Integral BioSystems

Science at the Interface of Biology and Chemistry

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Our Team

Our staff currently has 8 full time persons who are formulators and analytical method development scientists. In addition, we have expert consultants that we draw upon for consultations and projects in various fields.

JULY NEWSLETTER 2013

Message from the Founders

Welcome to the Integral BioSystems Monthly Newsletter, to be released every month. The newsletter will contain our service offerings, updates to our organization, news releases and/or announcements of innovations, etc. Additionally, Integral staff will publish white papers on topics of interest to the drug development community. The topic of interest for this newsletter is **"Drug Repurposing : An Integrated IP/Formulation Development Strategy**".

Sincerely,

Shikha P. Barman, Ph.D.
Founder, CEO and CTO
Integral BioSystems

Dave Karasic, Esq.
Founder, Legal Counsel
V.P. Operations
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About Integral BioSystems

Integral BioSystems is a privately-owned specialty drug delivery firm is based in Bedford, MA. The company focuses on formulation development of pharmaceuticals, both small molecules and biologics. Additionally, due to our partnership with Boston-area IP firm Patents Etcetera, we assist our client with drug repurposing strategies, starting with a robust IP strategy followed by potential reformulation approaches that may be patentable. To this end, we are differentiated from other formulation development companies.

Integral BioSystems' niche is in *nano-engineered* drug delivery systems aimed at providing solutions to long-held issues in drug products, especially in low drug absorption by target tissues due to cell impermeability and insolubility. In addition to assisting drug companies in developing their dosage forms, Integral scientists are also working on novel solutions to improve the bioavailability of Class II, III and IV compounds. In this regard, we have developed dosage forms in ophthalmic, intranasal, transdermal, IV routes, with customization to achieve sustained release or targeted delivery.

Our services include the development of specialty sustained release systems, such as microspheres, nanospheres, liposomes, hydrogel depots, nanocrystals, nano-suspensions to improve bioavailability of insoluble Class II/IV compounds.

Our business is organized into three divisions: (a) formulation

development of generic drug products (ANDAs), (b) formulation development of repurposed drugs (505(b)(2) and NCEs and (c) innovative drug delivery systems that offer higher bioavailability and precisely engineered release rates.

Integral BioSystems has combined expertise in drug delivery, formulation development and CMC. The company has adopted a translational approach to drug development, customizing delivery systems to accomplish the biologically effective objectives of the therapy.

Once the drug-containing formulations are tested in preclinical models, an integrated CMC plan is developed to systematically transition the project to scale up and tech transfer to GMP manufacturing houses.

Integral BioSystems recognizes the need from both small and virtual clients to further supplement their current service offerings by providing consultant services. Integral BioSystems offers a full range of consulting services to complement our formulation development, manufacturing and analytical services. We can provide "stand alone" development consulting or intertwine it with our other service offerings.

The services we offer with our drug development program consist of pre-formulation, formulation development, analytical method development and preparation of toxicological materials. Integral BioSystems scientists will scale-up the formulation preparation process and technology transfer to GMP manufacturing site for final packaging of CTM. We assist in each step, from project management and consulting, integrated to our development services.

White Paper

Drug Repurposing: An Integrated IP/Formulation Development Strategy

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Integral BioSystems and its affiliate Patents Etcetera have combined expertise to help companies assess their drug repurposing strategies, by assessment of patentability and recommendation of methods to secure IP for the repurposed products.

Introduction

Instead of investing dollars and time in a lengthy approval process for a NCE, more and more pharmaceutical companies are seeking to reduce risks and costs by finding new uses for existing products. Companies that take this approach fit naturally within the risk reduction model because they start with approved compounds with established history of use in humans. Theoretically, repurposed compounds can enter the clinical development phase rapidly and at much lower cost, than new chemical entities.

Companies that take this approach "repurpose" drugs use one or a combination of the following strategies: (a) reformulating to 'improve" efficacy, (b) discovery of new targets of old drugs, (c) reformatting an old drug with an established mechanism of action for another indication and (d) repurposing existing drugs to identify novel uses. While these approaches offer easier regulatory approval paths compared to the

lengthy approval process for a New Drug Application for a new chemical entity, new challenges have emerged in terms of gaining patent protection and product exclusivity for the new "repurposed" products.

Patentability

The "patentability" aspects of a patent application are primarily dependent upon two important considerations. These are "novelty" and "obviousness". In the classical patent application for a new molecule with novel properties, patentability is not an issue. A unique molecule never previously contemplated is clearly not "obvious" to persons "skilled in the art".

While new targets for old drugs offer "novel" therapeutic uses that were not previously contemplated, other aspects of repurposing such as in reformulation of a known product for a known indication may be more difficult, since the inventor would need to show that the new formulation offers attributes that were not previously specified or anticipated in the prior art. Furthermore, demonstrating that the new formulation is not "obvious" and cannot be theoretically contemplated by knowledge of prior art and by skill in the art is a critical aspect in product strategy.

Assess patentability prior to development and formulate an IP-securable strategy.

Patentability and Integrated Product Development Strategy

Assessment of patentability includes examination of the patent space with the drug, to assess the prior art associated with the drug and its dosage forms. Also important is the assessment of novelty of the concept proposed.

Novelty: Strategies employed to establish "novelty" of a well-known drug could include a novel utility not previously contemplated or a new mechanism of action not previously contemplated or a novel/unique composition of matter that proffers new properties to the drug.

a. "New" properties of an old drug. Hypothetically speaking, if a drug is discovered" to have antimicrobial properties that were not previously established, it offers a novel method of treatment. Or, for example, if a drug is contemplated to be used in an indication that was never contemplated before in any publicly available document, then that indication could be argued as a novel indication in the patent application. Discovery of new indications for old drugs is the concept utilized in drug repurposing".

b. New Composition of Matter.

If the company develops/invents new composition of matter (such as a new formulation, or a new polymorph) that adds new properties to the drug, then the entire composition may be described as "novel". This approach to impart novelty is one that companies can adopt in its product development strategy. Drug developers and formulators often adopt a "kitchen sink" approach, where commonly used methods and excipients used by those skilled in the art, are defined in the patent application to cover broad-based variations of the theme. This approach is fine, if the drug is a NCE. The chances to patentability are enhanced when the composition is clearly defined, with a drug that has been established. The novelty of the new concept must be clearly described and defined.

Novelty can also be imparted by special ways to deliver or administer

the drug. For example, if a drug can be administered through a specially designed device that delivers a specific dose and enhances the manner in which the drug "works," that mode of delivery can be defined as novel.
Prior Art: The invention must be differentiated from concepts already reported in the literature, any form of public documentation or commercial products. This includes international and US patents, patent applications, journal publications, presentations, white papers and public discussions.

Differentiate your product.

Obviousness: This is the highest hurdle that inventors face in defending their inventions. If the invention that is proposed can be contemplated and enabled, by examination of
the currently available knowledge, then there is
a risk of an obviousness rejection by the USPTO.

The IP and product development strategy should include approaches that characterize the product as "non-obvious" and "counter-intuitive".

Your API. Our Formulation.

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