Research and Development

Torii divides its Research and Development (R&D) functions of pharmaceutical business between itself and its parent company, JT. JT is responsible for R&D activities pertaining to new compounds, while Torii is responsible for improvements to the formulations of existing products and the development of additional indications. Torii also carries out its own R&D in its specific areas of expertise. Moreover, Torii collaborates with JT to search out and develop candidates for new, in-licensed drugs.

Below are some of the major achievements of our in-licensing and research and (joint) development activities.

(Renal diseases and hemodialysis)

- A domestic phase III clinical trial for iron deficiency anemia within a new indication has been conducted for hyperphosphatemia agent Riona Tablets (development number: JTT-751) in collaboration with JT.

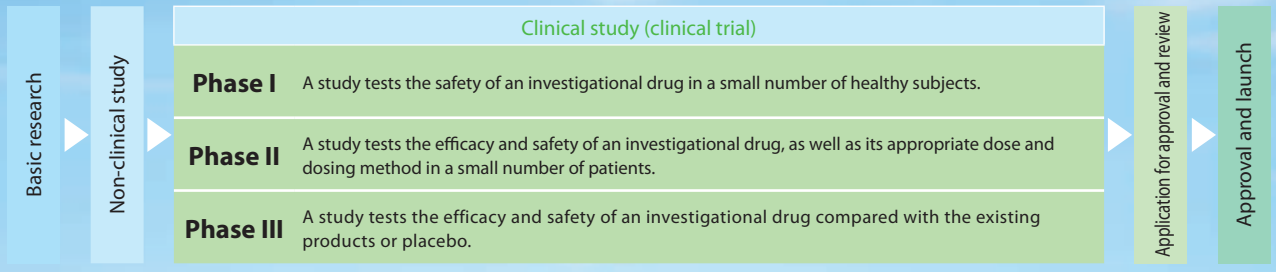
(Skin diseases)

- JT and Torii decided to discontinue development of Serlopitant (development code: JTS-661), a neurokinin (NK-1) receptor antagonist. In June 2018, we canceled the license agreement for the exclusive rights to develop and commercialize Serlopitant in Japan concluded with Menlo Therapeutics Inc. in August 2016.
- A domestic Phase III clinical trial for children was conducted for JTE-052 (Delgocitinib) ointment, a JAK inhibitor, for which Torii signed a license agreement with JT for joint development and commercialization in Japan. In January 2019, JT filed an application for manufacturing and marketing approval for adults in Japan.

(Allergens)

- In February 2018, we received an application for additional approval of dosage and administration for children for MITICURE House Dust Mite Sublingual Tablets (Allergen Immunotherapy) (development code: TO-203) being distributed in Japan by Torii.

The Process of Creating a New Drug



It is said that approximately 1 in every 30,000 candidate drugs only is approved as a new drug. A new drug is launched only after it has been rigorously reviewed by experts and received approval from the national government.

Mainstay Research and Development Products (As of February 6, 2019)

Development code [Product name]	Indication	Formulation/ Route of administration	Development stage (domestic)					Remarks
			Phase I	Phase II	Phase III	Application	Approval	
Renal diseases and hemodialysis								
JTT-751 [Riona® Tablets]	Iron-deficiency anemia	Oral			Phase III			○ Licensing agreement signed with Keryx for development and commercialization of hyperphosphatemia drug in Japan ○ Co-development with JT (Additional indication) ○ Riona filed by JT has been approved as a treatment of hyperphosphatemia in January 2014, and is being promoted and distributed by Torii
JTZ-951	Anemia associated with chronic kidney disease	Oral			Phase III			○ JT's original compound ○ Licensing agreement signed with JT for development and commercialization in Japan
Skin diseases								
JTE-052	Atopic dermatitis	Topical				Application		○ JT's original compound ○ Licensing agreement signed with JT for development and commercialization in Japan ○ Approval for development and commercialization applied by JT in January 2019
	Atopic dermatitis in children	Topical			Phase III			○ JT's original compound ○ Licensing agreement signed with JT for development and commercialization in Japan
Allergens								
TO-203 [MITICURE® House Dust Mite Sublingual Tablets]	House dust mite induced allergic asthma (Allergen Immunotherapy)	Sublingual tablet		Phase II/III (Study completed*) * Examining the future development policy				○ Licensing agreement signed with ALK-Abelló A/S for providing exclusive development and distribution rights in Japan ○ In-house

(Reference)
In October 2017, JT announced that the company signed an exclusive license agreement with EirGen Pharma Limited for the development and commercialization in Japan of calcifediol extended-release capsules (marketed by OPKO Health, Inc. in the U.S. under the brand name "RAYALDEE®") for the treatment of secondar hyperparathyroidism (SHPT) in chronic kidney disease, and Torii is expected to distribute the product after it is approved.