

# GENE1500

7 fYUhj Y '9bfYdfYbYi fg\jd

HYfa %Z &\$&&



7 ci fgY`Cj Yfj ]Yk

GHJZZ 7 cbHJW`8YHU]`g

7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`]m	@cWU]cb	D\cbY
@ Wlg`< U_Yk ]`	<a href="#">"\U_Yk ]`4 i bgk "YXi "Ui</a>	6mUddc]bfa Ybh	K cf_]b[ fYa chY`m	

@YW`i fYfg

B Ua Y	9a U]`	5j U]`UV]`]m	@cWU]cb	D\cbY
: ]K cc``]gWfcZh	<a href="#">Zk cc``]gWfcZh i bgk "YXi "Ui</a>	6mUddc]bfa Ybh	K cf_]b[ fYa chY`m	

Hi hcfg

B Ua Y	9a U]`	5j U]`UV]`]m	@cWU]cb	D\cbY
@]nYHhY`@YY	<a href="#">a WU] i bgk "YXi "Ui</a>	6mUddc]bfa Ybh	K cf_]b[ fYa chY`m	

GWXcc``7cbHJW`bZcfa Uh]cb

: UW`hmcZ9b[ ]bYYf]b[

9a U]: Yb[ "hgU4 i bgk "YXi "Ui

7ci fgY'8YHJ]`g

I b]hg'icZ7 fYX]h\*`

Gi a a UfmicZ'h\Y'7ci fgY

K \Uh]g'WYUhj ]m3'K \Uh]g'YbhfYdfYbYi fg\]d3'K \mXc'h\Ymia UHf3

⊕'h]g'Wci fgYžmci 'k ]''XYbh]žž'UbU'mgY'UbX'dfcdcgY'U'gc'i hcb'hc'U'a YUb]b[ ž''i bgc'j YX'dfcV'Ya ]'b'h\Y k cfX"

Mci fi'žcW'g'icb'U'gdYW]Z]Wa Uf\_YhgY[ a Ybž'XYj Y'cd'mci f'ck b'dfchcmYgž'UbX'XY'j Yf'U'd]hW'hc'Ub'YI dYfh dUbY"

H\]g'Wci fgY'j]g'a cfY'dfUW]W'U'Ub'UWUXYa ]W'mci fi'žcfa'U'a i'h]X]gW]d'j]bUfmiYUa'hc'UW\_Y'mci f'WkcgYb dfcV'Ya "'Mci fi'XYj Y'cd'YI dYf]YbW'k ]h'gca Y'cZ'h\Y'žci bXU]hcbU'g\_]`g'mci 'bYYX'hc'Ya VUf\_'cb'Ub YbhfYdfYbYi f]U'j Ybh fY.

- 7 f]h]W'mXYj Y'cd'gc'i hcb'WcbWdHg
- 5 bU'mgY'Wca dYh]hcf
- Gc'j Y'dfcV'Ya g
- 6 i ]X'mci f'bYhk cf\_'UbX'k cf\_]b'U'h'Ua
- 8 Yg][ b'dfchcmYg'UbX'YI dYf]a Ybh]h'j U'XU'h'WcbWdHg
- 7 ca a i b]WU'h'mci f'XYUg'k ]h' ]bZi YbW

5Zf'h]g'Wci fgYžmci 'k ]''\Uj Y'U\_Yb'ghYdg'hc k UfXg'WYUhb[ 'mci f'ck b'žfghghUfh džk ]h'a Ybhc'fgžgi ddcfh

- 6Y'XY'j YfYX'hfci [ \ 'Ub' ]bbcj Uhj Y'cb' ]bY #ZJW!hc!ZJW'W ff]W`i a`h UhWta V]bYg'h Ycfnž  
YI dYf]Ybh]U`dfUW]Wž UbX'gY`Z fYZYW]cb`hc`Yb\UbW'`h.Y'gh XYbh`YUfb]b[
- : cW'g'cb'XYj Y`cd]b[ '[ YbYfUhj] Y`WdUW]m]b'gh XYbh'gc`h Uh'h YmW]b`Vch`h]b\_`UbX`UW]cb`bYk  
]XYUg'hc`gc`j Y`j U`i UV`Y`dfcV`Ya g
- I`gY`Ub`YI dUbgj Y`a`j]`cZ hVWbc`c[ mYb\UbW X`YUfb]b[ `UW]j`]h+

Ym


gfhi Wñ fYX`ZYXVUW`cb"

H\]g`]g`bchU`Hi fb]h]b`Ugg][ ba Ybh

5XX]h]cbU`XYHJ]`g

Mci f`Wcbj Ybcf`k ]`dfcj ]XY`XYHJ]g`h]fci [ \ `A ccXY"

5ggYgga Ybh' . ; fci d`Dfc`YWh`DFYgYbhUbX`Gi Va ]h; fci d`Dfc`YWh

Gi Va ]gg]cb`bchYg. Mci fi`dfYgYbh]g`Xi f]b[ `mci f`hi hcf]U"

8i Y`XUñ. `%&#\$( #&\$&& \$&.\$\$`DA

`DFYgYbhUbX`Gi Va ]h; fci d`Dfc`YWh

Gh XYb]g`]b`hYUa g`k ]`VY`fYei ]fYX`hc`XYg][ b`U`Vi g]bYgg`a cXY`UbX`d]hX`XYW`Zc`f`U`WfYU]j`Y  
YbhYdfYbYi f]U`j`Ybh`fY`h]UhiUf[ Yhg`U`dfcV`Ya`gdUW` [ YbYfU]YX`Vmi]hY`Wc`c`fhf]bX]j` ]Xi U`Dfc`YWh5E`H\]g  
YI YfW]gY`]g`a YUb]h`h`Y`hc` [ Yh`Yf`hY`Wc`i fg`Y`a U]Yf]U`g`Zca`YUW`c`Z`hY`k`YY`\_g`]b`Ub`]b]bcj`U]j`Y`UbX  
]a U[ ]bU]j`Y`k`Um`H\Y`hYUa`VUgYX`Udd`]YX`YUfb]b[ `YI YfW]gY`g]a i`U]Yg`hY`UW]j`]h]Yg`h]UhfYU`  
YbhYdfYbYi fg`Xc`k`Yb`XYg][ b]b[ `U`j`Ybh`fY"

F Yei ]fYa Yb]g. ) `a ]bi hY`d]hX`dfYgYbhU]cb`d`i g`%\$`a ]bi hYg`E / 5"

Gh XYb]g`k ]`fYW]j`Y`Vch`U` [ fci d`Wc`a`dcbYbh]f) \$i`cZUggYgga Ybhj U`i`Yc`UbX`Ub`]bX]j ]Xi U`Wc`a`dcbYbh  
f) \$i`cZUggYgga Ybhj U`i`Yc`]b`hY]f`a`Uf`"

H\]g`]g`bchU`Hi fb]h]b`Ugg][ ba Ybh

5XX]h]cbU`XYHJ]`g

5ggYgga YbhW]h]f]U`k ]`VY`Uj`U]UV`Y`cb`A`ccXY"

## 5 hYbXUbW F Yei ]fYa YbHg

Gh XYbHg UFY gfc b[ mYbWci fU[ YX'fc UHbX'U''WUggYg UbX'fYj ]Yk ''YWhi fY'fYWcfX]b[ g"

## 7 ci fgY'GWXYXi `Y

Gh XYbHg k \c'Xc'k Y'']b; 9B9% \$\$'[ YbYfU`m'

- G\ck 'i d'Zcf'hY]f''YWhi fYg'UbX'WcbWU[S'k hY'h fc]U'g
- ; YhZYXVUW\_cb'XfUZg'cZ'hY]f'k cf\_z'UbX'a U\_Y'i gY'cZcZ]W'`lci fg'cf'WcUW]b[ 'gYgg]cbg

[J \]Yk 'WUgg'h'a YhUVY](#)

H]a YhUV`Y`

8UH	HrdY	7cbhYbh
K YY_%`%& ': YVfi Ufm! % ': YVfi Ufm	@YWhi fY	

df

|







## Gi Va ]gg]cb`cZ5ggYgga YbhHUg\_g

K cf\_gi Va ]hYX`UH`k ]hCi hUb`Uddfcj YX`YI H`bg]cb`VmiHY`Wci fgY`Wc`cfX]bUrcf`cf`XY`Y[ UHYX`Ui h`cf]hm]g gi V`Y`W`h`c`U`UH`d`YbU`hmcZ]j Y`d`Y`f`W`b`h`f) i` E`c`Z`h`Y`a`U`i`j`a`i`a`a`Uf`\_`dcgg]V`Y`Z`c`f`h`U`h`UggYgga Ybh]hYa ž dYf`W`Y`b`X`U`f`X`U`m`

H\Y`UH`d`YbU`h`m]g`Udd`]YX`d`Y`f`W`Y`b`X`U`f`X`U`m`f]b`W`i`X]b[ `k`YY`\_`Y`b`X`g`U`b`X`di`V`]W`c`]X`U`m`g`E`h`U`h`h`Y` UggYgga Ybh]g`c] YfXi`Y`"H\YfY`]g`bc`d`fc!fU`h`U`c`Z`h`Y`UH`d`YbU`h`m]Z`c`f`gi`Va`]gg]cbg`a`UXY`d`U`f`h`k`U`m`h`f`ci`[`\`U`X`U`m`"H\]g`]g`Z`c`f`U`"UggYgga Ybh]k`Y`f`Y`U`d`YbU`h`m]Udd`]Yg"

K cf\_gi Va ]hYX`UZ`Y`f`Z] Y`X`U`m`g`f`%`&`\$`ci`fg`E`k`]`"b`ch`VY`U`V`W`Y`d`H`X`U`b`X`U`a`Uf`\_`c`Z`n`Y`f`c`k`]`"VY`U`k`U`f`X`Y`X`Z`c`f` h`U`h`UggYgga Ybh]hYa "

: cf\_gca Y`UggYgga Ybh]hYa gžU`UH`d`YbU`h`m]a`U`m`b`ch`VY`U`dd`f`c`d`f]U`h`"H\YgY`k`]`"VY`W`Y`U`f`m]b`X]W`h`Y`X`]b`h`Y` Wci fgY`ci`h]b`Y`Z`U`b`X`gi`W`UggYgga Ybh]k`]`"f`Y`W`]j`Y`U`a`Uf`\_`c`Z`n`Y`f`c`]Z`b`ch`W`c`a`d`Y`h`X`V`m`i`h`Y`g`d`Y`W`Z]Y`X`X`U`h`" 9I`U`a`d`Y`g`]b`W`i`X`Y`.

- K YY`\_`micb`]bY`h`Y`g`h`c`f`"U`V`c`f`U`h`c`f`m`k`c`f`\_`k`c`f`h`U`g`a`U`"d`f`c`d`c`f`h]c`b`c`Z`h`Y`gi`V`Y`W`h`a`Uf`\_`ž`c`f`
-

# 5 WUXYa ]W< cbYgmiUbX`D`U[ ]Uf]ga

I BGK `Ug`Ub`cb[ c]b[ `Wca a ]ha Ybhlc`ZcghYf]b[ `U`W`h`i`fY`cZ`YUfb]b[ `]bZcfa YX`VmiUWUXYa ]W]bhY[ f]m`5`  
I BGK `gh`XYbhg`Uj`Y`U`fYgdcbg]V`]mhc`UX`YfY`hc`h`g`df]bW]d`Y`cZUWUXYa ]W]bhY[ f]m`D`U[ ]Uf]ga  
i bXYfa ]bYg`UWUXYa ]W]bhY[ f]mUbX`]g`bchlc`YfUHYX`Uhl`BGK`"B`SY[Sde\_`SfG@E|`[e VWX`W`Se ge[`Y`  
fZWi`ad/e`ad[VWSe`aXafZW`S`V`bSee[`Y`fZW\_`aXSe`kagdai`ž`

D`U[ ]Uf]ga`]g`U`mdY`cZ]bhY`YWi`U`h`YZh`h`WUb`hU`\_Y`a`UbmiZcfa`gž`Zca`XY`]VYfUHY`WXYU]b[ `hc`UWUXYbH`m`  
W`dm]b[ `Zca`U`gci`fW`k`]h`ci`hUW`bck`YX[`Ya`Ybh`I`BGK` `Ug`dfcXi`W`X`U`k`YVg]h`k`]h`U`k`YU`h`cZ`  
fYgci`fW`g`hc`gi`ddcfghi`XYbhg`hc`i`bXYfgHUbX`UbX`Uj`c]X`d`U[ ]Uf]ga`ž`]g]h`[gh`XYbh`i`bgk`"YXi`"Ui`#d`U\[ \]Uf\]ga`"](#)  
H\Y`@YUfb]b[ `7`YbfY`Ugg]gh`gh`XYbhg`k`]h`i`bXYfgHUbX]b[ `UWUXYa ]W]bhY[ f]mUbX`ck`bchlc`d`U[ ]Uf]gY`  
H\YmiU`gc`lc`X`k`cf\_g`cdg`UbX`WUb`Y`d`gh`XYbhg`cbY!cb!cbY"

Mcc`UFY`bY`c`U`V`a`]U`f]ga`]h`U`k`W`m`z`h`ag`U`a`U`W`Y`a`Y`b`h`U`f]ga`]h`c`f`g`h`c`U`h`c`Z`g`h`X`m`U`b`X`g`Y`c`h`X`Y`g` `a`Ub`U`gc`\  
]XYbh]ZYX`Wli`gYg`cZd`U[ ]Uf]ga`]g`d`ccf`h`a`Y`a`UbU[`Ya`Ybh`Gh`XYbhg`g`ci`X`U`ck`gi`Z]WYbh]h`a`Y`Z`f`  
fYgYUfW`ž`X`f`U`Z]b[ `UbX`h`Y`dfcdYf`fY`Z`f`Y`c`Z` `h`Z`gh`fW`g`h` `]`Y`c`f]g[ `Ub` `hgg]`g]Ybhlc`ggg\`

≡'GdYWU`Wc bg]XYfUh]cb`UbX`gi dd`Ya YbhUfmiUggYgga Ybh

≠mci` \Uj Y`YI dYf]YbWX`Ub`]`bYgg`cfa` ]gUXj Ybhi fY`VYmcbX`mci f`Wc bfc``hUhi k`]`]bHYfZYfY`k`]h`mci f