral artery	Self-dilatation	Bovine pericardium	+	-	N/A	N/A

# Revenue was similar to that in Venus Medtech's first year of disclosure

- MicroPort CardioFlow's 2019 annual report for the first time revealed a revenue of US\$3.12 million, slightly better than Venus Medtech's revenue in its first disclosure.
- With the popularity of TAVR surgery in China and the decline in the cost of surgery, MicroPort CardioFlow is expected to benefit from the industry growth. In addition, the quality of the existing products and the progress of the second generation products are better than other manufacturers; thus it is expected to grow by several multiples as Venus Medtech did.
- The product is priced at a high level, therefore very profitable for the company.

Revenues of MicroPort CardioFlow and Venus Medtech



Sources: Wind, Horizon Insights

## Future drivers: market expansion and technology updates

- **Market expansion:** TAVR surgeries growth at 100%
- **Technology Upgrades:**

(1) The material and technology of biological valves are improved to prevent blood leakage.

(2) New products bring more growth

The development of non-reusable aortic valves to reusable aortic valves provides the possibility for secondary surgeries.

### Product Upgrades

Company	Existing product	Upgraded product
<u>MicroPort CardioFlow</u>	VitaFlow	VitaFlow II recoverable
<u>Venus Medtech</u>	VenusA-Valve	VenusA-Plus recoverable

Source: Horizon Insights



C

# New players in orthopedics and cardiac rhythm management

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## C. New players in orthopedics and cardiac rhythm management

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C2.3 Industry comparison



C1

**"Goral™" fills orthopedic joint products**

# MicroPort Orthopedics' sophisticated joint products have grown rapidly in China in recent years

- **China's orthopedic market scale exceeds 28 billion yuan, with an annual growth rate of about 15%**, but the penetration rate of products is still far below the global average, especially joint products, less than 1%. Orthopedic products such as interbody fusion cages, hip and knee replacement systems have high requirement for materials. Biocompatibility and elastic modulus are key performance indicators. Most joint raw materials of China rely on imports. In the future, the product will be developed toward the direction of 3D printing, providing customized products for patients with orthopedic diseases.
- **China's orthopedic products, especially for spine and joints, are mainly imported. The highest market share among domestic manufacturers is only 5%, but they have been progressing quickly the past few years.** The top five orthopedics companies by market share in China are all import manufacturers, accounting for more than 40%. Chinese manufacturers started late and their product capabilities and performance have lagged behind. Except for the trauma field, imports account for more than 60% in most segments of the two major orthopedic fields, spine and joints. Domestic manufacturers are expected to achieve import replacement in spine and joints by gradually narrowing the technology gap and manufacturing cost-effective products.
- **MicroPort Orthopedics' domestic revenue is growing rapidly, and its business profits are expected to improve further upon the completion of its overseas channel integration and domestic product introduction.** The acquisition of Wright's major joint reconstruction business in 2013 made the company the sixth largest joint reconstruction company in the world. The joint business has performed well in recent years in China, with a growth rate of more than 30% per year. With the approval of "Goral™" total hip replacement system in China, it is expected that the domestic business will maintain rapid growth in the future. The revenue-to-income ratio and profitability will be further improved with the transfer of production to the domestic market. Orthopedics robots' clinical usage in China and the United States also add new growth points to the company's future revenue.

## More orthopedic joint products have been approved

Company	Classification	Product	Time of approval	Features
MicroPort	Knee joint	Aspiration Medial Pivot Total Knee Replacement System	Jan. 2019	One component can fulfill the functions of anti-rotation and stable support; the lag screw fills the bone for better gripping; avoid local stress
		SoSuperior Medial Stability Total Knee Replacement System	Mar. 2019	Head and tail groove design for easily location of the midline; super large bone graft window for easy observation of bone graft; pre-bent titanium plate, conform to the physiological curvature of cervical spine
		Evolution Medial-Pivot Knee System	June 2015	Imported titanium wire; high mechanical properties
		Advance Medial-Pivot Knee System	Mar. 2018	Easy to puncture and controllable
		Advance Revision Knee System	Apr. 2018	PEEK material, good biocompatibility; elastic modulus close to bone quality; X-ray transparent; bullet head design; surface inverted tooth-shaped protrusion design; oversized bone graft design; positioning needle preset
		Prophecy Pre-Operative Navigation Guides	2015	Special small teeth: high-strength; titanium alloy marker: easy to observe; PEEK material; X-ray transparent; elastic modulus close to bone

Sources: Company's official website, Horizon Insights

# More orthopedic joint products have been approved

Company	Classification	Product	Time of approval	Features
MicroPort	Hip joint	Goral™ Acetabular Cup	Feb. 2020	Integrate design features of metal femoral head and BIOLOX Delta ceramic femoral head; great anti-wear performances; mainstream product of total hip replacement currently
		BIOLOX Delta Hip Ceramic Products	June 2015	Ultralow abrasion; optimal bio-compatibility; Low bone osteolysis rate
		GLADIATOR Bipolar Femoral Head System	June 2017	CoCr shells; XLPE insert fixed in shell
		LINEAGE Acetabular Cup System	May 2015	Titanium shell for excellent biocompatibility; aspheric design enhances initial and long-term stability; beaded, porous surface for biologic fixation
		PROFEMUR TL Femoral Stem System	Jan. 2020	Dimple designed for uni-directional loading during stem insertion and oval slot designed for rotational control during stem insertion; plasma titanium slurry sprayed surface: extra pressure distribution to facilitate bone growth
A total of 12 products				

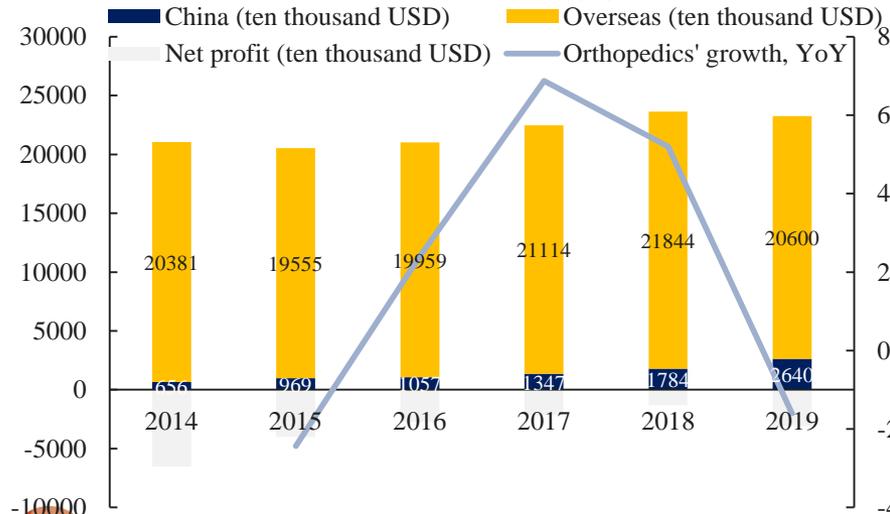
Time	Approvals in the past three years
2018	Knee equipment set for domestic ADVANCE and Evolution launched Hip prosthesis component femoral stem used in combination with SuperPATH technology approved
2019	Suzhou MicroPort Aspiration® Medial Pivot Total Knee Replacement System launched Suzhou MicroPort SoSuperior™ Medial Stability Total Knee Replacement System launched Hip joint prosthetic component wedge-shaped femoral stem and metal femoral ball head obtained NMPA registration certificate
2020	Goral™ Acetabular Cup approved in China, joint product line completed

- MicroPort Orthopedics obtained technology by acquiring Wright, making it the sixth largest hip and knee orthopedic replacement company in the world. It is the leader of the joint business in China, with great potential to replace imports.
- After the approval of the Goral™ Acetabular Cup in China in February 2020, MicroPort accomplished its initial deployment in the joint field by completing its product lines.
- In 2019, MicroPort Orthopedics' domestic sales revenue increased significantly, mainly the initial results of the company's training of a group of doctors the past few years.

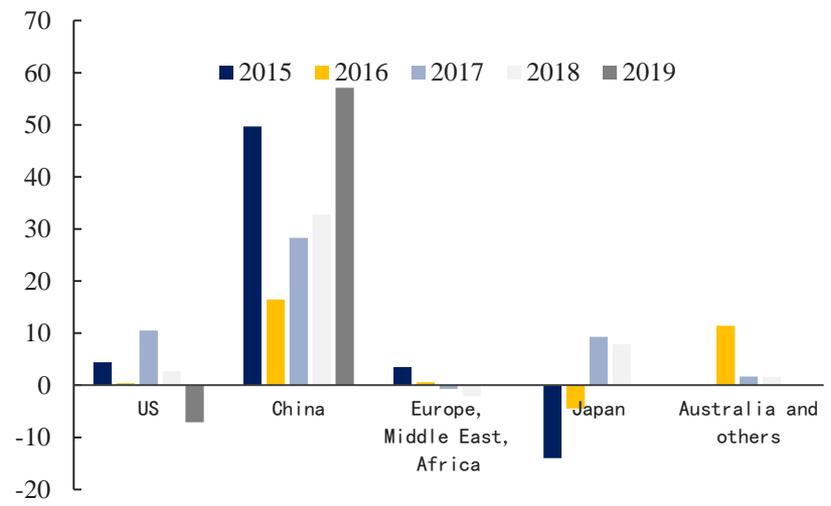
# MicroPort Orthopedics has huge business potential in China

- The company acquired the Wright Medical's major joint replacement business in 2013, including its original sales channels. Since 2015, the company has maintained steady growth, narrowing losses year by year. It was expected to turn losses into profits within 2-3 years. In 2016, it recorded positive revenue growth for the first time. In 2018, the operating profit of its overseas orthopedics business turned positive for the first time.
- The improvement of MicroPort Orthopedics' operating conditions was mainly driven by the rapid revenue growth (more than 30%) of domestic businesses the past few years, especially the leaping growth of joint business. The share of domestic revenue grew year by year as a result of the significant increase in clinical implant volume brought by MicroPort Orthopedics brand awareness and recognition.
- The U.S. region lost a major distributor in the second half of 2018, resulting in a slowdown in growth. In Europe, switching from sales channels with low gross margins to subsidiaries' direct sales channels with high gross margins has led to a decline in revenue. In Japan, due to the decline in the hospital's reimbursement rate in the past few years, sales have shrunk. But in the past two years, it has gradually recovered because of the company's cost-effective products and marketing improvements.

MicroPort Orthopedics' revenue and net profit, China and overseas



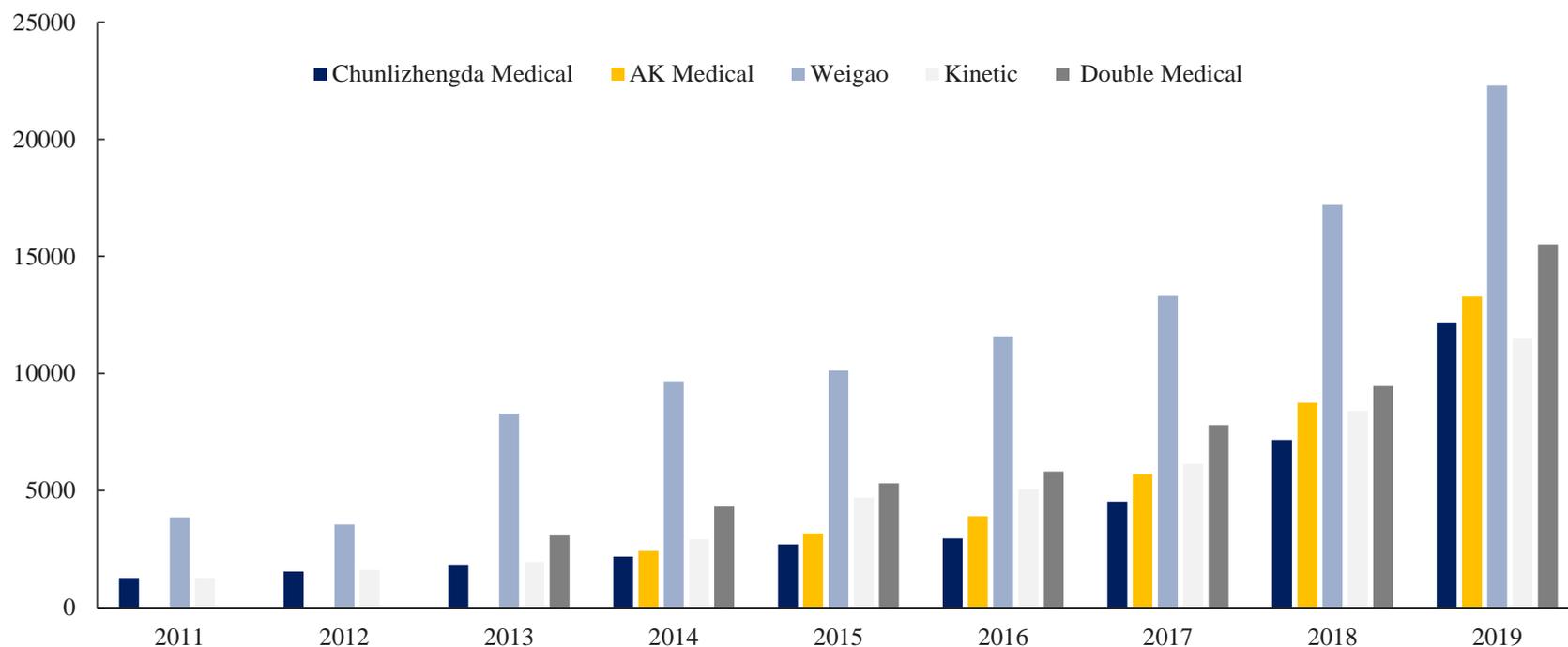
Changes in revenue growth by region



## Chinese manufacturers have grown rapidly

- In the past two years, major Chinese orthopedic companies have experienced rapid growth. Market expansion, technological progress and centralized procurement have benefited the leading companies.
- Weigao has grown significantly, mainly because of the company's complete product line and solid market foundation.
- AK Medical is the only company in China that commercializes 3D printing technology and applies it to surgeries. It has leading technology and has developed rapidly over the past few years.

Operating conditions by company



Sources: Wind, Horizon Insights

# Future drivers: market expansion, technology updates, and import replacement

**Market expansion:** The popularity of orthopedic implant surgeries will bring more business growth

## **Technology Updates:**

(1) The current technological upgrades of mainstream orthopedic products help the company maintain its existing market share:

The upgrading of materials and processes has promoted the company to form a comprehensive product portfolio containing new and old products covering different price groups in the market.

(2) Technology upgrades provide the company with new growth points:

3D printing provides customized products for orthopedics patients to cope with the problems that cannot be solved by the existing scale production.

**Import replacement:** More import replacement is expected in the spine and joints field, which now mainly depend on imports.



C2

"Xinyue™" supports a  
strong heart

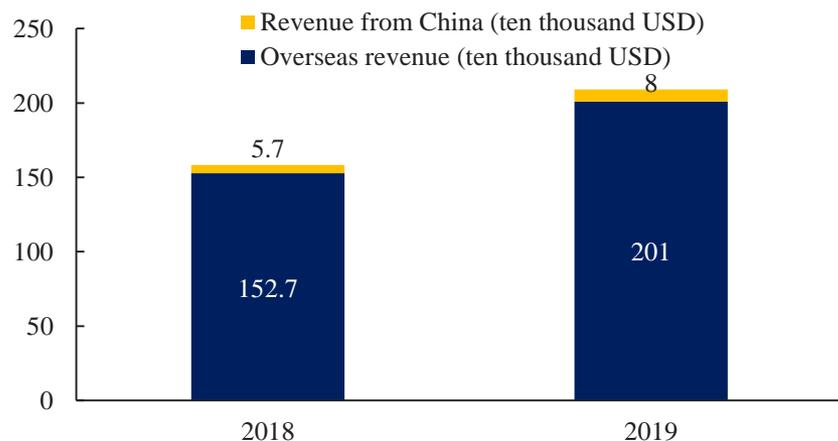
# MicroPort CRM has the world's smallest pacemaker; the MRI compatible products will be available in China soon

Company	Classification	Product	Time of approval	Features
MicroPort	Implantable cardiac pacemaker	Xinyue™ Rega series implantable cardiac pacemaker	2017	Monitor sleep apnea and hypopnea events for early warning of concomitant cardiovascular diseases; minimize right ventricular pacing and ensure synchronized atrioventricular pacing under long PR
		Orchidee series implantable cardiac pacemaker	2017	Automatically optimize the AV interval and encourage self-excited download; automatic pacing management from implantation to follow-up
		Trefle series implantable cardiac pacemaker	2017	Automatically optimize the AV interval and encourage self-excited download; automatic pacing management from implantation to follow-up
		ENO series implantable cardiac pacemaker	/	The world's smallest transvenous pacemaker. Provide atrial fibrillation risk management. Full-body MRI compatible
		OTO series implantable cardiac pacemaker	/	The world's smallest transvenous pacemaker. Provide atrial fibrillation risk management. Full-body MRI compatible
		TEO series implantable cardiac pacemaker	/	The world's smallest transvenous pacemaker; whole body MRI compatible; significantly reduce unnecessary right ventricular pacing; reliable screening for severe sleep apnea
		Platinum implantable cardioverter defibrillator	/	Longest life expectancy in the world
	Reply CRT-P	/	The world's smallest cardiac resynchronization therapy pacemaker; the world's first dual-chamber identification algorithm	
	Pacing system analyzer	CompassAnalyzer	2018	Compared with imported similar products, the measurement results of each parameter are highly consistent

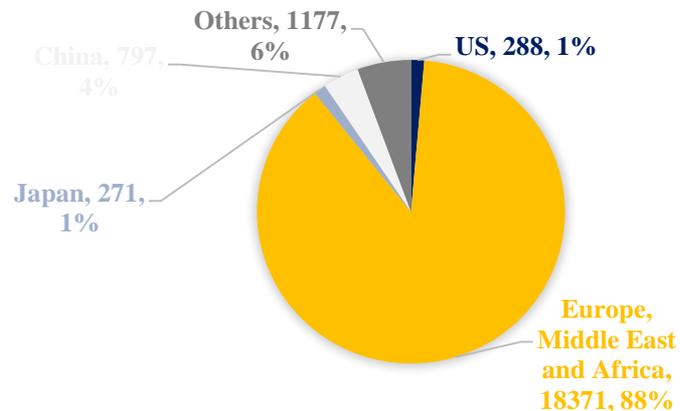
# MicroPort's cardiac rhythm management recorded excellent international sales

- MicroPort's cardiac rhythm management accounts for 26% of the company's revenue and is the Group's third largest business. In 2017, MicroPort acquired LivaNova's cardiac rhythm management business. Its pacemaker is currently the smallest size in the market with the leading technology in the world.
- Thanks to LivaNova's solid foundation in Europe, in the first half of 2019, the revenue of MicroPort's cardiac rhythm management from Europe accounted for more than 85% of the company's total CRM revenue. MicroPort's cardiac rhythm management covered more than 250 hospitals globally with an increase of 88.6% year-on-year.
- In the first half of 2019, the 1.5T and 3T MRI compatible pacemakers OTO, ENO and TEO series were officially launched in Europe and were widely used in hospitals.
- In the future, the company's business is expected to grow further driven by industry growth and increasing penetration.

Revenue from cardiac rhythm management



Revenue from cardiac rhythm management by region in 2019 (ten thousand USD)



Sources: Company annual reports, Horizon Insights

# Cardiac rhythm management business has a dominant position among domestic peers

Chinese manufacturers made their presence in this field through acquisitions or cooperation, through which their level of technology can be guaranteed. It is expected they can achieve import replacement through price advantage.

- Lepu Medical, once the agent of Biotronik's products, is the third largest pacemaker brand in the world. Now Lepu has involved in this segment through the acquisition of Qin Ming Medical.
- LifeTech Scientific develops and manufactures through cooperation with Medtronic.
- MicroPort got into this business segment by acquiring LivaNova Group's CRM business and now has the smallest pacemaker on the market.

Manufacturer	Product	Approval time	Description	Single-chamber pacemaker bid price	Double-chamber pacemaker bid price
Lepu Medical (Qin Ming Medicine)	Qinming	Oct. 2016	Once the agent of Biotronik, the third largest pacemaker brand in the world; it introduced the pacemaker production line of CPM Company and cooperated with Xi'an Jiaotong University in research and development	Around 10,000 yuan	26000~30000 yuan
LifeTech Scientific	HeartTone	Dec. 2017	Developed and manufactured with Medtronic	16000~20000 yuan	30000~50000 yuan
MicroPort(Chuangling)	New RegaTM series	Sep. 2017	Acquired LivaNova, currently the smallest on the market, a lifespan of more than 10 years。	16000~35000 yuan	30000~60000 yuan

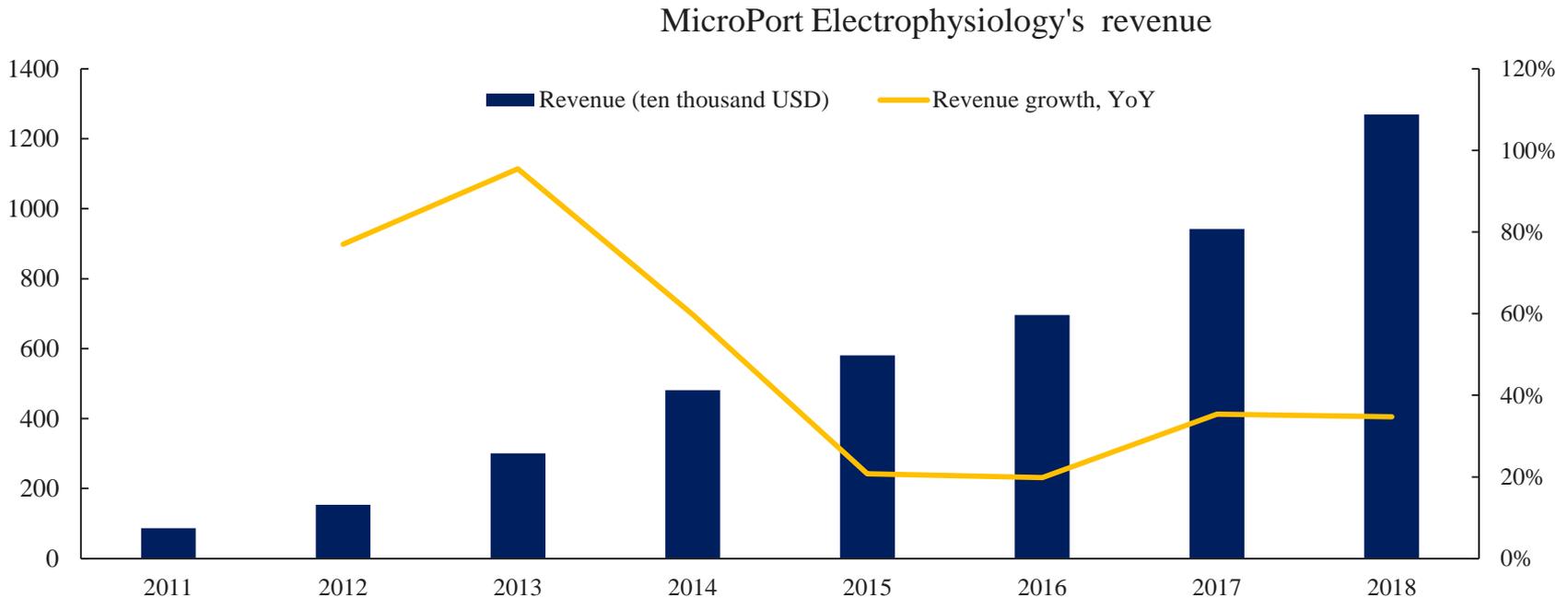


D

# Electrophysiology for Medbots and assisted reproduction

# MicroPort Electrophysiology's products

- MicroPort Electrophysiology's business has maintained rapid growth in recent years. As of the end of 2018, the revenue was US\$12.69 million.



Sources: Company annual reports, Horizon Insights

## MicroPort's surgical robot business

- With the mission “to provide intelligent surgical solutions,” MicroPort (Shanghai) MedBot Co., Ltd. ("MedBot ") is committed to the leading edge of clinical needs of minimal invasive surgeries, and to exploring the technologies of smart robots, intelligent control, and information sensing, etc. MedBot has gradually formed a product portfolio of 3D electronic laparoscopy, laparoscopic surgical robot ,and orthopedic surgical robot, providing intelligent surgical solutions domestically and even globally.
- At present, there are no local endoscopic surgical robot products in China. Toumai™ robot now has been in the special approval channel for innovative medical devices. This will help the company accelerate its marketing and seize the domestic high-end market.

Product	Time to market	Features
Toumai™ Endoscopic Surgery System ("Endoscopic Surgery Robot")	In the special approval channel for innovative medical devices	It is composed of three parts: the patient operation platform, image trolley, and surgeon console. It is used to assist in minimally invasive endoscopic surgeries, especially those complicated ones that are difficult to complete with open or conventional laparoscopic surgeries. The wrist-type surgical instruments are highly flexible, allowing highly dexterous movement in narrow spaces, thereby simplifying difficult surgical operations and reducing the amount of intraoperative bleeding and complications. The 3D laparoscope lens provides a three-dimensional real surgical field of view to assist complicated and delicate operations under the laparoscope. The intuitive remote control operation is sensitive and easy to use, thereby simplifying the surgery and shortening the surgery time. The product has extremely high clinical value.

Sources: Company annual reports, Horizon Insights

## MicroPort's assisted reproduction business

- Shanghai Mingyue Medical, a subsidiary of MicroPort, focuses on reproductive medicine. Its business covers R&D, manufacturing, sales technical support of medical devices required at all stages of the assisted reproductive cycle such as egg and sperm retrieval, sperm freezing and storage, gamete and embryo processing, and embryo implantation.
- The terminal scale of China's assisted reproduction industry in 2018 was about 26.2 billion yuan, growing at a rate of about 15% per year.
- The assisted reproduction equipment market in China is primarily occupied by import manufacturers without large sized Chinese peers.

Product	Time to market	Features
Lotus single-lumen egg retrieval needle	2019	The unique three-beveled horseshoe design of the needle tip and extreme sharpness can reduce the trauma of ovarian puncture and improve the operation efficiency. The unique ultrasonic recognition pattern design of the needle tip can help achieve accurate positioning during B-mode ultrasound. The inner and outer surfaces of the needle tube are treated with super smooth polishing, with superb technology to avoid scratching the oocyte and reduce damage.

Sources: Company's official website, Horizon Insights



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# Appendices

# Blockbuster product list

Company/Business	Product	Estimated launch time	Remarks
MicroPort	Firesorb degradable stent	2023/2024	Second generation degradable stent Better product performance than peer manufacturers'
Endovastec	Reewarm PTX peripheral drug balloon	Apr. 2020	Intergenerational product in peripheral intervention therapy Expected to replace some of imported stents Few similar products in China
MicroPort Neurotec	Vertebral artery rapamycin targeted eluting stent	In green approval channel	The world's first drug-eluting stent for the treatment of vertebral artery stenosis.
MicroPort CardioFlow	VitaFlow II	2021	Second generation cardiac valve, recoverable Few similar products in China
Cardiac rhythm management	MRI compatible pacemaker	2021	High-end pacemaker Chinese manufacturers have no similar products
Robots	Endoscopy robot/orthopedics robot	In green approval channel/Concurrent clinical trials in China and the United States	Leading progress among Chinese manufacturers

# Recent Financing Activities

Company/Business	Market activity	Time	Related company(ies)	Remarks
MicroPort	Hillhouse increased stake	6 Mar., 2020	Hillhouse	Market: secondary market Purchase price: HKD 13.51 Trading volume: 49.986 million shares, accounting for 2.89% of the issued shares Capital involved: HKD 645 million
MicroPort	JPMorgan increased stake	10 Mar., 2020	JPMorgan	Market: secondary market Purchase price: HKD 14.4753 Trading volume: 56.948 million shares Capital involved: HKD 824 million Total holdings: 111 million shares, accounting for 6.43% of the issued shares
MicroPort CardioFlow	Strategic investment	16 Apr., 2020	Hillhouse, E Fund, Lake Bleu Capital	130 million USD strategic investment Pre-investment valuation: USD 1.1 billion
Robot (vascular robot)	Strategic shareholding	29 Apr., 2020	MicroPort Robocath	MicroPort invested a maximum of 25.3 million euros in two phases in exchange for Robocath's 23.19% equity, and established a joint venture company based in China to develop and produce robots.
Robot (percutaneous navigation robot)	Strategic investment	6 May, 2020	MicroPort SGInnovate Kava Ventures NDR	MicroPort, as the lead investor in the A round, together with SGInnovate and Kava Ventures invested 8 million Singapore dollars in NDR, and established a joint venture company with NDR in China to develop and sell percutaneous navigation robots.
MicroPort Orthopedics	Strategic investment	13 May, 2020	E Fund, China Life Health Fund, CQY Capital, Gortune Investment, Wangdaotong Biotechnology	Wangdaotong Biotechnology and other investors invested 580 million yuan in MicroPort Orthopedics and obtained 14.83% equity.

# Thank You!

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