IV. Structure and operation of FTO-licensing markets in the pharmaceutical industry

A. FTO-licensing and EU competition law

1. Licensing and technology transfer in general

When a pharmaceutical company finds that the product or the process it wishes to sell or develop appears to be covered by the third party's patent rights, basically it has to obtain a license from the patentee in order to be free to go ahead. In general, licensing helps to spread innovation and enables licensee to develop new products and services. It also gives licensee an incentive to recoup the cost and further investment for next R&D. In this way, licensing plays an important role in economic growth and consumer welfare.[73] Therefore, licensing is in most cases pro-competitive. However, it could sometimes harm competition. The anticompetitive agreements are prohibited by Article 101 of the Treaty of the Functioning of the European Union (TFEU). As for the regime of licensing and technology transfer, it provides better guidance other than Article 101 of TFEU.

One is the Technology Transfer Block Exemption Regulation (TTBER), which exempts certain licensing agreements from antitrust rules, creating a safe harbour for licensing agreements concluded between companies that have limited market power and that respect certain conditions set out in the TTBER. Such agreements are deemed to have no anticompetitive effect or, if they do, the positive effects outweigh the negative ones. The other is the Technology Transfer Guidelines, which provide further guidance on the application of the TTBER as well as on the application of EU competition law to technology transfer agreements that fall outside the safe harbour of the TTBER.[74]

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73 European Commission press release, *Antitrust: Commission adopts revised competition regime for technology transfer agreements* (Mar. 21, 2014), http://europa.eu/rapid/press-release_IP-14-299_en.htm.

74 *Id.*

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2. Royalty obligations in general

The parties to a technology license are normally free to determine the amount and nature of royalty payments without being caught by the Article 101 of the TFEU.[75], [76] It is in principle permissible in the agreement that the payment by the licensee is a lump sum, a minimus royalty,[77] a fixed amount for each product produced using the licensed technology, or a percentage of the selling price, or (in the case of software) an amount per user or machine, or a combination of these. Where the licensed technology relates to an input in the final product, the Guidelines indicate that royalities may be based on the price of the final product, provided that it incorporates the licensed technology.[78]

75 The Guidelines § 184: "The parties to a license agreement are normally free to determine the royalty payable by the licensee and its mode of payment without being caught by Article 101(1) of the Treaty. This principle applies both to agreements between competitors and agreements between non- competitors. Royalty obligations may for instance take the form of lump sum payments, a percentage of the selling price or a fixed amount for each product incorporating the licensed technology. In cases where the licensed technology relates to an input which is incorporated into a final product it is as a general rule not restrictive of competition that royalties are calculated on the basis of the price of the final product, provided that it incorporates the licensed technology. In the case of software licensing royalties based on the number of users and royalties calculated on a per machine basis are generally compatible with Article 101(1)."

76 Jonathan D.C. Turner, Intellectual property and EU competition law 243 (2nd ed. Oxford 2015).

77 The Guidelines § 183(e): "This section does not deal with obligations in license agreements that are generally not restrictive of competition within the meaning of Article 101(1) of the Treaty. These obligations include but are not limited to: (e) obligations to pay minimum royalties or to produce a minimum quantity of products incorporating the licensed technology".

78 The guidelines § 184.

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3. Previous view on royalty obligation based on the price of the final product

a) Case: Windsurfing International v Commission of the European Communities

There is the CJEU case in 1986 that held it anticompetitive to impose obligations to pay royalties on products produced without using the licensed technology, that is, Case C-193/83 *Windsurfing International v Commission of the European Communities.*

Windsurfing International Inc. is a US-based company which develops and sells "sailboards", an apparatus composed of a "board" (a hull made of synthetic materials equipped with a center-board) and a "rig" (an assemblage consisting essentially of a mast, a joint for the mast, a sail and spars) which makes it possible to combine the art of surfing with the sport of sailing. The company's turn over derives partly from the proceeds of the sale of "sailboards" which it manufactures, and partly from the income arising out of licenses which it has granted to other undertakings. In the 1970's Windsurfing International Inc. extended its operations to Europe, where it initially submitted patent claims in certain member countries of the European Community, namely the United Kingdom and Germany.[79] Under the Article 1 of the licensing agreement between Windsurfing International Inc. and German undertakings, among many obligations on the licensees, there was the obligation on the licensees to pay royalties for "rigs" manufactured under the German patent only on the basis of the net selling price of a complete "sailboard".[80] The Commission held that a number of clauses in licensing agreements which were concluded prior to 1981 with certain German undertakings, including the method of calculating the royalties infringed Article 101 of the TFEU. Accordingly, Windsurfing International Inc. brought an action for annulment before the CJEU against the Commission decision.[81]

Under these facts, the CJEU concluded that the method of calculating the royalties Windsurfing International Inc. had adopted was anti-competi-

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79 Paragraph 2, *Case C-193/83 Windsurfing International v Commission of the European Communities*.

80 *Id.* paragraph 9(3).

81 Ariel Ezrachi, EU Competition Law: An Analitycal Guide to the Leading Cases 346 (4th ed., 2014).

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tive, holding that "As for the agreements providing that the royalty must be calculated at least on the basis of the price of the complete sailboard, it must first of all be noted that this is not one of the cases which, according to the commission, justify such a method of calculation, namely where 'the number of items manufactured or consumed or their value are difficult to establish separately in a complex production process, or . . . there is for the patented item on its own no separate demand which the licensee would be prevented from satisfying through such a method of calculation'. The rig is not incorporated in the board and, as was seen earlier, there was a separate demand for rigs. Those considerations also apply to the board, whose value is in any event much higher than that of the rig.",[82] "Nevertheless it must also be pointed out that the royalty levied on the sale of rigs on the basis of that calculation proves not to have been higher than that laid down for the sale of separate rigs in the new agreements, since the licensees acknowledged that it would be equitable to accept a higher rate of royalty once the licensor' s remuneration was to be calculated on the price of the rig alone. It follows that that method of calculation did not have as its object or effect a restriction of competition in the sale of separate rigs.",[83] and then "In the light of those considerations, it must be held that the method of calculating the royalties based on the net selling price of a complete sailboard was of such a nature as to restrict competition with regard to the separate sale of boards, which were not covered by the German patent, but not the sale of rigs.".[84]

b) The previous Guidelines: Commission Regulation (EC) No. 773/2004

The previous Guidelines on technology transfer agreements was Commission Regulation (EC) No. 773/2004 which include reference to above *Windsurfing International case*. With regard to the calculation of royalties, the paragraph 81 of the previous Guidelines noted that "The hardcore restriction contained in Article 4(1)(a) also covers agreements whereby royalties are calculated on the basis of all product sales irrespective of whether the licensed technology is being used. Such agreements are also caught by Article 4(1)(d) according to which the licensee must not be re-

82 *Windsurfing, supra* note 80 paragraph 65.
83 *Windsurfing, supra* note 80 paragraph 66.
84 *Windsurfing, supra* note 80 paragraph 67.

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stricted in his ability to use his own technology. In general such agreements restrict competition since the agreement raises the cost of using the licensee's own competing technology and restricts competition that existed in the absence of the agreement. This is so both in the case of reciprocal and non-reciprocal arrangements. Exceptionally, however, an agreement whereby royalties are calculated on the basis of all product sales may fulfil the conditions of Article 81(3) in an individual case where on the basis of objective factors it can be concluded that the restriction is indispensable for pro-competitive licensing to occur. This may be the case where in the absence of the restraint it would be impossible or unduly difficult to calculate and monitor the royalty payable by the licensee, for instance because the licensor's technology leaves no visible trace on the final product and practicable alternative monitoring methods are unavailable.“

c) License

As described above, it was once considered to be anti-competitive to base a royalty on the price of the whole product whrere only part of it is protected by the licensor’s rights, unless it is impractical to base the royalty on the value of the protected part, or there is no separate demand for the protected part on its own, or the basis used would make no practical difference to the royalty charged.[85]

4. Royalties on products produced without using licensed technology

a) Issues

Patent licenses are subject to competition laws, as are other business relationships. In EU, technology licensing and similar agreements, often referred to as “technology transfer”, are the subject of the technology transfer block exemption in Regulation 316/2014 of the European Union, which identifies certain provisions in a patent license that are considered to have an impact on competition, and identifies provisions that would be

85 Tuner, *supra* note 76, at 242.

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regarded as being anti-competitive[86]. The types of provisions in a patent license which need a consideration of competition law concern are price restrictions or price minimums, market division, export restrictions, product quantity limitations, and compulsory assignment of improvements from a licensee to a licensor[87].

In the pharmaceutical industry, when the parties need FTO-license, they often include many patents even though they are not sure to use all patents because they want to secure their freedom-to-operate in the future. The issue here is whether or not royalties on products produced without using licensed technology are anti-competitive.[88] As described above, in some early cases so far including *Windsurfing International case*, the courts held it to be anti-competitive when a licensor obliges a licensee to pay royalties on products produced without using the licensed technology.[89] And the previous Guidelines basically followed these cases.

b) TTBER and the Guidelines on the issue

Article 2 of the TTBER (Exemption) provides the safe harbour to the technology transfer agreements. But in contrast, Article 4 of the TTBER (Hardcore restrictions) provides certain types of agreements with which the exemption in Article 2 shall not apply. There are many types of the agreements listed in Article 4, the relevant article in this issue is Article 4.1(a) and (d).[90] With regard to this issue, the current guidelines, Guide-

86 Philip Mendes, *Licensing and Technology Transfer in the Pharmaceutical Industry* 26 (last visited September 7, 2016), http://www.wipo.int/export/sites/www/sme/en/documents/pdf/pharma_licensing.pdf

87 *Id.* at 26.

88 Tuner, *supra* note 76, at 243.

89 *Windsurfing, supra* note 79.

90 Article 4 of the TTBER (Hardcore restrictions) reads: 1. Where the undertakings party to the agreement are competing undertakings, the exemption provided for in Article 2 shall not apply to agreements which, directly or indirectly, in isolation or in combination with other factors under the control of the parties, have as their object any of the following: (a) the restriction of a party's ability to determine its prices when selling products to third parties; (d) the restriction of the licensee's ability to exploit its own technology rights or the restriction of the ability of any of the parties to the agreement to carry out research and development, hereunless such latter restriction is indispensable to prevent the disclosure of the licensed know-how to third parties.

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lines on the application of Article 101 of the Treaty on the Functioning of the European Union to technology transfer agreements (2014/C 89/03) (Hereinafter referred as "the Guidelines") provides several relevant paragraphs: § 101[91], 116[92], and 185[93].

According to TTBER and the Guidelines, it is clear that royalties on products produced solely with the licensee's own technology are regarded

91 § 101 of the Guidelines reads "The hardcore restriction contained in Article 4(1)(a) TTBER also covers agreements whereby royalties are calculated on the basis of all product sales irrespective of whether the licensed technology is being used. Such agreements are also caught by Article 4(1)(d) according to which the licensee must not be restricted in its ability to use its own technology rights (see point (116) of these guidelines). In general such agreements restrict competition since the agreement raises the cost of using the licensee's own competing technology rights and restricts competition that existed in the absence of the agreement (58). This is so both in the case of reciprocal and non-reciprocal arrangements."

92 § 116 of the Guidelines reads "According to Article 4(1)(d) the licensee must also be unrestricted in the use of its own competing technology rights provided that in doing so it does not make use of the technology rights licensed from the licensor. In relation to its own technology rights the licensee must not be subject to limitations in terms of where it produces or sells, the technical fields of use or product markets within which it produces, how much it produces or sells and the price at which it sells. It must also not be obliged to pay royalties on products produced on the basis of its own technology rights (see point (101)). Moreover, the licensee must not be restricted in licensing it own technology rights to third parties. When restrictions are imposed on the licensee's use of its own technology rights or its right to carry out research and development, the competitiveness of the licensee's technology is reduced. The effect of this is to reduce competition on existing product and technology markets and to reduce the licensee's incentive to invest in the development and improvement of its technology. Article 4(1)(d) does not extend to restrictions on the licensee's use of third party technology which competes with the licensed technology. Although such non-compete obligations may have foreclosure effects on third party technologies (see section 4.2.7), they usually do not have the effect of reducing the incentive of licensees to invest in the development and improvement of their own technologies."

93 § 185 of the Guidelines reads "In the case of licence agreements between competitors it should be borne in mind (see points (100) to (101) and (116) above) that in a limited number of circumstances royalty obligations may amount to price fixing, which is considered a hardcore restriction (see Article 4(1)(a)). It is a hardcore restriction under Article 4(1)(a) if competitors provide for reciprocal running royalties in circumstances where the licence is a sham, in that its purpose is not to allow an integration of complementary technologies or to achieve another pro-competitive aim. It is also a hardcore restriction under Article 4(1)(a) and 4(1)(d) if royalties extend to products produced solely with the licensee's own technology rights."

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as hardcore restrictions in agreements between competitors[94]. However, with regard to the royalties on products produced without using the licensed technology in other circumstances, the Guidelines does not clarify anything further.

c) Analysis on Article 4(1)(a) and relevant Guidelines

According to the Guidelines § 101[95], 185[96], the royalties on products produced without using the licensed technology are considered to restrict the ability to determine its prices. This might sound persuasive at the beginning because one intuitive approach for determining the price of products is to calculate it from the actual manufacturing cost. One simple way of calculation is to keep a cost percentage below 30%. If this calculation is actually taken in practice, it is true that it would restrict the ability to determine its prices because the payment of royalties is definitely extra cost the manufacturer has to pay additionally.

However, the cost is not a dominant factor at all to influence the price of products. The manufacturers will always think to maximize their profit. If there are people who are willing to pay at high price, the manufacturer would charge the high price regardless of how much the actual manufacturing cost is. In general, there is no direct connection between the payment of royalties and the prices charged for products, particularly in a competitive product market.[97] In addition to that, in the pharmaceutical industry where the determining price of a new drug is special and complex, there are many other factors that could have more influences on a drug price except for the payment of royalties.

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94 The Guidelines § 101, 116, 185, TTBER Article 4(1)(a) and 4(1)(d). Especially in § 185 of the Guidelines: "It is also a hardcore restriction under Article 4(1)(a) and 4(1)(d) if royalties extend to products produced solely with the licensee's own technology rights."

95 The Guidelines § 101: "The hardcore restriction contained in Article 4(1)(a) also covers agreements whereby royalties are calculated on the basis of all product sales irrespective of whether the licensed technology is being used."

96 The Guideline § 185: "It is also a hardcore restriction under Article 4(1)(a) and 4(1)(d) if royalties extend to products produced solely with the licensee's own technology rights."

97 Turner, *supra* note 76, at 243.

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According to Forbes article[98], the factors that should be taken into account are so many and complicated: uniqueness of a drug, competitors drug price, the benefit that a drug offer over existing therapy, the cost of current treatment for the disease a drug targets, a drug's possibility for changing practice of medicine such that patients will no longer have to pay costly hospital procedures, and whether a drug save or extend lives or not. This article goes on further regarding how people feel about that price of a drug. If it costs too highly, doctors and patients might be reluctant to prescribe it because it is likely that they think the drug too little benefit for the added cost. If it provides a discount price to an existing therapy, it is likely that they might avoid it because the cheap drug would not work better than existing therapy.[99]

One study conducted on determinants of launch price of a drug points out the following factors.[100]

(i) Competitors Prices

First of all, if there is a competitor's drug in the similar category and in the same market, the launch price of a drug would be significantly influenced by that competitor's drug.[101] If there is a local pharmaceutical company that sells a generic drug, that cheap price would definitely have an influence on the drug price.

(ii) Launch Timing and Sequence

The launch price of a drug will generally decline with time elapsed since global launch.[102] Therefore, if the timing of the launch of a drug in the market is delayed, the pharmaceutical company of the drug would be vir-

98 John LaMattina, *What Is The Rationale For The Pricing Of New Drugs?* (Sep. 10, 2012, 11:55AM), http://www.forbes.com/sites/johnlamattina/12012/09/10/on-the-pricing-of-new-drugs/#500d64ed4b8e

99 *Id.*

100 Patricia M. Danzon, Andrew J. Epstein, Working Paper Series: Effects Of Regulation On Drug Launch And Pricing In Interdependent Markets 35-40 (Working paper 14041, National Bureau of Economic Research 2008).

101 *Id.* at 35.

102 *Id.* at 35.

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tually obliged to set a cheaper price than the first one put on the global market. The entry of the following drugs could also have an impact on the launch price of a drug. As for sequence, drugs are classified as two categories in the study; superior products and inferior products, and then they analyse that in case of inferior products first or second entrants appear to receive premium price compared to the other inferior drugs although in case of superior products first several drugs are likely to enjoy premium price.[103]

(iii) Cross-national spillovers

Since drugs can be exported internationally, pharmaceutical companies have to take into account the lowest price of their own drug that was already put on the market in other countries. In the study they analyse that for both superior and inferior products launch prices will be influenced by the lowest price previously received in other high-price EU countries, whereas effects of launch in low-price EU countries is insignificant. In case of superior products the lowest price in non-EU countries is significant, but that is not significant in case of inferior products because they are less likely to launch in high-price non-EU countries such as US and Canada.[104]

(iv) Products Characteristics

The characteristics of a drug (package size, drug forms etc) should also be taken into account. If the drug is sold as the pack with many units all together and the price of a drug is determined by the pack, it would have a negative effect on the price of the drug. For example, a drug with pack size over 100 units will be purchased in large quantities by pharmacists to dispense them to patients from large packs. The price per dose for injectable and non-oral forms (liquids, creams etc) is significantly higher than that of the oral solid formulations.[105]

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103 *Id.* at 36.
104 *Id.* at 37.
105 *Id.* at 39.

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(v) Country Fixed Effects

The country where a drug is going to launch is a big factor on its price. In case of superior product, the price is significantly higher in the US and Japan than that in Germany.

Taking into all these factors above, interestingly enough, the cost of manufacturing a drug is not counted as important factor in this paper. I assume that this shows small influence of the cost on the price of a drug. Here, I would like to introduce one typical example of "Soliris" to show that the cost of manufacturing a drug has little to do with the price of products. Soliris is the drug for rare diseases manufactured by Alexion, which is often referred as an orphan drug. Solaris is used for treating two types of diseases: a rare kind of anemia and an more rarer kidney disease known as aHUS (atypical hemolytic uremic syndrome). It is estimated that there are only a few thousand patients around the world who use Soliris. Nonetheless, Soliris anually earns $1.1 billion in sales in 2012. This is because Soliris costs $440,000 per patient per year, being known as the most expensive drug in the world.[106] The reason why the price of Soliris is so high is not known to the public since Alexion refuses to clarify it regardless of NICE[107]'s inquiry. Accordingly, it is totally unknown whether or not Alexion pays royalty, and if so, the extent to which that royalty has an influence on the price of Soliris. But I assume it is quite likely that even if Alexion pays royalty, the amount of the royalty would not be comparable to Soliris's extraordinary expensive price. The influence of the royalty on the price of Soliris would be almost negligible.

As described above, according to the Guidelines § 101, 185, the royalties on products produced without using the licensed technology are considered to restrict the ability to determine its prices. Therefore, such royalties must be regarded as hardcore restrictions. However, I think this guidance by the Guidelines is not appropriate especially for the pharmaceutical industry with the reasons discussed above.

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106 Pharmaphorum, *Alexion must 'explain' high cost of Soliris, says NICE* (Mar. 4, 2014), http://pharmaphorum.com/news/alexion-must-explain-high-cost-of-soliris-says-nice/.

107 NICE (The National Institute for Health and Care Excellence) is an executive non-deparmental public body of the Department of Health in the United Kingdom.

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B. FTO-licensing between a venture business company for innovative drug development and a pharmaceutical company

1. Introduction

As described above, developing a new drug from zero to marketing is becoming more and more difficult these days. Accordingly, it is significantly important option for a pharmaceutical company to build an alliance with a venture business company for innovative drug development.[108]

2. Reasons for the growing interest for licensing-in/out the pharmaceutical industry

Recently, there are quite a few numbers of larger pharmaceutical companies developing new drugs that adopt the IP strategy with which they are willing to license-in the technology of a venture business company.[109] The reasons are three holds. First, they have been struggling with developing new drugs even though they have to do it. In order for a pharmaceutical company to keep growing up its pharmaceutical business, it must continue investing for next drugs.[110] Therefore, they are desperate to find a candidate for future new drugs.[111] Second, since there is a clear unmet medical needs[112] in the pharmaceutical industry, many pharmaceutical companies are conducting similar R&D accompanying severe competi-

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108 Takatori et al., *Seiyakukigyou to baiobentyâ to no araiansu: nichibeiou seiyakukigyou no hikaku bunseki (An alliance between a pharmaceutical company and bio venture company: Comparison and analysis of pharmaceutical companies in Japan, US and EU)* 31 (Nov., 2009), http://www.jpma.or.jp/opir/research/rs_048/paper-48.pdf.

109 *Id.* at 31.

110 Investment might bring a big profit to a pharmaceutical company ten years later. Without investment, sooner or later it will lose the source of profits in accordance of the expiration of patents.

111 Kenji Tomita, *Seiyakusangyou ni okeru raisensu-in/auto no muzukashisa (Difficulties in licensing-in/out in the pharmaceutical industry)* DousishaShogaku, Dai-66-kan, Dai-1-gou (Jul., 2014) 244, https://doors.doshisha.ac.jp/duar/repository/ir/16560/017066010015.pdf.

112 Unmet medical needs are medical needs for the patients for whom effective medical care has not been found yet. The concrete examples are serious diseases like a lifestyle-related disease, cancer, and dementia, and the diseases which is not fa-

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tion. It is of great help for a pharmaceutical company to utilize useful knowledge of a venture business company for developing a new drug faster than other competitors. In the case of a new drug, once a pharmaceutical company obtains the patent for it, the third party can't follow the same drug. Accordingly, an originator pharmaceutical company is extremely advantageous and there is no room for the second.[113] Third, as is pointed out above, the successful rates of the development for a new drug is so exceedingly low that it will be more promising to rely on the development performed by venture business companies in addition to pharmaceutical companies. This is one of the business strategies to reduce the risk. It is efficient and less risky to license-in the golden egg, that is, promising candidate for a new drug, which was found by a venture business company as the result of researching and experimenting many candidates.[114] These are the reasons why larger pharmaceutical companies are willing to license-in the technology of a venture business company.

For the side of a venture business company, there are two reasons why it willing to license-out its technology to a larger pharmaceutical company.[115] First, since clinical trials will take long time and a lot of investment especially after phase II, it is almost impossible for a pharmaceutical company to conduct a whole R&D process without having enough corporate strength. In other words, a venture business company is unable to conduct clinical trials. Therefore, a venture business company takes charge of only pre-clinical trial research, leaving the following clinical trials to a larger pharmaceutical company. Second, since a venture business company usually does not have enough capital and has difficulty in financing, it wishes to sell or license the achievement at the stage of research (pre-clinical trial) as soon as possible to obtain the capital to start next research for a new drug.

The fields of diseases which a venture business company wishes to research are the one in which a new drug is likely to appear in near future, such as cancer, mental illness, and disease seen among old people.[116] On the contrary, a venture business company is reluctant to get involved in the

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tal but nevertheless the patients strongly demand the development of the effective medical care for better quality of life like insomnia and migraine.

113 Tomita, *supra* note 112, at 244.

114 Tomita, *supra* note 112, at 244.

115 Tomita, *supra* note 111, at 245.

116 Tomita, *supra* note 111, at 245.

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field of disease such as lifestyle-related disease and rare diseases. As for the lifestyle-related disease, pharmaceutical companies have already acquired enough ability to research by their own such as lifestyle-related disease, and accordingly it is not an attractive to a venture business company. As for rare diseases, the market is not big enough for a venture business company to yield large profit. Thus a venture business company can't afford to pay expensive cost. But if there is the rare disease that pharmaceutical companies boggle at difficulty to launch the research, but nevertheless a venture business company is able to find promising candidate, a venture business company can license-out the technology.[117]

In addition to the above, there is one more factor that enhances the division of R&D. In the normal R&D process, there are two groups even in one pharmaceutical company: the group of experts conducting researches and experiments for pre-clinical trials, and the group of experts conducting development for clinical trials. They belong to the separated department and focused on their own specialized jobs, being mutually independent. The expert for the former will never conduct the job for the later and vice versa. In other words, there is the favourable circumstance for two different companies to take in charge of these two different jobs respectively, and to license-in/out each other.[118]

In this way, in the pharmaceutical industry, the interest for licensing-in/out is increasing for both sides of a larger pharmaceutical company and a venture business company.

3. The type of drugs a venture business company develops

Pharmaceutical drugs are divided into the low molecule pharmaceuticals and the biopharmaceuticals. With regard to the low molecular pharmaceuticals, researchers entirely synthesize them utilizing chemical synthesis technology, or utilize naturally occurring products. On the contrary, with regard to the biopharmaceuticals, researchers utilize the molecular found in the human body and its modifications. Examples are genetically modified pharmaceuticals (protein pharmaceuticals) and antibody pharmaceuti-

117 Tomita, *supra* note 111, at 245.
118 Tomita, *supra* note 111, at 245.

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cals.[119] These biopharmaceuticals tend to be sold at very expensive price. And unlike the development of the low molecular pharmaceuticals, the development of the biopharmaceuticals requires special expertise.[120] Therefore, recently the number of the venture business company specialising the biopharmaceuticals (hereinafter referred as "bio-venture company") is rapidly increasing.

4. The reality of licensing-in/out

According to the survey which analysed origins of products for top ten pharmaceutical companies in US, EU and Japan, nearly 40-45% of the products found to be originated in the third party, among which 75-90% is from a venture business company.[121] There is no significant difference between three regions. This clearly shows larger pharmaceutical companies are actively licensing-in the third party's technology, especially from a venture business company.

The recent licensing-in/out often occurs in the region of cancer drugs. Most of the larger pharmaceutical companies place emphasis on the development of cancer drugs which is one of unmet medical needs, and aiming desperately at obtaining patents and commercialization as soon as possible, making that region highly competitive. As described above, in the process of developing a new drug, what matters most is the speed of the development. Therefore, a larger pharmaceutical company tends to active-

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119 Antibody pharmaceutical is the antibody as a drug that links the specific antigen like cancer cell and pathogen, and works performing antigen and antibody response.

120 For example, since the method of cultivating the molecular found in the human body is not often established, and quality control is quite difficult accordingly, the high level of knowledge and experience of cultivation and quality control is required, which even a larger pharmaceutical company does not necessarily has.

121 Takatori et al., supra note 108, at 15 (Figure 2-1). They used Trend Analysis in the Pharmaprojects as of January 2009 as database (last visited September 7, 2016), https://citeline.com/products/pharmaprojects/. The pharmaceutical companies which were the subject of survey were, Takeda, Eisai, Daiichi Sankyo, Astellas, Otsuka, Mitsubishi Tanabe, Dainippon Sumitomo, Shionogi, Ono, and Kyowa Hakko Kirin (Japan), Pfizer, Johnson & Johnson, Merck & Co. Abbot, Lilly, Wyeth, Bristol-Myers Squibb, Schering-Plough, Baxtar, and Forest (US), GlaxoSmithKline, Novartis, Sanofi Aventis, AstraZeneca, Roche, Bayer, Boehringer Ingelheim, Novo Nordisk, Merk, and Servier (Europe).

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ly license-in or buy the promising candidate. Because of these reasons, there are many bio-venture companies that specialize in cancer drugs.[122]

However, it is reported that the number of licensing-in/out in the pharmaceutical industry is not quite large regardless of the fact that there are many bio-venture companies who wish to license-out.[123] It is very difficult to know the accurate number of licensing-out cases because most of bio-venture companies' stocks are not listed and the information on their transaction including licensing-out is not published. There is the survey in which the reporter examined the number of license-in cases of top ten large pharmaceutical companies[124] in Japan based on their financial statements in which the important business contracts shall be reported.[125] The results are shown in Table 3.[126]

[Table 3]

	total	Bio-venture company		Pharmaceutical company	
		overseas	domestic	overseas	Domestic
2007	17	12	1	2	2
2008	12	11	0	0	1
2009	9	6	1	2	0
2010	17	11	4	0	2
2011	10	7	2	0	1
2012	4	4	0	0	0

Table 3 shows the situation of licensing-in/out in Japan for the period from 2007 to 2012. The numbers are the actual cases of licensing-in/out. The licensing-in/out by a pharmaceutical company could be carried out not only with a(n) (overseas/domestic) bio-venture company but also a(n) (overseas/domestic) pharmaceutical company. Table 3 classified these cases of licensing-in/out respectively.

122 Tomita, *supra* note 111, at 248-249.
123 Tomita, *supra* note 111, at 248-249.
124 These ten pharmaceuticals are, Takeda, Astellas, Daiichi Sankyo, Esai, Mitsubishi Tanabe, Otsuka, Chugai, Dainippon Sumitomo, Shionogi, and Ono.
125 The fact of licensing-in bio-venture patents is included here. But detailed licensing conditions such as price are not published.
126 Tomita, *supra* note 111, at 248 (Figure 2).

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According to this survey, the number of license-in/out cases is found to be very small. Most of origin companies of license-in cases are bio-venture companies overseas. It should be noted that this number is only for license-in/out, and a pharmaceutical company has alternative options such as M&A, joint research and a capital tie-up to achieve the same result. But considering that licensing-in/out is common way for a bio-venture company, the actual number is estimated to be still small. Another report[127] published by one bio-venture researcher in Japan also refers to the difficulty of license-in/out between a pharmaceutical company and a bio-venture company. It reports that more than 1,800 venture companies that originated in the research in universities had been established since the Ministry of Economy, Trade and Industry, Japan encouraged universities to launch their businesses in 2001. There were more than 500 bio-venture companies included in those venture companies. However, only a handful of bio-ventures succeeded in licensing-out. Since a lot of investment and quite a long time are required to develop a candidate for a new drug, most of them suffer from financing and end up with going out of business or going dormant state. I would like to analyze this current situation and propose a possible solution.

5. Analysis of current situation

It is considered that there are several reasons why license-in/out between a pharmaceutical company and a bio-venture is not so successfully performed despite the fact that there are many pharmaceutical companies / bio-venture companies who wish to establish alliances each other. I will describe these reasons as follows.

a) Needs/Seeds mismatching

There is some possibilities that the needs of a pharmaceutical company and the seeds of a bio-venture company don't match properly in the phar-

127 Kenzo Takada, *Seiyakugaisya tono raisensu keiken kara mita koutaiiyakuhin kaihatsu (The development of antibody pharmaceuticals in the sense of licensing-out the technology to a larger pharmaceutical company)*, Yakugaku Zasshi, 133(1), 61-66.

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maceutical market.[128] As described above, a pharmaceutical company is limiting the fields of diseases which they wish to develop in order to maximize profits and minimize risks. Therefore, a bio-venture company has to deliberately investigate what kind of new drugs are actually waited to appear in the pharmaceutical industry, and what exactly a pharmaceutical company expects a bio-venture company to develop. The latter is really important because the need of the market and that of a pharmaceutical company are not necessarily the same. Even if a bio-venture company develops a good candidate of a new drug for a certain field of disease, that might be the field which a pharmaceutical company wants to develop by its own, not by licensing-in. A bio-venture company can obtain this kind of information by reading relevant papers, attending international conferences, and analysis of relevant patents.

b) Unclear relationship of right

One of the fears that a pharmaceutical company confronts when it licenses-in the technology of a bio-venture company is that it might encounter some legal problems in the future arising from the negligence of a bio-venture company concerning clearing the relationship of rights. This relationship of rights includes issues concerning service invention. Even if the patent is filed by the bio-venture company as an applicant, it is still unclear whether or not the bio-venture company actually owns the right to be a patentee. As for job related invention, in some countries[129] the inventor initially owns the right to file the invention to patent office, whereas in other countries[130] the employer does. If the transfer of the inventors' rights has not been properly conducted, a pharmaceutical company might compensate for the inventors who would start claiming huge amount of remuneration after their invention are found to have brought huge profit to a pharmaceutical company. Or in a worst scenario, they might start insisting invalidity of the patent. Therefore, a pharmaceutical company has to make sure that all necessary rights belong to the bio-venture company. However,

128 *Id.* at 65.

129 The examples are US, Germany and Japan (Article 101 of US Patent Act, Article 6 of German Patent Act, Article 35 of Japan Patent Act.).

130 The examples are France and UK (Article 611-7(1) of French Intellectual Property Act, Article 39(1) of UK Patent Act).

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with regard to the development for a new drug candidate by a bio-venture company, there are many people who get involved in the research and might be entitled to be one of inventors, including professor, project leader, staff, student and technical staff. It is almost impossible for a pharmaceutical company to completely make sure that all necessary rights are properly transferred to a bio-venture company. Accordingly, a pharmaceutical company has to take a risk of future claim for remuneration or invalidation when it licenses-in or buys a bio-venture company's technology.[131]

Another example is the relationship of right with regard to the informed consent from the donor. The development of biopharmaceuticals often requires donors to obtain human cells, organs such as blood. When a bio-venture company uses human blood for the development of an antibody drug for instance, it needs to acquire the informed consent from the donor which states that (i) the donor offers the blood for the purpose of antibody drug development, (ii) the donor shall not have any right and remuneration regarding the blood. If a bio-venture company uses the blood of patient, it might be required to obtain the approval of the medical institute.[132] This relationship of right will possibly lead to some problem in the future.

I think this unclear relationship of rights is one reason why a pharmaceutical company is afraid of license-in or buying a bio-venture company technology.

c) Geographical distance

Table 4 below shows nationality of a bio-venture company from which major pharmaceutical companies in US, EU and Japan license-in or buy. The number of US companies is overpowering that of other regions. Germany and Japan are less than a tenth of US.[133]

131 Of course, a pharmaceutical company can reduce this risk as much as possible by requesting documents from a bio-venture company, but basically, a pharmaceutical company does not know who are the real inventors in the development at a bio-venture company.

132 Takada, *supra* note 127, at 65.

133 Takatori et al., *supra* note 108, at 17 (Figure 2-2).

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[Table 4]

ranking	The nationality of a bio-venture company	The number of drugs developed
1	US	334
2	UK	38
3	Canada	29
4	Switzerland	20
5	France	19
6	Germany	18
11	Japan	10

Table 5 shows the geographical relationship between a pharmaceutical company and a bio-venture company. As for US, EU and Japanese pharmaceutical companies, the nationality of the first ranked bio-venture company is US, followed by EU bio-venture company. On the other hand, if we look at this table from a bio-venture's point of view, it is found that the candidate of drugs developed by EU and Japan bio-venture companies are firstly introduced to EU and Japan pharmaceutical companies respectively, whereas that by US bio-venture companies are introduced all around to US, EU and Japan pharmaceutical companies.[134]

[Table 5]

The nationality of a bio-venture company	pharmaceutical companies		
	US	EU	Japanese
US	136	141	57
EU	59	85	21
Canada	14	9	6
Australia	4	7	5
Japan	1	2	7
Others	9	3	3

It should be also noted that EU and Japan pharmaceutical companies have the R&D canters in US, and this has a lot to do with the fact that EU and

134 Takatori et al., *supra* note 108, at 19 (Figure 2-4).

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Japan pharmaceutical companies license-in or buy from US bio-venture companies. This shows that geographical proximity affects the alliance between them. There are some reasons why geographical proximity affects in favour of building an alliance. If a bio-venture company and R&D center of a pharmaceutical company are located nearby, it is easy for both sides to have face-to-face meetings frequently, and/or to visit the R&D center to know how the invention actually works. Additionally, it is likely that they can communicate in the same language without any stress. I think this geographical distance is one reason to cause both sides to stay away from building an alliance.

d) Risk of insufficient FTO performed by a bio-venture company

I think it is possible that the insufficient FTO performed by a bio-venture company is in the way of building smooth alliance. As described above, to achieve thorough FTO requires specific expertise and experience. However, it is considered that a bio-venture company usually lacks the ability to perform thorough FTO because the scale of the company is so small that it does not have enough money and time to spend on their "extra" job. A pharmaceutical company does not want to take the risk of insufficient FTO.

As a counter measure for that, a pharmaceutical company often requests a bio-venture company to guarantee that the sufficient FTO was performed and it is no legal obstacle for a pharmaceutical company to reduce in practice. But a bio-venture company will try to limit their responsibility in order to minimize their risk, for example, showing the range of the FTO and insisting that it won't carry responsibility even if the relevant patent is found from outside of that range[135]. In addition, if the relevant patent is found in the future and the patent holder demands injunction under the patent infringement by a pharmaceutical company, it has to stop the marketing. The pharmaceutical company is probably able to ask compensation against the bio-venture company insisting the breach of the contract. However, it is useless to obtain compensation from a bio-venture company be-

135 This range could be about region (ex. US, Germany and Japan), company (ex. top 10 ranked pharmaceutical companies), and use of a drug (ex. a drug used for the treatment of lung cancer).

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cause the only purpose of the pharmaceutical company is to sell its drug to recoup its investment.

Of course it might be one option for a bio-venture company to ask an outside agency for its FTO, but as also described above, the FTO in the pharmaceutical industry needs very specific way to achieve FTO such as pharmaceutical technical considerations (Part III D), pharmaceutical patent information (Part III E), and patent term extension system (Part III G5(b)). However, there are two problems to utilize outside agency. First, I suppose there is no outside agency that specializes in the pharmaceutical industry and has enough ability to achieve sufficient FTO. If a bio-venture company asks general outside agency for its FTO, it is more likely that it fails to achieve thorough FTO, being unable to find some quite relevant patents. This likelihood is exactly what a pharmaceutical company detests. Second, as also described above, the FTO team should consist of wide range of staff including the team leader, the scientist who supervised the project, technology transfer personnel, and technicians/support staff in order to collect opinions from different point of view (Part III B). But it is impossible for the FTO team at outside agency to have such members because a bio-venture company is outsourcing the FTO.

Instead of the FTO performed by a bio-venture company, a pharmaceutical company might be able to conduct the FTO alone before it starts the negotiation for licensing-in. However, it is quite time consuming and almost impossible to conduct the sufficient FTO for all possible technologies before the negotiation. Furthermore, the FTO conducted by a pharmaceutical company has the same problem with that done by outside agency, that is, a pharmaceutical company, as a third party, can't build a proper FTO team.

In this way, a bio-venture company itself is considered to be the most appropriate one to conduct the FTO. Aside from the lack of skill of a bio-venture to conduct the FTO, there is another aspect that a bio-venture company is missing. That is the IP strategy. As described above (Part III H1(a)), in the whole process of developing a new drug, a pharmaceutical company should try to obtain "aggressive patent" in advance in order to make the future possible license negotiation easier to agree. However, a bio-venture company usually lacks this point of view because it normally license-out or sell its technology before the development proceeds to the clinical trial. A bio-venture company is never prepared for future possible negotiation for patent license, which a pharmaceutical company as a licensee or a buyer would encounter later on. One important thing I would

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like to point out is the significance of "aggressive patent". In the pharmaceutical industry which has really cut-throat competition of R&D, the result of the FTO would almost always bring several adverse patents. A pharmaceutical company can't give up its development for the reason of the existence of several adverse patents. In this case, "aggressive patents" will work pretty well to continue the development by means of cross-license. Even if the technology itself is excellent, a pharmaceutical company might hesitate to license-in or buy it, being afraid of the tough negotiation in the future without "aggressive patents".

6. Some proposals

I would like to propose some solutions concerning this FTO issue.

a) More attention to the FTO analysis and licensing by a bio-venture company

I think that a bio-venture company should be more aware of the importance of the FTO analysis and licensing. Without the sufficient FTO, the technology transfer won't be easy even if that technology itself is quite sophisticated. I pointed out that the scale of a bio-venture company could be one reason, but no matter how small it is, a bio-venture company should try to organize its own FTO team to achieve thorough FTO to convince a future licensee or buyer. In addition to this, it would be of great help if a bio-venture company takes into account the whole process of the development of a new drug and have the IP strategy to obtain "aggressive patent" which could be effective for cross licensing in the future. Then when a bio-venture company offers license-out or sell the technology, it can show the thoroughness of its FTO and can also offer to give "aggressive patents" in case for the future license negotiation regarding a relevant adverse patent. I think this offer is really convincing to a pharmaceutical company that is afraid of legal trouble in the future.

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b) The FTO by a pharmaceutical company at earlier stage of the development

On the other hand, there are things which a pharmaceutical company should prepare in advance to license-in the technology. As described above, a bio-venture company is basically the one that performs the FTO appropriately. But if a pharmaceutical company has the specific narrow area[136] in which it would like to license-in a bio-venture company's technology, it is a good chance to conduct the FTO by its own. Normally, the FTO analysis starts after the basic concept of the product/process is determined because it is too broad and time consuming to conduct the FTO without the product/process. However, in case that the area is quite limited, it is not impossible any more to check all patents/patent applications. If a pharmaceutical company conducts this type of FTO by its own, it would familiarize itself with existing patents/patent applications in that area so much that it becomes able to find the promising technology and determine to license-in the technology much faster than other competitor pharmaceutical companies. This speedy decision is very important because the promising technology is also the target of other competitors.

136 For example, a pharmaceutical company might be interested in license-in the technology with regard to the candidate for antibody drug on liver cancer, which is quite narrow and therefore the FTO analysis without any specific technology could be realistic.

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