

# **MUSC3804**

 $9XiWUhb["h\Y"Aig]WU"Bcj]WV$ 

HYfa 'H\fYY''##'&\$&\$

# 7ci fgY<sup>.</sup>Cj Yfj ]Yk

### 7ci fgY 8YHJ] g

#### 7 fYX]hDc]bhg \*

### Gi a a UfmcZh\Y 7ci fgY

9Xi WUhjb['h\Y'A i g]\WJ`Bcj ]\Wf]g`XYg][ bYX`Zcf`UXj Ub\WX`a i g]\WJ`dYfZcfa Yfg`k \c'UfY``YUfb]b['hc'hYU\X\gdY\]U]gh']bghfi a YbhU`cf'j c\WJ``g\_]``g`hc'VY[ ]bbYfg"''\Mci `k ]```XfUk 'gY`Y\Wjj Y`mUbX'\Wf]h]\WJ``mcb'mci f'ck b ghi X]c'hfUX]h]cbgž'k ]h\ 'h\Y'VYbYZ]hcZh\Y'cVY\Wjj Y`ghUb\W'XYj Y`cdYX']b'h\Y'[ UhYk Um\Wci fgY'? ge[U efgV[a f\\SUZ[ Y UbX'4\Wa\_ [ Y S b\WXad\_ \Wd''H\Ymk ]```VY'Z fh\Yf'gi ddcfhYX'\mfYgYUf\\X'\bX'h\YcfYh]\WJ` \_bck `YX[ Y'fY`UhYX'hc'\W]`XfYbfij``YUfb]b[ 'UbX'a i g]\WYXi \WJhcb"

### 7 ci fgY @YUfb]b[ Ci hWca Yg

- %" ⇒ YbhjZmUbX`XYa cbghfUhY`hYUW\]b[`'UbX``YUfb]b['ghfUhY[]Yg`Uddfcdf]UhY`Zcf`bcj]WY`a i g]WjUbgž'Uh j Uf]ci g`ghU[Yg`cZXYjY`cda Ybh/
- &" F YWc[b]gY`UbX`Wf]hJWJ``mUggYgg`U`j Uf]YhmcZUddfcUWXYg`hc`h\Y`hYUWX]b[`UbX``YUfb]b[`cZaig]Wz]b h\Y`WcbhYI hcZVX]`XfYb'q`YXi WUhjcb/
- '"; Uh\Yf`UbX`YjU`iUhY`WiffYbhfYgYUfW\`]bhc`aig]WYXiWUh]cb`h\fci[\`h\Y`igY`cZdiV`]g\YX`^cifbU`gUbX`h\fci[\`h\Y`]bhYfbYh

#### HYUWX]b[ GhfUhY[]Yg

@YWn fYg'k]``]bhfcXi Wh']ggi Yg'cZdUfh]Wh'Uf'fY`Yj UbWh'hc'h\Y'YXi WUh]cb'cZa i g]WU`bcj ]Wh'gž']bWi X]b[Zcfa U``UbX'[fci d!VUgYX'a Yh\cXc'c[]YgžXYj Y`cda YbhU`'h\Ycf]Yg'cZW\]`X\ccX'UbX'a i g]WU```]hYfUWnž'UbX Wh ff]Wh'i a 'XYg][b'UbX'XY`]j Yfm''`

#b`k cf\_g\cdg`ghi XYbhg`k ]```VY`]bhfcXi W\X`hc`h\Y`Udd`]\Whjcb`cZZcfa U``a Yh\cXc`c[]\Yg`gi W\`Ug`8 U`\fonYž? cXU`m`UbX`C fZZ`UbX``YUfb`hc`XYj ]gY`a UhYf]U`g`UbX`U\Mjj ]hj\Yg`gi ]hUv`Y`Zcf`VY[]bbYfg`cZj Uf]ci g`U[Yg"``H\Ym k ]```U`gc`a U\_Y`Wca dUfUhjj Y`Wf]hjei Yg`cZdi V`]g\YX`hi hcf]b[`a UhYf]U`g`UbX`h\Y`ghUbXUfX`gm``UVi g`Zcf ]bghfi a YbhU``UbX'j c\WJ``YI Ua ]bUhjcbg`]b`5i ghfU`]U"``7`cgY`fYZ\fYb\W`k]```VY`a UXY`hc`fY\W\bhfYgYUf\X`UbX hcd]\WJ``XYVUhYg`Zc\W gYX`cb`h\YgY`UfYUg"````

# 5ggYgga Ybh

5 Zcfa U``Vf]YZZcf`YUW.`UggYgga Ybh'HJg\_`k]```VY`[]j Yb`cb`a ccX`Y"'`

# 5ggYgga Ybh'HUg\_g'

5ggYgga YbhhUg_	K Y][\h	8iY'8UhY	Gh XYbh@YUfb]b[ Ci hWca Yg 5ggYggYX
7 f]h]ei Y'cZdi V']g\YX'hi hcf Vcc_g'	' \$1		

.

5ggYgga Ybh'' . '9ggUm

GhUfh'XUhY.

8YHJ]`g.

&\$\$\$!k cfXg

')!dYfWYbh

 $\label{eq:first-condition} F Y`UhYX`hc`XYj Y`cda YbhU``m`Uddfcdf]UhY`a i g]WYXi WUh]cb$ 

: YYXVUW\_'dfcj ]XYX'j ]U'@A G

H\]g`]g`h\Y`Z]bU``UggYgga Ybh

•

# 5 hm/b XUbVW F Yei ]fYa Ybhg

 $\hbox{Ghi XYbhg'UfY'ghfcb[`mYbWci fU[YX'hc'UhhYbX'U```WUggYg'UbX'fYj]Yk ``YWhi fY'fYWcfX]b[g''] } \\$ 

# 7ci fgY GWX YXi `Y

<u>J ]Yk "WUgg"hja YHUV"Y</u>

H]a YtUV`Y


# FYgci fWfg

# DfYgWf]VYX F Ygci fWYg

H\Y`Wci fgY`hYI hi]g`6i fk Y``ž'? `f&\$%&Ł'E fgV[aŽTSeWV [`efdg\_ W`fS^MSd [`Y"``: Ufb\Ua .``5g\[UhY

### FYWca a YbXYX FYgci fWYg

@]VfUfmigci fWrgik]``VYia UbU[YXih\fci [\ih\Yi@Y[UbhcigmghYa icbih\YiWci fgYia ccXiYig]hY"

### 7ci fgY 9j U`i Uh]cb UbX 8Yj Y`cda Ybh

: cfa U``Yj U`i Uhjcbg`k]```VY`gci [\h'Uhhh\Y`YbX`cZgYa YghYfž`UbX`]bZcfa U``ZYYXVUW\_'UbX`ei Yghjcbg`k]```VY kY`Wca Y`Uh'Ubmhja Y"

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

### Hi fb]h]b Gi Va ]gg]cb

Image: Ybwei bhyfu'dfcv'ya k \yb'uhhya dhjb[ 'hc'gi va ]hmci f'Ugg][ ba Ybhh\fci [ \ 'Hi fb]h]bž'd'YUgY

Hy'Yd\cby'9| hy'fbu''Gi ddcfhcb'-', ) '' ' ' %cf'Ya U]''h\Ya 'cb'Y! hy'fbu'hy'hgi ddcfh4 i bgk "YXi "Ui "''Gi ddcfh
\ci fg'UfY', .\$\$Ua '-'%\$.\$\$da 'cb'k YY\_XUmg'UbX'-.\$\$Ua '-').\$\$da 'cb'k YY\_YbXg'fl \*) 'XUmg'U'mYUft'''=Z'mci
UfY'i bUV'Y'hc'gi va ]hmci f'Ugg][ ba YbhXi Y'hc'U'ZJi 'hk ]h\ 'Hi fb]h]b'mci 'a Um'Udd'mZcf'Ub'Y! hy'bg]cbž'Vi hmci
a i ghfYhJ]b'mci f'h]W\_Yhbi a VYf'Zfca '9! hy'fbU''Gi ddcfhfU'cb[ 'k ]h\ 'Ubmch\Yf'fy'Yj UbhXcW a Ybhgt'hc
]bWi XY'Ug'Yj ]XYbW' hc'gi ddcfhmci f'Y! hy'bg]cb'Udd']WUh]cb"'=Zmci 'Ya U]''9! hy'fbU''Gi ddcfhmci 'k ]'`
Ui hca Uh]WJ'`mfYW']j Y'U'h]W\_Yhbi a VYfž'Vi h]Zmci 'hY'Yd\cbY'mci 'k ]``bYYX'hc'gdYW]Z]WJ'`mUg\_'Zcf'cbY''
Hi fb]h]b'U'gc'dfcj ]XYg'i dXUhy'g'cb'h\Y]f'gmghYa 'ghUh' g'cb'Hk]hyf''

; YbYfU`mž'UggYgga YbhiHug\_g'a i ghVY'gi Va ]hhYX'Y`YVWfcb]\WJ``mij ]U'Y]h\Yf'Hi fb]h]b'cf'U'A ccX`Y Ugg][ ba Ybh''=b']bgHJb\W'g'k \YfY'h\]g']g'bchdcgg]V`Yž']hk ]```VY'gHJhYX'cb'mci f'\\circ i fgY'g'A ccX`Y'g]hY'k ]h\U`hYfbUh]j Y'gi Va ]gg]cb'XYHJ]`g"

cfi]bZcfa Uhjcbicbi\ckihcigi Va ]hUgg][ ba Ybhgicbi]bYij ]UiA ccXiY.i\hdg.#gh XYbhi bgk "YXi "Ui #\ck! gi Va ]hUgg][ ba Ybha ccXiY

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

D`U[]Uf]ga `]g`i g]b[ 'h\Y`k cfXg`cf`]XYUg`cZch\Yfg`UbX`dfYgYbh]b[ 'h\Ya `Ug`mci f`ck b"`±hWJb`hU\_Y`a Ubm Zcfa gžZfca `XY`]VYfUhY`W\YUh]b[ 'hc`UWW]XYbhJ``mWcdm]b[ 'Zfca `U`gci fWY`k ]h\ci hUW\_bck `YX[ Ya Ybh'

IBGK [fcidg'd'U[]Uf]ga ]bhc'h\Y'Zc``ck]b[ 'WUhY[cf]Yg.

 $7 \text{ cdm}b[...i g]b[...h\Y.gUa Y.cf.j Yfmig]a] \Uf'k cfXg'hc'h\Y.cf][]bU''hYl h'cf']XYU'k]h\ci h'U\V_bck `YX[]b[...h\Y.cf][]bU''hYl h'cf']XYU'k]h'cf']$ 

i bXYfgHJbX'mci f'f][\hg'UbX'fYgdcbg]V]`]h]Yg'Ug'U'gh XYbhUhi BGK

### 5 WUXYa ]W = b Zcfa Uh cb

: cf'YggYbhJU`'gh XYbh']bZcfa UhJcb'fY`UhJb['hc.

- fYei Yghg 'Zcf'Yl hYbg]cb/
- `UhY`gi Va ]gg]cbg`[ i ]XY`]bYg/
- fYi]Yk cZa Uf\_g/
- I BGK '< YU'h\ 'UbX'GUZYhm'dc`]\\\Yg/
- YI Ua ]bUhcb dfcWXi fYg/
- qdYWJU``Wcbq]XYfUHjcb`]b`H\Y`Yj YbhcZ]``bYgg`cf`a ]gUXj Ybh fY/
- gh XYbhYei ]miUbX'X]qUV]`]m/
- UbX'ch\Yf'YggYbhJU`'UWUXYa ]W]bZcfa UhJcbž'gYY

\hdg.#k k k "Ufhg"i bgk "YXi "Ui #W ffYbhgh XYbhg#UWJXYa ]W]bZcfa Uh]cb#dfchcWc`g![i ]XY`]bYg#

.

#### ⇒a U[Y'7fYX]h

D\chc'Vm? UVcca d]Wg'"Wca 'Zfca 'DYI Y`g

#### 7F = 7CG

7F = 7CG Dfcj ]XYf 7cXY. \$\$\$-,;

#### 5W\_bck `YX[ Ya YbhcZ7ci bhfm

 $K Y : UW\underline{b} ck `YX[Y : h, Y : 6YXY[U : dY cd `Y : k \ c : UfY : h, Y : hfUX]h\underline{b} cb : `W ghc X]Ubg : c Z : h, Y ``UbXg : cb : k \ ]WX : I B G K ? Ybg]b[hcb : WUa di g : ]g ``c WUhY X''$