

!" #&/  
4;O <548G=>3> 70AB>AC20==O ;V:0@AL:>3> 70A>1C

#"  
(NEURORUBINE")

!::04:

4VNGV @5G>28=8: BV0E;>@84 (2VB0<sub>1</sub>), ?V@84>:A8=C 3V4@>E;>@84 (2VB0<sub>6</sub>), FV0=>:>10;0<sub>12</sub>);  
1 07G8=>< E;>@84C (2VB0<sub>1</sub>) 100 <3, ?V@84>:A8=C 3V4@>E;>@84C (2VB0<sub>6</sub>) 100 <3, FV0=>:>10;0<sub>12</sub>) 1  
<3;  
4>?>28=8: :0;VN FV0=V4, A?8@B 15=78;>289, 2>40 4;O V=T:FV9.

V:0@AL:0 D>@<0. >7G8= 4;O V=T:FV9.  
A=>2=V DV78:>-EVABV: ?@>7>@89, G5@2>=>3> :>;L>@C @>7G8=.

\$0@<0:>B5@0?52B8G=0 3@C?0. VB0<sub>1</sub> C :><1V=0FVW 7 2VB0< 6 B0/01> 2VB0< 12.  
>4 "X 11D B.

\$0@<0:>3VG=V 2;0AB82>ABV.

\$0@<0:>48=0  
59@>@C1V=" ?>T4=CT C A>1V 28A>:V 4>78 B@L>E 2VB0<sub>1, 6, 12</sub>, O:V 2V4V3@0NBL 206;82C @>;L C  
4VO;L=>ABV =5@2>2>W A8AB5<8. >65= V7 F8E 2VB01EV4=89 4;O 70157?5G5==O ?>B8<0;L=>3> >1  
28= C =5@2>28E ;:VB8=0E. @V< B>3>, ?@8 70AB>AC20==V F8E 2VB0:8E 4>70E, 2>=8 ?@>O2;ONBL  
7=51>;N20;L=C 4VN.

/: V 2AV V=HV 2VB0=8 T =570

"5@0?52B8G=5 22545==O 2 >@30=V7< 2VB0<sub>1, 6</sub> V<sub>12</sub> ?>?>2=NT =54>AB0B=T =04E>465==O 2VB0  
70157?5GCT =002=VABL 2 >@30=V71EV4=>W :V;L:>ABV :>5=78□VB0=5=B0<8 D5@<5=B=8E A8AB5  
<, O:V @53C;NNBL <5B01>;V7< 1V;:V2, 68@V2 B0 2C3;52>4V2. @>B5 :>65= V7 2VB0=CT  
A?5F8DVG=C 1V>;>3VG=C @>;L. E ?@8ACB=VABL 2 >@30=V720=V9 :V;L:>ABV =5>1EV4=0 4;O =>@  
<0;L=>3> DC=:FV=>C20==O >128=.

"5@0?52B8G=5 70AB>AC20==O F8E 2VB0@N20==OE =5@2>2>W A8AB5<8 A?@O<>20=> =0 B5, I>1, 7  
>4=>3> 1>:C, :>4=>G0A=> VA=CNGC =54>AB0B=VABL (<6;82>, G5@57 71V;LH5==O ?>B@518  
>@30=V71C<>2;5=>W 157?>A5@54=L> 70E2>@N20==O<) V, 7 V=H>3> 1>:C, 018 AB84=V <5E0=V7<8  
2V4=>2;5==O. □VB0<sub>1, 6</sub> V<sub>12</sub> 2>;>4VNBL 4C65 =87L:>N B>:A8G=VABN V =5<0NBL ?>B5=FV9=>3>  
@878:C 4;O ;N48=8. 0 AL>3>4=V =5<0T 40=8E I>4> :0=F5@>35==8E, B5@0B>35==8E 2;0AB82>AB59  
F8E 2VB0

\$0@<0:>:V=5B8:0.

>7G8==V C 2>4V 2VB02=VABN 70A2>NNBLAO >@30=V7<<< ?VA;O 2=CB@VH=L<<O7>2>3>  
22545==O. !BC?V=L 70A2>T==O 70;568BL 2V4 7=0E>465==O :@>2>B>:C 2V4=>A=>  
?0(2VB0<sub>12</sub>). VA;O 01A>@1FVW 2VB0<sub>12</sub> 72O7CTBLAO C A8@>20BFV 7V A?5F8DVG=8<8 12-  
72□O7CNG8< 15B0-(B@0=A:>10;0<sub>12</sub>-72□O7CNG8< 0;LD0<sub>1</sub>-3;>1C;V=>  
0:>?8G5==O 2VB0<sub>12</sub> 2V41C20TBLAO 2 >A=>2=>4 =0?V2282545==O 7 A8@>20B:8 :@>2V A;:040T  
?@81;87=> 5 4=V2, 0 7 ?5GV=:8 ?@81;87=> 1 @V:.

"V0E;>@84 (2VB0<sub>1</sub>). '0AB8=0 70A2>T=>3> BV0 A=>2=V ?@>4C:B8 5:A:@5FVW BV0 F5 BV0=>20  
>8A;>B0 B0 ?V@0  
(2,5-48<5B8;-4-0?V@8< V7 F8< 284V;OTBLAO =525;8:0 :V;L:VABL BV0  
V@84>:A8=C 3V4@>E;>@84 (2VB0<sub>6</sub>). >@30=V7:A8= :>8A=NTBLAO 4> ?V@84>:A0;N 01> 0  
?V@84>:A0AD>@8;N20==O 70 !<sub>2</sub>-3@C?>N 2 5-;>65==V, B>1B> CB2>@5==O ?V@84>:A0;L-5-D>AD0BC  
(\$). # :@>2V 1;87L:> 80 % \$ 72O70=V 7 1V;:0<8. V@84>:A8= ?5@5206=> =0:>?8GCTBLAO C <O70E C  
283;O4V \$. >;>2=89 ?@>4C:B 5:A:@5FVW 4-?V@84>:A8=>20 :8A;>B0.

;V=VG=V E0@0:B5@8AB8:8.

>:070==O.

V:C20==O =52@8BV2 V =52@0;3V9, B0:8E O::  
- =52@0;3VO B@V9G0AB>3> =5@20;

-  
- VHV0A;  
- ?>?5@5:>289 A8=4@< (>N<103>);  
- ?;5:A8B (H89=>3> B0 ?;5G>2>3> A?;5BV=L);  
- :>@V=F52V =52@8B8 2=0A;V4>: 4535=5@0B82=8E 70E2>@N20=L E@51B0;  
- ?@>7?;>53VO (C@065==O ;8FL>2>3> =5@20).

**@>B8?>:070==O.**

V?5@GCB;82VABL 4> 1C4L-O:>3> :>=5=B0 ?@5?0@0BC.  
VB0<sub>1</sub> ?@>B8?>:070=> 70AB>A>2C20B8 ?@8 0;5@3VG=8E 70E2>@N20==OE.  
VB0<sub>6</sub> ?@>B8?>:070=> 70AB>A>2C20B8 ?@8 28@07:>2V9 E2>@>1V H;C=:0 V 420=04FOB8?0;>W :8H:8  
C AB04VW 703>AB@5==O >A;V;L:8 <>6;825 ?V428I5==O :8A;>B=>ABV H;C=:>2>3> A>:C).  
VB0<sub>12</sub> ?@>B8?>:070=> 70AB>A>2C20B8 ?@8 5@8B@5F8B>7V, B@<1>5<1>;VW.

**70T<>4VO 7V=H8<8 ;V:0@AL:8<8 70A>10<8 B0 V=HV 2848 270T<>4V9.**

8A>:V 4>78 2VB0<sub>6</sub>, =0?@8;:04, B0:V, O:V @C1V=", <>6CBL 7<5=HC20B8 B5@0?52B8G=89 5D5:B  
;52>4>?8 I>4> E2>@>18 0@:V=A>=0.  
>65 71V;LH8B8AL B>:A8G=VABL V7>=V0784C.  
VB0<sub>6</sub> <>65 7<5=H8B8 5D5:B82=VABL 0;B@5B0  
4=>G0A=89 ?@89>< 7 0=B03>=VAB0<8 ?V@84>:A8=C (=0?@8;:04 V7>=V0784, 3V4@0;078=, ?5=VF8;0  
F8;:>A5@8=), ?5@>@0;L=8<8 :>=B@0F5?B820<8 <>65 ?V428IC20B8 ?>B@51C C 2VB0<sub>6</sub>.  
VO BV0@C@0F8;><, >A;V;L:8 >AB0==V9 :>=:C@5=B=> V=3V1CT D>AD>@8;N20==O BV0D>AD0B.  
=B0F848 C?>2V;L=NNBL 2A<:BC20==O 2VB0<sub>1</sub>.  
5B;L>2V 4VC@5B8:8, =0?@8;:04, DC@>A5 30;L@1FVN, ?V4 G0A 4>23>B@820;>W B5@0?VW <>6CBL  
A?@8G8=8B8 ?V428I5==O 5:A:@5FVW BV0  
6820==O =0?>W2, I> ), ?V428ICT 453@040FVN BV0

**A>1;82>ABV 70AB>AC20==O.**

@5?0@0B =5 A;V4 22>48B8 2=CB@VH=L>25==>.  
=CB@VH=L<<07>2V V=T:FVW 2VB0<sub>12</sub> <>6CBL A?@8G8=OB8 0=0DV;0:B>W4=V @50:FVW C  
?0FVT=BV2 7 ?V428I5=>N GCB;82VABN.  
0@5=B5@0;L=5 22545==O 2VB0<sub>12</sub> <>65 B82> 2?;820B8 =0 4V03=>AB8:C DC=V:C;O@=>3> 7C 01>  
?5@=VFV>7=>W 0=5  
>23>B@820;89 ?@89>< 2VB0<sub>6</sub> (?>=04 6-12 70E 1V;LH5 =V6 50<3 I>45==> 01> C 4>70E 1V;LH5 =V6 1000  
<3 =0 4>1C (?>=04 2 W A5=A>@=>W =59@>?0BVW (?0@5AB57VW) =5>1EV4=> 2V4:>@83C20B8 4>7C  
?@5?0@0BC B0, O:I> =5>1EV4=>, ?@8?8=8B8 ;V:C20==O.  
A;V;L:8 59@>@C1V=B< 6, A;V4 7 >15@56=VABN 70AB>A>2C20B8 ?@5?0@0B ?0FVT=B0< 7  
?5?B8G=>N 28@07:>N H;C=:0 V 420=04FOB8?0;>W :8H:8 2 0=0<=57V, 7 28@065=8<8 ?>@CH5==O<8  
DC=:FVW =8@>: V ?5GV=:8.  
0FVT=B0< 7 =>2>CB2>@5==O<8, 70 28=OB:>< 28?04:V2, I> AC?@>2>46CNBLAO <530;>1;0AB=>N 0=5  
< 2VB0<sub>12</sub>, =5 A;V4 70AB>A>2C20B8 ?@5?0@0B.  
@5?0@0B =5 70AB>A>2CNBL ?@8 BO6:V9 01> 3>AB@V9 D>@W 4VO;L=>ABV B0 AB5=>:0@4VW.

**0AB>AC20==O C ?5@V>4 203VB=>ABV 01> 3>4C20==O 3@C44N.**

;V=VG=V 4>A;V465==O ;V:C20==O ?@5?0@0B< 59@>@C1V=" B20@8= G8 6V=>: C ?5@V>4  
203VB=>ABV 2V4ACB=V.  
@5?0@0B ?@87=0G0NBL BV;L:8 ?VA;O @5B5;L=>W >FV=:8 A?V22V4=>H5==O :>@8ABV B0 @878:C,  
>A;V;L:8 =54>AB0B=L> 40=8E I>4> 157?5:8 70AB>AC20==O ?@5?0@0BC ?V4 G0A 203VB=>ABV.  
VB0<sub>1, 6</sub> B0<sub>12</sub> 5:A:@5BCNBLAO C 3@C4=5 <>;>: 8A>:V :>=F5=B@0FVW 2VB0<sub>6</sub> <>6CBL  
?@83=VGC20B8 ?@>4C:FVN <>;>:0. >A;V465==O I>4> ABC?5=O A5:@5FVW 2VB0

**40B=VABL 2?;820B8 =0 H284:VABL @50:FVW ?@8 :5@C20==V 02B>B@0=A?>@B< 01> V=H8<8  
<5E0=V7<0<8.**

@5?0@0B =5 2?;820T =0 740B=VABL :5@C20B8 02B>B@0=A?>@B< 01> ?@0FN20B8 7V A;:04=8<8  
<5E0=V7<0<8.

# 28?04:0E, O:I> ?V4 G0A ;V:C20==O ?@5?0@0B<< A?>AB5@V30TBLAO 70?0<>@>G5==O, A;V4 CB@8 <0B8AO 2V4 :5@C20==O B@0=A?>@B=8<8 70A>10<8 B0 @>1>B8 7 <5E0=V7<0<8.

!>AV1 70AB>AC20==O B0 4>78.

;O 2=CB@VH=L<<O7>2>3> 22545==O.

# BO6:8E (3>AB@8E) 28?04:0E: ?> 1 01C 4> 7=OBBO 3>AB@8E A8

VA;O ?>A;01;5==O A8C 28?04:0E ?>W BO6:>ABV: ?> 1 0

;O ?V4B@8<0==O 01> ?@>4>265==O B5@0?52B8G=>3> :C@AC V=T:FV9 01> 4;O ?@>DV;0:B8:8 @5F8482C @5:><5=4CTBLAO 70AB>A>2C20B8 ?@5?0@0B 59@>@C1V="->@B5 0:B01, B01;5B:8, 2:@8BV ?;V2:>2>N >1>;>=:>N.

5 A;V4 ?5@528IC20B8 @5:>5=4>20=C 4>1>2C 4>7C.

"5@@N20==O V 287=0G0T ;V:0@.

"5E=V:0 70AB>AC20==O.

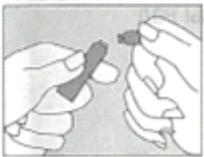


)>1 2V4:@8B8 0

B@8<0B8 03>@8 <0@:C20==O< C 283;04V :@0?:8;

AB@CA8B8 0:8 @V48=0 =5 ?>B@0?8BL C =86=N G0AB8=C;

2V4;0<0B8 3>;V2:C 0.



**VB8.**

V4ACB=V9 4>A2V4 ;V:C20==O 4VB59 40=8< ?@5?0@0B<<, B>

5@54>7C20==O.

@8 ?5@54>7C20==V 2V41C20TBLAO ?>A8;5==O A81VG=>W 4VW.

VB0<sub>1</sub>: <0T H8@>:89 B5@0?52B8G=89 4V0?07>=. C65 28A>:V 4>78 (1V;LH5 10 3) 28O2;ONBL

:C@0@5?>4V1=89 5D5:B, ?@83=VGCNG8 ?@>2V4=VABL =5@2>28E V

VB0<sub>6</sub>: 2>;>4VT 4C65 =87L:>N B>:A8G=VABN.

04AC20==O 2VB0<sub>6</sub> C 4>70E 1V;LH5 =V6 1 3 =0 4>1C ?@>BO3>< 45;V;L:>E

59@>?0BVW 7 0B0:AVTN V @>7;048 GCB;82>ABV, F5@51@0;L=V :=>2C;LAVW 7V @59=89 45@

<0B8B 1C;8 >?8A0=V ?VA;O 22545==O 1V;LH5 2 3 =0 4>1C.

VB0<sub>12</sub>: ?VA;O ?0@5=B5@0;L=>3> 22545==O (C @V4:VA=8E 28?04:0E ?VA;O ?5@>@0;L=>3>

70AB>AC20==O) ?@5?0@0BC 2 4>70E, 28I8E 70 @5:><5=4>20=V, A?>AB5@V30;8AL 0;5@3VG=V

@50:FVW, 5:75<0B>7=V H:V@=V ?>@CH5==O V 4>1@>O:VA=0 D>@<0 0:=5. @8 B@820;>AC20==V C

28A>:8E 4>70E <>6;825 ?>@CH5==O 0:B82=>ABV D5@<5=BV2 ?5GV=:8, 1V;L C 4V;O=FV A5@FO,

3V?5@:>03C;OFVO.

>1VG=V @50:FVW.

I>:C VW A8AB5<8: @50:FVW 3V?5@GCB;82>ABV, 2 B>52@>B8G=89 =01@O:, 0=0DV;0:B>W4=V

@50:FVW, 0=0DV;0:B8G=89 H>: ?5@5206=> C ?0FVT=BV2 V7 ?V428I5=>N GCB;82VABN.

I>:C 5=4>:@8==>W A8AB5<8: V=3V1VFVO 284V;5==O ?@>;0:B8=C.

I>:C =5@2>2>W A8AB5<8: 2V4GCBBO =5A?>:>N; 4>23>B@820;5 70AB>AC20==O (?>=04

6-12 :A8=C 3V4@>E;>@84C (2VB0<sub>6</sub>) C 4>70E 1V;LH5 =V6 50 <3 I>45==> <>65 ?@8725AB8 4>

?5@8D5@8G=>W A5=A>@=>W =59@>?0BVW, =5@2>2>3> 71C465==O, =574C60==O, 3>;>2=>3> 1>;N,

70?0<>@>G5==O.

I>:C A5@F52>-AC48==>W A8AB5<8: B0EV:0@4VO, F8@:C;OB>@=89 :>;0?A ?5@5206=> C

?0FVT=BV2 7 ?V428I5=>N GCB;82VABN.

I>:C 48E0;L=>W A8AB5<8: FV0=>7, =01@O: ;535=L ?5@5206=> C ?0FVT=BV2 V7 ?V428I5=>N

GCB;82VABN.

I>:C H;C=:>2>-.:8H:>2>3> B@0:BC: H;C=:>2>-.:8H:>2V @>7;048, C B> 1;N20==O, 4V0@50, 1V;L C

682>BV, ?V428I5==O :8A;>B=>ABV H;C=:>2>3> A>:C, =C4>B0, :@>2>B5G0 7 >@30=V2 B@02=>3>

B@0:BC ?5@5206=> C ?0FVT=BV2 V7 ?V428I5=>N GCB;82VABN.

I>:C 35?0B>1V;V0@=>W A8AB5<8: 28A>:V 4>78 ?@5?0@0BC <>6CBL ?@8725AB8 4> ?V428I5==O @V2=O 3;NB02>W 0A?0@B0B-0B@0=AD5@078 (!") C A8@>20BFV :@>2V.

I>:C H:V@8 B0 ?V4H:V@=>W ;:VB:>28=8: A25@1V6, :@>?82O=:0 ?5@5206=> C ?0FVT=BV2 V7 ?V428I5=>N GCB;82VABN.

8A>:V 4>78 ?@5?0@0BC <>6CBL A?@8G8=8B8 ?>O2C 0:=5. V@84>:A8=C 3V4@>E;>@84 <>65 ?@>2>:C20B8 ?>3V@H5==O 70E2>@N20==O =0 728G09=V 2C3@V G8 ?>O2C 2C3@>28E 28A8?0=L. 030;L=V @50:FVW: @50:FVW C @;V.

"5@ABV.3 @>:8.

#<>28 715@V30==O. 15@V30B8 ?@8 B5 8 □ (C E>;>48;L=8:C). 15@V30B8 C =54>ABC?=>

5AC

'5@57 2V4ACB=VABL 4>A;V465=L I>4> ACABV ;V:0@AL:8E 70A>1V2 59@>@C1V=" =5 <>6=0 7

#?0:>2:0.> 3 <; 2 0; ?> 5 0@>1FV.

0B53>@VO 2V4?CA:C. 0 @5F5?B>

8@>1=8:. 5@:;5 <1%.

VAF57=0E>465==O 28@>1=8:0 B0 04@5A0 20465==O 9>3> 4VO;L=>ABV.

N42V3-5@:;5-(B@0AA5 3, 89143 ;0C1>9@5=, V<5GG8=0.