

## WHY **REBINYN®**

**Coagulation Factor IX** (Recombinant), GlycoPEGylated



Rebinyn®—Reach for high factor levels in hemophilia B1

shown are for illustrative purposes only.

#### INDICATIONS AND USAGE

Rebinyn®, Coagulation Factor IX (Recombinant), GlycoPEGylated, is a recombinant DNA derived coagulation Factor IX concentrate indicated for use in adults and children with hemophilia B for on demand treatment and control of bleeding episodes and perioperative management of bleeding.

Limitations of Use: Rebinyn® is not indicated for routine prophylaxis or for immune tolerance induction in patients with hemophilia B.

Please see additional Important Safety Information throughout. Please see accompanying Prescribing Information.



rebinyn<sup>®</sup>

Coagulation Factor IX (Recombinant), GlycoPEGylated

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## TAKE CONTROL WITH HIGH **FACTOR ACTIVITY**

In a phase 3 study of adults with ≤2% factor levels, a single dose of Rebinyn® 40 IU/kg was shown to

Elevate factor levels above baseline levels<sup>1,a</sup>

achieved after an infusion<sup>1,b</sup>

sustained after 7 days<sup>1,a</sup> n=6

Based on pharmacokinetic (PK) assessment of a single dose of Rebinyn® 40 IU/kg in 6 adults (mean FIX activity 16.8%), 3 adolescents (mean FIX activity 14.6%), 13 children aged 7-12 (mean FIX activity 10.9%), and 12 children aged 0-6 (mean FIX activity 8.4%) upon enrollment in the phase 3 trials using 1-stage assay and product-specific standard. All values are geometric mean.

<sup>b</sup>Based upon a 2.34% increase in factor levels per IU/kg infused in adults.

Rebinyn® achieved an 83-hour mean half-life in adults¹,a

#### IMPORTANT SAFETY INFORMATION

#### **Contraindications**

• Rebinyn® is contraindicated in patients with a known hypersensitivity to Rebinyn® or its components, including hamster proteins.

#### **Warnings and Precautions**

• Hypersensitivity reactions, including anaphylaxis, may occur. Signs may include angioedema, chest tightness, difficulty breathing, wheezing, urticaria, and itching. Discontinue Rebinyn® if allergic or anaphylactic-type reactions occur and initiate appropriate treatment.

Please see additional Important Safety Information throughout. Please see accompanying Prescribing Information.

## **HIGH FACTOR ACTIVITY IN PEDIATRIC PATIENTS**

In paradigm™ 2 and paradigm™ 5, a single dose of Rebinyn® 40 IU/kg was shown to elevate factor levels above baseline in pediatric patients<sup>1,c</sup>

In children aged ≤6 years

achieved after an infusion<sup>1,d</sup>

sustained after 7 days1,c n=12

In children aged 7-12 years

achieved after an infusion<sup>1,e</sup>

sustained after 7 days1,c n=13

In adolescents aged 13-17 years

achieved after an infusion<sup>1,f</sup>

sustained after 7 days1,c n=3

'Based on PK assessment of a single dose of Rebinyn® 40 IU/kg in 3 adolescents (mean FIX activity 14.6%), 13 children aged 7-12 (mean FIX activity 10.9%), and 12 children aged 0-6 (mean FIX activity 8.4%) upon enrollment in the phase 3 trials using 1-stage assay and product-specific standard. All values are geometric mean.

<sup>d</sup>Based upon a 1.51% increase in factor levels per IU/kg infused in children aged ≤6.1

<sup>e</sup>Based upon a 1.59% increase in factor levels per IU/kg infused in children aged 7-12.<sup>1</sup>

Based upon a 1.96% increase in factor levels per IU/kg infused in adolescents aged 13-17.1



rebinyn Coagulation Factor IX (Recombinant), GlycoPEGylated

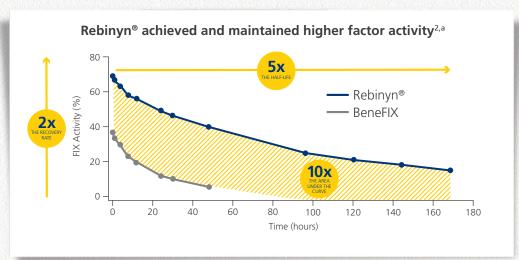
# ACHIEVE HIGHER FACTOR ACTIVITY FOR LONGER COMPARED WITH BENEFIX®

In a phase 1 study, compared to BeneFIX, Rebinyn® was shown to<sup>2,a</sup>

Increase FIX activity

Solve the properties of the body of the properties of the pro

- Rebinyn® is not approved for routine prophylaxis.
- Animals given repeat doses of Rebinyn® showed accumulation of PEG in the choroid plexus. The potential clinical implications of these animal findings are unknown.



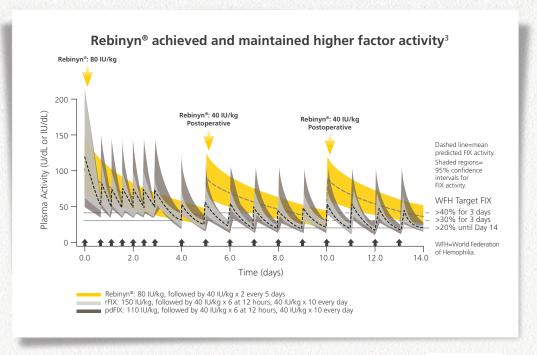
In this study, the estimated time to 1% with Rebinyn® was 22.5 days<sup>2,c</sup>

Based upon a phase 1 study of patients administered 1 of 3 doses of Rebinyn® (25, 50, or 100 IU/kg) compared with one 50 IU/kg dose of their prior SHL recombinant FIX (rFIX) (n=7) or plasma-derived FIX (pdFIX) (n=8) using a 1-stage assay and product-specific standard. For Rebinyn®, estimated mean activity is adjusted to a dose of 50 IU/kg. Differences were similar in comparison of Rebinyn® to pdFIX (recovery 1.3 vs 1.1 IU/dL per IU/kg, 1.2x; half-life 93 vs 18 hours, 5.2x; area under the curve [AUC] 70 vs 9 U x h/mL, 8x).<sup>2</sup>

Please see additional Important Safety Information throughout. Please see accompanying Prescribing Information.

# AN INITIAL DOSE OF REBINYN® WAS PREDICTED TO MAINTAIN FIX LEVELS IN SURGERY

A single 80 IU/kg dose of Rebinyn<sup>®</sup>, followed by two 40 IU/kg doses, was predicted to maintain target FIX levels for a 2-week postoperative period using PK simulations<sup>3</sup>



### 3 doses of Rebinyn®

vs 17 doses of BeneFIX or pdFIX were required to maintain the same WFH target FIX activity level<sup>3</sup>



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#### **IMPORTANT SAFETY INFORMATION (cont'd)**

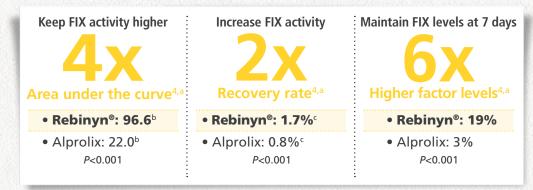
#### Warnings and Precautions (cont'd)

• Development of neutralizing antibodies (inhibitors) to Factor IX may occur. Monitor patients for development of factor IX inhibitors if bleeding is not controlled with the recommended dose of Rebinyn® or if expected Factor IX activity plasma levels are not attained. Factor IX activity assay results may vary with the type of activated partial thromboplastin time reagent used.



# HIGHER FACTOR ACTIVITY SUSTAINED OVER 7 DAYS COMPARED WITH ALPROLIX

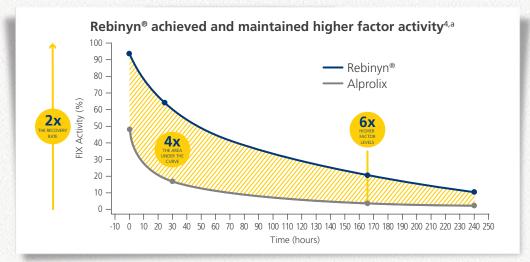
In a phase 1 study, Rebinyn® was shown to<sup>4,a</sup>



<sup>a</sup>Based upon a phase 1 study of 15 patients administered a single dose of Rebinyn<sup>®</sup> 50 IU/kg compared with a single dose of Alprolix 50 IU/kg using both 1-stage (shown above) and chromogenic assays. The standard Alprolix dose of 50 IU/kg was administered for both products to allow for comparison of dose-dependent parameters; dose normalized to 50 IU/kg to reflect minor differences in dose administered. Geometric mean half-life was also prolonged (Rebinyn: 103.2 hours, Alprolix: 84.9 hours). All comparisons were significant (*P*<0.001) for both assays.<sup>4</sup>
<sup>b</sup>IU x h/mL.

Per IU/kg.

#### Comparison of Rebinyn® and Alprolix



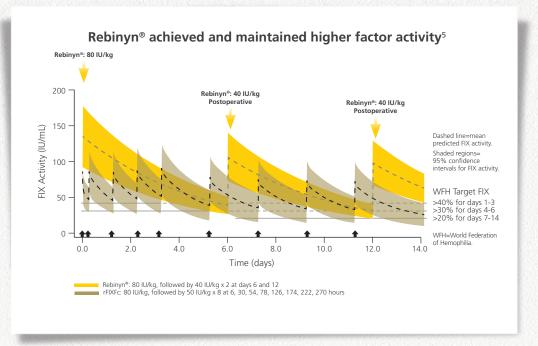
- The clinical relevance of these PK differences is unknown
- Rebinyn® is not approved for routine prophylaxis

The half-life of Rebinyn® was 103 hours vs 85 hours for Alprolix.4

Please see additional Important Safety Information throughout. Please see accompanying Prescribing Information.

# AN INITIAL DOSE OF REBINYN® WAS PREDICTED TO MAINTAIN FIX LEVELS IN MAJOR SURGERY

A single 80 IU/kg dose of Rebinyn®, followed by two 40 IU/kg doses, was predicted to maintain target FIX levels for a 2-week postoperative period using PK simulations<sup>5</sup>



### 3 doses of Rebinyn®

vs 9 doses of Alprolix were required to maintain the same WFH target FIX activity level<sup>5</sup>

### Scan here to view additional

#### **IMPORTANT SAFETY INFORMATION (cont'd)**

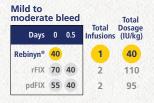
#### Warnings and Precautions (cont'd)

- The use of Factor IX-containing products has been associated with thrombotic complications. Monitor for thrombotic and consumptive coagulopathy when administering Rebinyn® to patients with liver disease, post-operatively, to newborn infants, or to patients at risk of thrombosis or disseminated intravascular coagulation (DIC).
- Nephrotic syndrome has been reported following immune tolerance induction therapy with Factor IX products in hemophilia B patients with Factor IX inhibitors, often with a history of allergic reactions to factor IX. The safety and efficacy of using Rebinyn® for immune tolerance induction have not been established.

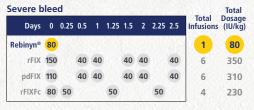


# REBINYN® MAY REDUCE THE NEED FOR ADDITIONAL INFUSIONSa-c

#### Estimated number of doses and amount of FIX per episode<sup>3,5</sup>



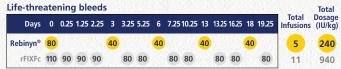
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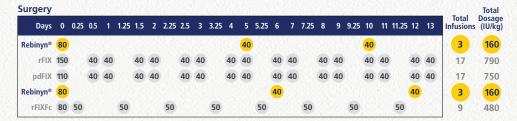


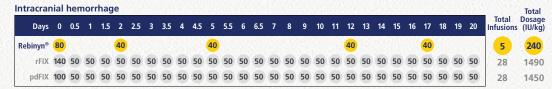
<sup>a</sup>A single dose should be enough for minor and moderate bleeds. Your doctor may recommend additional doses of 40 IU/kg.<sup>3</sup>

<sup>6</sup>Based on a PK modeling to WFH guidelines. Simulated results based on phase 1 PK studies of Rebinyn<sup>®</sup> (n=30), rFIX (n=7), pdFIX (n=8), and rFIXFc (n=15).<sup>3</sup>

'Based on a PK modeling to WFH guidelines. Simulated results based on a phase 1 PK study of Rebinyn (n=15).<sup>5</sup>







#### **IMPORTANT SAFETY INFORMATION (cont'd)**

#### **Adverse Reactions**

• The most common adverse reactions reported in clinical trials (≥1%) were itching and injection site reactions.

Please see additional Important Safety Information throughout. Please see accompanying Prescribing Information.

# REBINYN® REDUCES THE AMOUNT OF FIX NEEDED

#### In a phase 3 study in previously treated adolescents and adults<sup>6</sup>

- Half of the patients treated on-demand were able to resolve all bleeds with a single dose of Rebinyn®
- Of the remaining patients, those previously treated with multiple high doses<sup>d</sup> saw a significant decrease in FIX use with Rebinyn<sup>®</sup>

## Patients previously treated with multiple SHL doses needed up to 80% less FIX<sup>d</sup> with Rebinyn<sup>®6</sup>



<sup>a</sup>In a phase 3 study, the efficacy of Rebinyn® in adults/adolescents was evaluated. The on-demand arm included 15 patients; 1 patient had no bleeds; the other 14 patients received Rebinyn® 40 IU/kg for the treatment of bleeds. Patients received on-demand treatment for 28 weeks. Seven patients controlled all bleeds (62 bleeds) with a single 40 IU/kg dose of Rebinyn®. The remaining 7 patients (81 bleeds) required ≥2 doses to control at least 1 of their bleeds. Of those 7, 4 patients who were previously treated with multiple high doses (2-3 doses of 60 IU/kg or 83 IU/kg) were able to control 71% of their bleeds with a single dose and used 58%-80% less FIX while using Rebinyn® 40 IU/kg.<sup>6</sup>

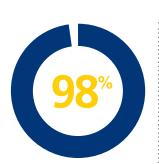
#### IMPORTANT SAFETY INFORMATION (cont'd)

#### **Adverse Reactions (cont'd)**

 Animals administered repeat doses of Rebinyn® showed accumulation of PEG in the choroid plexus. The potential clinical implications of these animal findings are unknown.



# ACHIEVE CONTROL WHEN BLEEDS OCCUR



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**bleeds treated with 1-2 infusions**<sup>1</sup>
n=143 bleeding episodes<sup>a</sup>



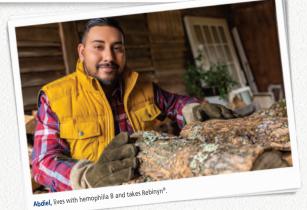
rated their bleed control as successful (defined as excellent or good)<sup>1,b</sup> n=142 bleeding episodes



rated their bleed control as successful (defined as excellent or good)<sup>7</sup> n=42 bleeding episodes

<sup>a</sup>Results shown are from the on-demand arm of the adolescent/adult trial, in which 15 previously treated adolescent/adult subjects were treated for on-demand bleeds. In 14 subjects, there were a total of 143 bleeding episodes. In 1 subject, no bleeding episode data were recorded.<sup>1</sup>

<sup>b</sup>Results shown are based on a bleed assessment by either the patient (for home treatment) or the study investigator (for treatment under medical supervision). Bleeds were assessed using a 4-point scale of excellent, good, moderate, or poor.<sup>1</sup>



#### IMPORTANT SAFETY INFORMATION (cont'd)

#### **Contraindications**

• Rebinyn® is contraindicated in patients with a known hypersensitivity to Rebinyn® or its components, including hamster proteins.

#### **Warnings and Precautions**

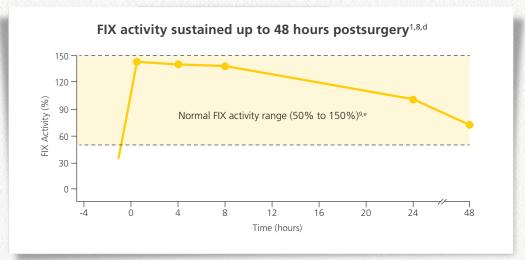
Hypersensitivity reactions, including anaphylaxis, may occur. Signs may include angioedema, chest tightness, difficulty breathing, wheezing, urticaria, and itching. Discontinue Rebinyn® if allergic or anaphylactic-type reactions occur and initiate appropriate treatment.

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# PROTECTION FROM A SINGLE DOSE DURING SURGERY



'Results shown are from the surgery trial, which included 13 previously treated adolescent and adult subjects. On the day of their respective surgeries, patients received 1 infusion of Rebinyn® 80 IU/kg. Postoperatively, subjects received infusions of Rebinyn® 40 IU/kg at the investigator's discretion for up to 3 weeks after surgery. Across 13 surgical procedures (9 major)—which included 9 orthopedic, 1 gastrointestinal, and 3 oral cavity procedures—the hemostatic effect during surgery was evaluated on a 4-point scale of excellent, good, moderate, or poor. Treatment success was defined as excellent or good hemostasis.'



In the surgery study, mean FIX activity following an initial preoperative Rebinyn® 80 IU/kg in 13 procedures was assessed by 1-stage assay with product-specific standard. At 8 and 24 hours, 1 subject who had no FIX activity measurement obtained was excluded. At 48 hours, 2 subjects who had no FIX activity measurement obtained were excluded and 4 subjects re-dosed prior to the second day after surgery for whom FIX activity at 24 hours were 84%, 112%, 131%, and 134%. The FIX activity at 48 hours reflects a measurement on the second day after surgery (range 47-57 hours).

<sup>e</sup>Range shaded represents the normal population FIX activity range of 50% to 150%.<sup>9</sup>



### **DESIGNED FOR SAFETY**

#### In clinical trials, 115 previously treated male patients were given Rebinyn® for 8801 exposure days1



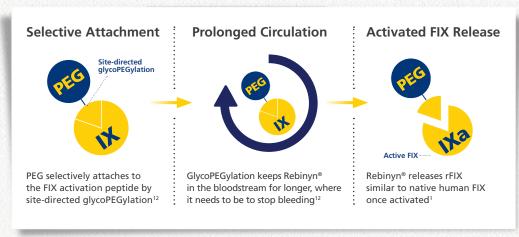
12

Adverse reactions include hypersensitivity (1%), itching (3%), and injection-site reactions (4%)1,a Formation of inhibitors and thrombotic complications have been associated with FIX treatment. Monitor patients for the development of

inhibitors and signs of thrombosis<sup>1</sup>

<sup>a</sup>ldentified in 115 previously treated patients who were treated with Rebinyn® in clinical studies. A previously treated patient was defined as a subject with a history of at least 150 exposure days to other FIX products (adolescent/adult subjects) or 50 exposure days to other FIX products (pediatric subjects) and no history of inhibitors. There were a total of 8801 exposure days, equivalent to 170 patient-years. A total of 40 patients (35%) were treated for more than 2 years.

#### PEGylation<sup>b</sup> is a technology used to extend half-life<sup>11</sup>



bPEG=polyethylene glycol.

#### **IMPORTANT SAFETY INFORMATION (cont'd)**

#### **Warnings and Precautions**

**Adverse Reactions** 

- The most common adverse reactions reported in clinical trials (≥1%) were itching and injection site reactions.
- Animals administered repeat doses of Rebinyn® showed accumulation of PEG in the choroid plexus. The potential clinical implications of these animal findings are unknown.

Please see additional Important Safety Information throughout. Please see accompanying Prescribing Information.

## **TAKE CONTROL WITH** SIMPLIFIED DOSING

Unlike other FIX products, there is no need to calculate desired FIX activity levels when determining the appropriate dose<sup>1,13-17</sup>

The recommended dose for all patients is

for minor or moderate bleeds<sup>1,</sup>

80 IU/kg for major bleeds<sup>c</sup>

<sup>c</sup>A single dose should be sufficient for minor and moderate bleeds. Additional doses of 40 IU/kg can be given.1

#### Rebinyn® can be infused in 1-4 minutes1

With MixPro®, preparing a dose of Rebinyn® is as quick as

### ATTACH<sup>1,d</sup> Prefilled diluent syringe contains 4 mL of

diluent—works with any dose strength

### TWIST<sup>1,d</sup>

Adapter connects the syringe and vial, with a 25-µm inline particle filter



After mixing the reconstituted solution can be administered

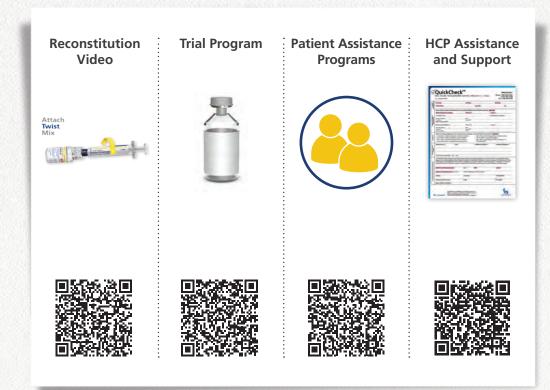


<sup>&</sup>lt;sup>d</sup> For complete instructions on reconstitution and administration, please refer to the Instructions for Use.

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# RESOURCES FOR YOU AND YOUR PATIENTS

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References: 1. Rebinyn [package insert]. Plainsboro, NJ: Novo Nordisk Inc; May 2017. 2. Negrier C, Knobe K, Tiede A, Giangrande P, Møss J. Enhanced pharmacokinetic properties of a glycoPEGylated recombinant factor IX: a first human dose trial in patients with hemophilia B. Blood. 2011;118(10):2695-2701. 3. Collins PW, Møss J, Knobe K, et al. Population pharmacokinetic modeling for dose setting of nonacog beta pegol (N9-GP), a glycoPEGylated recombinant factor IX. J Thromb Haemost. 2012;10(11):2305-2312. 4. Ettingshausen C, Hegemann I, Simpson M, et al. Favorable pharmacokinetics in hemophilia B for nonacog beta pegol versus recombinant factor IX-Fc fusion protein: a randomized trial. Res Pract Thromb Haemost. 2019;3(2):268-276 5. Simpson M, Kulkarni R, Ettingshausen C, et al. Population pharmacokinetic modeling of on-demand and surgical use of nonacog beta pegol (N9-GP) and rFIXFc based upon the paradigm 7 comparative pharmacokinetic study. J. Blood Med. 2019;10:391–398. 6. Escobar M, Walsh C, Cooper D, Young G. Efficacy of on-demand treatment of bleeding episodes in hemophilia B patients with extended half-life N9-GP in pivotal trials: an in-depth analysis of treatment. Poster presented at: 70th NHF Bleeding Disorders Conference; October 11-13, 2018; Orlando, FL. 7. Carcao M, Zak M, Abdul Karim F, et al. Nonacog beta pegol in previously treated children with hemophilia B: results from an international open-label phase 3 trial. J Thromb Haemost. 2016;14(8):1521-1529. 8. Escobar MA, Tehranchi R, Karim FA, et al. Low-factor consumption for major surgery in haemophilia B with long-acting recombinant glycoPEGylated factor IX. Haemophilia. 2017;23(1):67-76. 9. 1-Stage APTT-Based Factor Assays. Practical-Haemostasis website. http://practical-haemostasis.com/Factor%20Assays/1\_stage\_aptt\_assays.html. Accessed October 27, 2019. 10. Collins PW, Young G, Knobe K, et al. Recombinant long-acting glycoPEGylated factor IX in hemophilia B: a multinational randomized phase 3 trial. Blood. 2014;124(26):3880-3886. 11. Swierczewska M, Lee KC, Lee S. What is the future of PEGylated therapies? Expert Opin Emerg Drugs. 2015;20(4):531-536. 12. Østergaard H, Bjelke JR, Hansen L, et al. Prolonged half-life and preserved enzymatic properties of factor IX selectively PEGylated on native N-glycans in the activation peptide. Blood. 2011;118(8):2333-2341. 13. Alprolix [package insert]. Cambridge, MA: Biogen Inc; 2017. 14. Rixubis [package insert]. Westlake Village, CA: Baxalta Healthcare Corporation; 2016. **15.** Idelvion [package insert]. Kankakee, IL: CSL Behring LLC; 2017. **16.** Ixinity [package insert]. Berwyn, PA: Aptevo BioTherapeutics LLC; 2016. **17.** Benefix [package insert]. Philadelphia, PA: Wyeth Pharmaceuticals, Inc.; 2017.

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# TAKE CONTROL TO A HIGH LEVEL

Greater coverage with the highest activity for the longest time<sup>2,4,a</sup>

**High factor activity** 

17% sustained after

7 days with a single

40 IU/kg dose<sup>1,b</sup>

Improved PK profile compared with BeneFIX and Alprolix<sup>2,4</sup>

**5**x

longer half-life compared with BeneFIX<sup>2,c</sup>
P<0.001

**4**x

greater AUC compared with Alprolix<sup>4,d</sup> P<0.001

<sup>a</sup>Compared with BeneFIX and Alprolix.<sup>2,4</sup>

bBased upon a single initial dose of Rebinyn® 40 IU/kg in a subset of 6 adults upon enrollment in the phase 3 trials. Mean FIX activity was 16.8% (1-stage assay with product-specific standard), incremental recovery was 2.34 IU/dL per IU/kg, and half-life was 83 hours.¹

Phase 1 study of 15 adults administered single doses of Rebinyn® (25, 50, and 100 IU/kg) and prior product (50 IU/kg). Comparison of incremental recovery (Rebinyn® vs SHL rFIX: 1.31 vs 0.68 IU/dL per IU/kg), half-life (93 vs 19 hours), and AUC (72 vs 7 [U x h/mL]) are for 7 patients using 1-stage assay and product-specific standard. All comparisons were significant (P<0.001). Estimated mean activity for Rebinyn® was adjusted to a dose of 50 IU/kg to allow for comparison of dose-dependent parameters.²

Based upon a phase 1 study of 15 patients administered a single dose of Rebinyn® 50 IU/kg compared with a single dose of Alprolix 50 IU/kg using both 1-stage and chromogenic assays. The standard Alprolix dose of 50 IU/kg was administered for both products to allow for comparison of dose-dependent parameters; dose-normalized to 50 IU/kg to reflect minor differences in doses administered. Comparisons were significant (*P*<0.001) for both assays; 1-stage results for Rebinyn® vs Alprolix included AUC (96.6 vs 22.0 IU x h/mL), incremental recovery (1.7% vs 0.8% per IU/kg), and FIX at 7 days (19% vs 3%).4

- Rebinyn® is not approved for routine prophylaxis
- Animals given repeat doses of Rebinyn® showed accumulation of PEG in the choroid plexus. The potential clinical implications of these animal findings are unknown

#### INDICATIONS AND USAGE

Rebinyn®, Coagulation Factor IX (Recombinant), GlycoPEGylated, is a recombinant DNA derived coagulation Factor IX concentrate indicated for use in adults and children with hemophilia B for on demand treatment and control of bleeding episodes and perioperative management of bleeding.

Limitations of Use: Rebinyn® is not indicated for routine prophylaxis or for immune tolerance induction in patients with hemophilia B.

Please see additional Important Safety Information. Please see accompanying Prescribing Information.



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rebinyn

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