

BUSINESS BRIEFS

Amgen Buys Rights to Array Drug

In need of a cash infusion, Array BioPharma has received a \$60 million up-front payment from Amgen for worldwide rights to ARRY-403, a phase I glucokinase activator for type 2 diabetes. Glucokinase activators stimulate the pancreas to secrete insulin while increasing the liver's glucose intake and reducing its secretion. The Boulder, Colo.-based biotech firm told investors it would make a deal before year's end. Array has six other homegrown products in clinical development with partners that include Genentech and Celgene. Amgen also has agreed to fund a 2-year research collaboration to identify and advance second-generation glucokinase activator compounds. Array can realize up to \$666 million in clinical and commercial milestones, although some are pegged to at least one backup compound reaching market in addition to 403. Array can receive double-digit royalties on sales of 403 should it reach market, and the company retains an option to copromote the drug in the United States.

J&J, Diabetes Group to Collaborate

The Juvenile Diabetes Research Foundation announced that it will work with Johnson & Johnson to speed the development of drugs to promote the survival and function of insulin-producing cells in diabetes patients. The program will fund 1- or 2-year research projects at academic centers around the world that could lead to novel drug targets and industry collaborations for the treatment of type 1 diabetes. "This program will clearly help accelerate the translation of basic research into therapies useful in the treatment of diabetes," said Alan J. Lewis, Ph.D., JDRF president and CEO. Funding decisions will be led by a combined review committee consisting of representatives from the JDRF and the Johnson & Johnson Corporate Office of Science and Technology and its affiliates, with oversight from a scientific advisory board and JDRF volunteers.

Diagnos Licensed for Retinal Device

Diagnos has received a Health Canada Class 2 Medical Device License for its CARA-CCE (Computer Assisted Retinal Analysis) device, the Brossard, Quebec firm has announced. "Health Canada approval enables us to begin to market and sell our product to support diabetic retinopathy screening," said Peter Nowacki, the firm's general manager-medical. Company president André Larente noted that "Because diabetics require regular screening for eye disease, we estimate the global value of the retinopathy screening market at \$600 million annually. We have established a global sales network and feel confident in our ability to begin to generate revenues with CARA." CARA performs a proprietary enhancement of retinal images and can automatically highlight areas of possible pathology to the user, according to the company, which noted that "CARA's image enhancement algorithms make standard retinal images

sharper, clearer, and easier to read." It is an automated platform accessible securely over the Internet, and is compatible with all recognized image formats and brands of fundus cameras.

Biocompatibles Begins CM3 Trials

Biocompatibles International will initiate clinical trials for CM3—a type 2 diabetes drug—this month, the company announced in December. Biocompatibles entered into an agreement with AstraZeneca in December 2008 to develop

CM3, a glucagon-like peptide-1 (GLP-1) analogue invented by Biocompatibles subsidiary CellMed. The agreement included preclinical, phase I and phase IIa activities managed by CellMed. As part of the development agreement, AstraZeneca will pay Biocompatibles a \$6.9 million installment payment, part of a total payment of \$14.2 million. The agreement also provides AstraZeneca with an exclusive option to license relevant patents for further exploitation at any time during the course of the de-

velopment program, which is expected to be completed in 2012. "The first-generation GLP-1s have established the drug class in treating type 2 diabetes but have also shown some limitations," said Biocompatibles CEO Crispin Simon. "We see CM3 as a second generation GLP-1, which has the potential to overcome these limitations."

—From staff reports

Reporters and editors from Elsevier's "The Pink Sheet" contributed to this column.

NovoLog® (insulin aspart [rDNA origin] injection)

Rx only

BRIEF SUMMARY. Please consult package insert for full prescribing information.

INDICATIONS AND USAGE: NovoLog® is an insulin analog indicated to improve glycemic control in adults and children with diabetes mellitus.

CONTRAINDICATIONS: NovoLog® is contraindicated during episodes of hypoglycemia and in patients hypersensitive to NovoLog® or one of its excipients.

WARNINGS AND PRECAUTIONS: Administration: NovoLog® has a more rapid onset of action and a shorter duration of activity than regular human insulin. An injection of NovoLog® should immediately be followed by a meal within 5-10 minutes. Because of NovoLog®'s short duration of action, a longer acting insulin should also be used in patients with type 1 diabetes and may also be needed in patients with type 2 diabetes. Glucose monitoring is recommended for all patients with diabetes and is particularly important for patients using external pump infusion therapy. Any change of insulin dose should be made cautiously and only under medical supervision. Changing from one insulin product to another or changing the insulin strength may result in the need for a change in dosage. As with all insulin preparations, the time course of NovoLog® action may vary in different individuals or at different times in the same individual and is dependent on many conditions, including the site of injection, local blood supply, temperature, and physical activity. Patients who change their level of physical activity or meal plan may require adjustment of insulin dosages. Insulin requirements may be altered during illness, emotional disturbances, or other stresses. Patients using continuous subcutaneous insulin infusion pump therapy must be trained to administer insulin by injection and have alternate insulin therapy available in case of pump failure. **Hypoglycemia:** Hypoglycemia is the most common adverse effect of all insulin therapies, including NovoLog®. Severe hypoglycemia may lead to unconsciousness and/or convulsions and may result in temporary or permanent impairment of brain function or death. Severe hypoglycemia requiring the assistance of another person and/or parenteral glucose infusion or glucagon administration has been observed in clinical trials with insulin, including trials with NovoLog®. The timing of hypoglycemia usually reflects the time-action profile of the administered insulin formulations [see *Clinical Pharmacology*]. Other factors such as changes in food intake (e.g., amount of food or timing of meals), injection site, exercise, and concomitant medications may also alter the risk of hypoglycemia [see *Drug Interactions*]. As with all insulins, use caution in patients with hypoglycemia unawareness and in patients who may be predisposed to hypoglycemia (e.g., patients who are fasting or have erratic food intake). The patient's ability to concentrate and react may be impaired as a result of hypoglycemia. This may present a risk in situations where these abilities are especially important, such as driving or operating other machinery. Rapid changes in serum glucose levels may induce symptoms of hypoglycemia in persons with diabetes, regardless of the glucose value. Early warning symptoms of hypoglycemia may be different or less pronounced under certain conditions, such as longstanding diabetes, diabetic nerve disease, use of medications such as beta-blockers, or intensified diabetes control [see *Drug Interactions*]. These situations may result in severe hypoglycemia (and, possibly, loss of consciousness) prior to the patient's awareness of hypoglycemia. Intravenously administered insulin has a more rapid onset of action than subcutaneously administered insulin, requiring more close monitoring for hypoglycemia. **Hypokalemia:** All insulin products, including NovoLog®, cause a shift in potassium from the extracellular to intracellular space, possibly leading to hypokalemia that, if left untreated, may cause respiratory paralysis, ventricular arrhythmia, and death. Use caution in patients who may be at risk for hypokalemia (e.g., patients using potassium-lowering medications, patients taking medications sensitive to serum potassium concentrations, and patients receiving intravenously administered insulin). **Renal Impairment:** As with other insulins, the dose requirements for NovoLog® may be reduced in patients with renal impairment [see *Clinical Pharmacology*]. **Hepatic Impairment:** As with other insulins, the dose requirements for NovoLog® may be reduced in patients with hepatic impairment [see *Clinical Pharmacology*]. **Hypersensitivity and Allergic Reactions: Local Reactions -** As with other insulin therapy, patients may experience redness, swelling, or itching at the site of NovoLog® injection. These reactions usually resolve in a few days to a few weeks, but in some occasions, may require discontinuation of NovoLog®. In some instances, these reactions may be related to factors other than insulin, such as irritants in a skin cleansing agent or poor injection technique. Localized reactions and generalized myalgias have been reported with injected metacresol, which is an excipient in NovoLog®. **Systemic Reactions -** Severe, life-threatening, generalized allergy, including anaphylaxis, may occur with any insulin product, including NovoLog®. Anaphylactic reactions with NovoLog® have been reported. Generalized allergy to insulin may also cause whole body rash (including pruritus), dyspnea, wheezing, hypotension, tachycardia, or diaphoresis. In controlled clinical trials, allergic reactions were reported in 3 of 735 patients (0.4%) treated with regular human insulin and 10 of 1394 patients (0.7%) treated with NovoLog®. In controlled and uncontrolled clinical trials, 3 of 2341 (0.1%) NovoLog®-treated patients discontinued due to allergic reactions. **Antibody Production:** Increases in anti-insulin antibody titers that react with both human insulin and insulin aspart have been observed in patients treated with NovoLog®. Increases in anti-insulin antibodies are observed more frequently with NovoLog® than with regular human insulin. Data from a 12-month controlled trial in patients with type 1 diabetes suggest that the increase in these antibodies is transient, and the differences in antibody levels between the regular human insulin and insulin aspart treatment groups observed at 3 and 6 months were no longer evident at 12 months. The clinical significance of these antibodies is not known. These antibodies do not appear to cause deterioration in glycemic control or necessitate increases in insulin dose. **Mixing of Insulins:** Mixing NovoLog® with NPH human insulin immediately before injection attenuates the peak concentration of NovoLog®, without significantly affecting the time to peak concentration or total bioavailability of NovoLog®. If NovoLog® is mixed with NPH human insulin, NovoLog® should be drawn into the syringe first, and the mixture should be injected immediately after mixing. The efficacy and safety of mixing NovoLog® with insulin preparations produced by other manufacturers have not been studied. Insulin mixtures should not be administered intravenously. **Subcutaneous continuous insulin infusion by external pump: When used in an external subcutaneous insulin infusion pump, NovoLog® should not be mixed with any other insulin or diluent.** When using NovoLog® in an external insulin pump, the NovoLog®-specific information should be followed (e.g., in-use time, frequency of changing infusion sets) because NovoLog®-specific information may differ from general pump manual instructions. Pump or infusion set malfunctions or insulin degradation can lead to a rapid onset of hyperglycemia and ketosis because of the small subcutaneous depot of insulin. This is especially pertinent for rapid-acting insulin analogs that are more rapidly absorbed through skin and have a shorter duration of action. Prompt identification and correction of the cause of hyperglycemia or ketosis is necessary. Interim therapy with subcutaneous injection may be required [see *Dosage and Administration, Warnings and Precautions, How Supplied/Storage and Handling, and Patient Counseling Information*]. NovoLog® is recommended for use in pump systems suitable for insulin infusion as listed below. **Pumps:** MiniMed 500 series and other equivalent pumps. **Reservoirs and infusion sets:** NovoLog® is recommended for use in reservoir and infusion sets that are compatible with insulin and the specific pump. In-vitro studies have shown that pump malfunction, loss of metacresol, and insulin degradation, may occur when NovoLog® is maintained in a

pump system for longer than 48 hours. Reservoirs and infusion sets should be changed at least every 48 hours. NovoLog® should not be exposed to temperatures greater than 37°C (98.6°F). **NovoLog® that will be used in a pump should not be mixed with other insulin or with a diluent** [see *Dosage and Administration, Warnings and Precautions and How Supplied/Storage and Handling, Patient Counseling Information*].

ADVERSE REACTIONS: Clinical Trial Experience: Because clinical trials are conducted under widely varying designs, the adverse reaction rates reported in one clinical trial may not be easily compared to those rates reported in another clinical trial, and may not reflect the rates actually observed in clinical practice. **Hypoglycemia:** Hypoglycemia is the most commonly observed adverse reaction in patients using insulin, including NovoLog® [see *Warnings and Precautions*]. **Insulin initiation and glucose control intensification:** Intensification or rapid improvement in glucose control has been associated with a transitory, reversible ophthalmologic refraction disorder, worsening of diabetic retinopathy, and acute painful peripheral neuropathy. However, long-term glycemic control decreases the risk of diabetic retinopathy and neuropathy. **Lipodystrophy:** Long-term use of insulin, including NovoLog®, can cause lipodystrophy at the site of repeated insulin injections or infusion. Lipodystrophy includes lipohypertrophy (thickening of adipose tissue) and lipatrophy (thinning of adipose tissue), and may affect insulin absorption. Rotate insulin injection or infusion sites within the same region to reduce the risk of lipodystrophy. **Weight gain:** Weight gain can occur with some insulin therapies, including NovoLog®, and has been attributed to the anabolic effects of insulin and the decrease in glucosuria. **Peripheral Edema:** Insulin may cause sodium retention and edema, particularly if previously poor metabolic control is improved by intensified insulin therapy. **Frequencies of adverse drug reactions:** The frequencies of adverse drug reactions during NovoLog® clinical trials in patients with type 1 diabetes mellitus and type 2 diabetes mellitus are listed in the tables below.

Table 1: Treatment-Emergent Adverse Events in Patients with Type 1 Diabetes Mellitus (Adverse events with frequency ≥ 5% and occurring more frequently with NovoLog® compared to human regular insulin are listed)

| Preferred Term | NovoLog® + NPH N= 596 | | Human Regular Insulin + NPH N= 286 | |
|-------------------|--------------------------|-----|---------------------------------------|-----|
| | N | (%) | N | (%) |
| Hypoglycemia* | 448 | 75% | 205 | 72% |
| Headache | 70 | 12% | 28 | 10% |
| Injury accidental | 65 | 11% | 29 | 10% |
| Nausea | 43 | 7% | 13 | 5% |
| Diarrhea | 28 | 5% | 9 | 3% |

*Hypoglycemia is defined as an episode of blood glucose concentration <45 mg/dL with or without symptoms. See *Clinical Studies* for the incidence of serious hypoglycemia in the individual clinical trials.

Table 2: Treatment-Emergent Adverse Events in Patients with Type 2 Diabetes Mellitus (except for hypoglycemia, adverse events with frequency ≥ 5% and occurring more frequently with NovoLog® compared to human regular insulin are listed)

| | NovoLog® + NPH N= 91 | | Human Regular Insulin + NPH N= 91 | |
|-------------------------|-------------------------|-----|--------------------------------------|-----|
| | N | (%) | N | (%) |
| Hypoglycemia* | 25 | 27% | 33 | 36% |
| Hyporeflexia | 10 | 11% | 6 | 7% |
| Onychomycosis | 9 | 10% | 5 | 5% |
| Sensory disturbance | 8 | 9% | 6 | 7% |
| Urinary tract infection | 7 | 8% | 6 | 7% |
| Chest pain | 5 | 5% | 3 | 3% |
| Headache | 5 | 5% | 3 | 3% |
| Skin disorder | 5 | 5% | 2 | 2% |
| Abdominal pain | 5 | 5% | 1 | 1% |
| Sinusitis | 5 | 5% | 1 | 1% |

*Hypoglycemia is defined as an episode of blood glucose concentration <45 mg/dL, with or without symptoms. See *Clinical Studies* for the incidence of serious hypoglycemia in the individual clinical trials.

Postmarketing Data: The following additional adverse reactions have been identified during postapproval use of NovoLog®. Because these adverse reactions are reported voluntarily from a population of uncertain size, it is generally not possible to reliably estimate their frequency. Medication errors in which other insulins have been accidentally substituted for NovoLog® have been identified during postapproval use [see *Patient Counseling Information*].

OVERDOSAGE: Excess insulin administration may cause hypoglycemia and, particularly when given intravenously, hypokalemia. Mild episodes of hypoglycemia usually can be treated with oral glucose. Adjustments in drug dosage, meal patterns, or exercise, may be needed. More severe episodes with coma, seizure, or neurologic impairment may be treated with intramuscular/subcutaneous glucagon or concentrated intravenous glucose. Sustained carbohydrate intake and observation may be necessary because hypoglycemia may recur after apparent clinical recovery. Hypokalemia must be corrected appropriately.

More detailed information is available on request.

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www.novonordisk-us.com

NovoLog® is a registered trademark of Novo Nordisk A/S.

NovoLog® is covered by US Patent Nos 5,618,913; 5,866,538; and other patents pending.

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