

NIH Investigation of Co-occurring conditions across the Lifespan to Understand Down syndrome (INCLUDE) Down Syndrome Research Plan

888%

8fUz S&#S#888%

BUcbU' bghh HgcZ< YUk fB=< L
I "G" 8YdUfa YbhcZ< YUk UbX< i a Ub'GYj jWgfk < GL

Executive Summary

Ob'Dfc[fYgQ

8G]b Yl]g]b['UbXZ hi fYW]b]W' hf]Ug' : cf'h]gfYgMfW d'Ubžh Y]bZcfa U]cb]g'cf[Ub]nXX
Ufc] bXZj YMcUXh Ya Yg'

- 6Ug]WF YgYfW
- 7c\cfh8 Y Ycda Yb#0d]Xa]c`c[mi
- 7]b]W FYgYfW#7c!cWff]b[`7cbX]hcbg
- @j]b['UbX5 []b[k]h 8G#Gyf]WgFYgYfW
- FYgYfW =bZUgfi WifYUbXHcc`g

K]h]b YUW cZH YgYh Ya Ygžh YfYa UmWYg V\YU]b]g'hc [fci d'fYUXXcVMMj Yg''9UW h Ya Y
Ugc \UgUDfc[fUa DcfffU]hlc \][\`][\hUb Yl Ua d'YcZUgdWZ]WYgYfW dfc^MMh UhUXfYggYg
hYh Ya Y'

Portfolio Analysis

Gb Dfc[fYggQ

- 8Y Ycd'a cXYgcZHY[YbY]WUlgza YWU]ga g'UbXg[b]ZVbWcZXngY[i `UHX YbXcga Yg'Yl cga Yg'U lcd\U cga Yg'UbXdfchYcgU]g]b'U]b[`UbX8G!58"
- 9i VXYWbZcfa U]cb'UbXlcl]Vá YWU]ga g'cZU [fY U]b[`dfch]bg'g WUgVWU Uá mc]XUbXHU žZca `i a Ub]gg Y]b'8G!58"
- 7fYU'UbXWa dUfYa cXYg'lc UggYg'hY]a dUWcZchYf `i a Ub'Wfca cga Y&%[YbYg cb'U]b[`UbX8G!58"
- 8Y]bYX]ZfYbWgUbXga]'U]h]YgVlk Yb a cXYgcZ8G!58 j Yfg g@UM.Cbg'h58 `UbX Yf'mcbg'h: Uá]'U'58"
- 9l d'cfYhYZZMg'UbXa YWU]ga g'cZUá mc]XUb[]cdUhm'UbXVYUW'cZHYVccXVU]b' VUf]Yf']b'8G!58"
- 9l d'cfYhYfc`YcZHYa]WcV]ca Ycb'58 `dUhc`c[m]b'8G"

Develop Model Systems for DS-AD Research

- 7cbX VWWa dYfYbgj YDa]Vg'gi X]Yg'cZU]b[`UbX58]b'Uk]XfU]b[YcZa cXYg'z]bW X]b[`mU]žk cfa žZn'YVU]g'za ci g'žfUžbcbl`i a Ub'df]a UYfB< DžUbX`i a Ub' W`'a cXYg'
- 9l Uá]bYh'ca Yf]WYb[h' UbXfY[i `U]cb]'b'a ci g'Ya cXYgj Yfg g`i a Ub W`'']bYg'
- 8Y]bYU YfYUHXWU] Yg]b'b'Y fcbg'z [`]UžUbX'YbXchY]U'W`g]'b'a ci g'Y'UbX`i a Ub' a cXYg'
- 8Y]bYhYfc`YcZU YfYUHX`cfa cbU'WU]b[Yg'cb'8G!58 `YbXchm]g'UbXd'Ybchm]g]'b' a ci g'Ya cXYg'
- Gh Xn'h Ycf][]bg'UbXWbg'Yei YbWg'cZU lc]a a i bYWbX]h]cbg]'b'Ua ci g'Ya cXY' cZ8G"
- 8Y]bY]b j]c a YWU]ga g]b a cXY' g'ghYa ghUhfYZWm]b]W`d'Ybchm]g]'b'8Gž dU]h]W'Uf'ndfYBU Xj Ycda YbU' gi X]Yg'h UhWbbchYWbX VmX]b`i a Ubg'
- 8Y]bYUbXWa dUfY[YbY]W'za YWU]ga g'UbXg[b]ZVbWcZXngY[i `UHX YbXcga Yg' Yl cga Yg'U lcd\U cga Yg'UbXdfchYcgU]g]b'8G]b]a U'a cXYg'
- 7cbX VifYgUfW]b Ua cXY' cZ]bX V]Yg' Yb]b[`cZHYb]fYWfca cga Y&%cf cZ g]W]Z]W YbYg'cb'Wfca cga Y&%''
- 7cb]bi Ylc UbUnmYgnbU]h]WZ bW]cb]b U8G'a ci g'Ya cXYžZcWg]b[`g]W]Z]W`mcb' fY]Y Ubh[YbYgUgc `cWmXcb`i a Ub'Wfca cga Y&%'
- 7ca d'YfYWa dUf' GbE `i X]b[`U]b[`UbX9`] fYU'cZU`G'a ci gb

Ugc fYWa a cb'lb'dYcd'Yk \c'Xc'bc'h\Uj Y8G/h'YfZcfYzZbX|b| g'Zca 8GfYgUfWk]` \Uj Y
ja d'W|hcbgZcf'hY\YU'h'cZ'hYcj YfU`'dcdi 'U|cb''

Develop a Cohort(s) for DS Research

- 8 Yj Ycd'UW\cfhcZ|bX|j |X| Ugk |h'8G'UW'cgg'h'Y'|ZgdUbz|bW'X|b| 'c'Xf'|bX|j |X| Ug
f|c'fb%' +S!%' - S|zUbX'h'cgY'Z'ca 'X|j YfgY'g'V'c'W'bc'a |WUW| fci bXg'UbX| Yc| fUd\|W
fYU'g'Y'bg f|b| 'fYdfY'g'bh'U|cb'UW'cgg'U`'U' Y'z'g'i z'UbX'f'U'U'#h'h'b|W'd'cdi 'U|cb|' fci dg''
8 Y|bY'h'Y|a dUW'cZ'h|g'ca m'8%'cb'f'U'W'UbX'Y'h'b|W'h'z'g'd'Y'W'Z'W' m'U'X'Y'g'g|b| 'k'\Y'h'f'
8G'\U'g'U'X|g'd'f'U'Y|a dUW'c'b'd'f'h|W'f'f'U'U' c'f'Y'h'b|W'd'cdi 'U|cbg''-b'W'X'Y'd'f'h|U
h|g'ca m'UbX'a'cg|U'W'8'G'W'\c'f'g|b'h'Y'g'Y'g'i'X|Y'g''''
- -b'W'X'Y'U'g'd'Y'W'Z'W'g' V'g'i'X'm'c'Z) z'S'S'd'f'h|W'd'U'b'g'k |h'8'G'|b'`U|'Y'g'i'X|Y'z'g'g'W'U'g'8'G|
7'cbb'W'W'. 'H'Y'8'G'F'Y| |g'f'm'f'g'Y'Y'D'f'c| f'U'a' D'c'f'h|U'h'&'L'c'f'B'< E'g' f'Y'g'U'f'W
d'f'c| f'U'a' "'7'c''Y'W' K'5'G'X'U'U'c'b'h'g'| f'c'i'd'f'c' d'f'c'j |X'Y'Y'c'i | \ 'g'U'h'g'|W' d'c'k'Y'f'f'c'
X|j Y'c'd'j'U|X| Y'b'c'h'd'Y'g'U'b'X'd'Y'b'c'h'd'Y'g''
- 7'c'b'X| W'f'Y'g'U'f'W'c'b'h'Y\YU'h' |a dUW'c'Z'c'k' g'c'V'c'W'bc'a |W'g'U'h'g'|b'8'G''
- @|b_ 'h'g'W\c'f'h'c' U'g' Z|W'W'bh'm'U'f| Y'bi' a'V'f'c'Z'W|c'c'| |W'g'U'a'd'Y'g'f'Y| "z'V'c'c'X'z'U'f'z'
g'U|j U'Z'ca' d'Y'c'd'Y'k |h'8'G'h'f'c'i | \ 'U'Z'X'Y'U'h'c'b'c'Z'W'c'f'X|b'U'h'X'V'c'V'b_g'k'c' U'c'k'
X'h|U'Y'z'c'b| |h'X|b'U'W'U'W'W'f|n'U'h'c'b'f'h'Y'b'c'h'd|b| E'c'Z|b'X|j |X| Ugk |h'8'G'' 'H'c'U'W|Y'j'Y'
h'g'|c'U'z'W'bg'X'f''|b_|b| 'f'c'Y' |g|h|b| 'W\c'f'h'z'|b'W'X|b| 'h'c'g'Y'a'U'bh|U'b'Y'X|b'h'f'b'U'h'c'b'U'mi''

A

Conduct Longitudinal/Prevalence Studies of Co-Occurring Conditions in DS

- 9l d'UbX'c'b| |h'X|b'U'g'i'X|Y'g'c'Z'h'Y'b'U'h'f'U'\|g'c'f'm'c'Z'U| |b| 'U'b'X'5'8' |b'8'G'z'V'W| |bb|b| '
Y'f'm|b' |Z' 7'c'b'X| W'Y'd|X'a' |c'c'| |W'g'i'X|Y'g'c'Z'U'X' |g'k |h'8'G'f'c' |X'Y'h|Z'h'h'Y'c'g'Y'h'U'b'X'
h'U'Y'W'c'f|Y'g'c'Z'W'c'W'f'f|b| 'W'b'X|h'c'bg'U'b'X'a' c'f'U| |h'm'Y'U'h'X'f'c' 5'8'z'U'b'X'U'g'W'h'U'j'b'h'Y'
X|g'f|V'i'h'c'b'z'X'a' c| f'U'd\|W'z'U'b'X'g' f|j' U'f'U'h'g'c'Z'8'G|5'8'z'|b'W'X|b| 'W'a'd' |W'h'c'bg'c'Z'5'8'
h'U'h'a'U'h'W'b'h|V'i'h'f'c'a' c'f'U| |h'm'f'g' W'U'g'd'b'Y'a' c'b|U'9l'U'a' |b'Y'h'Y| Y'b'X'Y'z'f'U'W'z'U'b'X'
Y'h'b|W'X|Z'f'Y'b'W'g'|b'8'G|5'8' 'c'bg'Y'h'U'b'X'd'f'c| f'Y'g'g'c'b''''
- 9l U'a' |b'Y'Y'bj |f'c'ba' Y'bh'U' U'b'X'V'Y\U'j'c'f'U'Z'U'c'f'g'f'Y| "z'Y'X' W'h'c'b'z'k'c'f' z'\c'a' Y'g'Y'h|b| g'U'b'X'
f|g' Z'U'c'f'g'f'Y| "z'|Z'g'm'Y'z'X|Y'z'Y' Y'f'V'g'z'g'Y'c'z'g' V'g'U'b'W'i'g'Y'f'c' W'h'h'i' b'X'f'g'U'b'X'h'Y'
|a dUW'c'b'W| b|h'c'b'U'b'X'V'c'X'm'g'h'a' Z' b'W'f'c'b'z'|b'W'X|b| 'W'X'c'j' U'g'W'U'f'\YU'h''
- 7\U'f'h'h'Y'h'U'W'c'f'm'c'Z'g'Y' X|Z'f'Y'b'W'g'U'b'X'W'c'W'f'f|b| 'W'b'X|h'c'bg'c'b'h'Y\YU'h' c'Z'
d'Y'c'd'Y'k |h'8'G'c'j' Y'f'h'a' Y'
- 8 Yj Ycd'X|j Yfg'Y'W\c'f'g'Z'f' |X'bh'Z'nb| 'U'b'X'j'U|X'h|b| 'd'U'g'a' U'V'c'a' U'f'Y'g''
- -b'W'X'Y'U'g'Y'g'g'a' Y'bh'g'c'Z'W| b|h'j' Y'z'Z' b'W'c'b'U' U'b'X'a' c'f'g'g'|`'g'f|b'W'X|b| 'Y'Y'W'h'j'Y'
Z' b'W'f'c'b'z'g'Y'W'#U'b| i' U'Y'U'b'X'\Y'f|b| z'U'b'X'V'Y\U'j'c'f'g'f|b'W'X|b| j'U|X'U'X'a' Y'h'c'X'g'f'c'
a'Y'U'g'f'Y'U'U'h'j'Y'W'U'j'c'f'g'U'b'X'g' W'g'z'`'|b'X'd'l

Y

X

- 9l Ůa]bYh.Ydfj UYbWcZbY fc`c[]W ŮbXdgnWc`c[]W ŮwbX]hcbg]b'dYcd`Yk]h`8G
UWcgg h`Y`ZgdUb)ž]bW X]b[]XbhZ]W]hcb`cZj Uf]U]hcbg`VmfUW#h.b]Wnžgyl žUbXef`
[Yc[fUd\nm`7c`WmXUcb'5 hmb]cb 8 YZ]W# naMfUMj]lm8]gcfXf f5 8 < 8 LUbX
5 i hga `GdYmfi a `8]gcfXf`f5 G8L/a YbU`YUh X]gcfXfžg W'Ug`XdfYgg]cbžUbl]Ynž



- 7cbXl WYd|Xa |c`c| |W fYgUfW cb hYdfy UYbWcZMbWfġ|bW X|b| `Yi _Ya |Uġ|b` dYcdYk |h`8G UMcġġhY`|ZġdUb`UbXdUfh|W Uf m|b`W|`XccX`zUbXhYg fj lj U|`|mi cZh YġYbWfUg Wa dFYXlc`hY| YbYU`dcdi`U|cb``7\ fUWf|nYbYi fcW| b|hj Yz VY`U| cfUzUbXei U|hm|cZ`|ZYci hWa YgfYUHXlc`WbWf hYfUdm|b`dYcdYk |h`8Gz Wb|h|bi |b|`h`fci [`g fj lj cfg`|dZlc`|Xbh|Znf|g`ZMcfgZcf`dccbYf`ci hWa YgUbXhUf| Yg Zcf`|bhfj Ybh|cbg`
- 7cbXl WfYgUfWlc`YġU|g` hYdfy UYbWcZ| i h# U|fc|bh|ġ|bU#|j Yf#|XbYn#UXXf WbX|h|cbg|b`dYcdYk |h`8G UMcġġhY`|ZġdUb`z|bW X|b|`|Xbh|ZW|cb`cZj Uf|U|cbg Vn|U`Yz fUW#h|b|W|n|z|g| zcf`| Yc| fUd`n|`7cbXl WmU`cb| |h`X|bU`W`cfh|ġi XmcZ Xngd`U| |U|b`W|`X`Yb`k |h`8G`
- 7cbXl WYd|Xa |c`c| |W fYgUfWlc`YġU|g` hYdfy UYbWcZg`|b`WbX|h|cbg|b`dYcdY k |h`8G UMcġġhY`|ZġdUb`%
- 7cbXl WbUhfU`|g|cfm|ġi X|YġcZa i gW`cg`YYU`WbX|h|cbg|b`dYcdYk |h`8G UMcġġ hY`|ZġdUb`%
- 7cbXl WXXZ|b|hj Yd|Xa |c`c| |W`ġi X|Yġlc`YġU|g` hYdfy UYbWcZ|UWYġ|b` dYcdYk |h`8G UMcġġhY`|ZġdUb`z|bW X|b|`|Xbh|ZW|cb`cZdfchW|j YUbXf|g` `ZMcfgZcf`h`YġY`WbX|h|cbg`
- 7ca d|`YX|Ucb`h`YY|c`c| m|UbX|h|a |b|`cZa YfUc`|Wk`Y| |`h|ġ|U|g`WUb| Yġ|b`dYcdY k |h`8G UMcġġhY`|ZġdUb`UbXhYdfy UYbWcZgYWbX|fmWbX|h|cbg`Uġc`V|UHXk |h` cVġ|h|
- ġi Xn|ck`h`Y|a a i bYġn|ġa` a U|fYġ|b|bX|j |X`Ug`k |h`8G`Zca`|bZU`W|h`fci [` U|`h`ccXzUbX`ck`h`YdfcWġga`| |`hX|Zz`Zca`h`Yġ|a`Ya`U|fU|cb`dfcWġġ|b`hcgY k |h`ci h8G``7cbXl W|cb| |h`X|bU`ġi X|Yġlc`a`Ud`h`Y|a a i bYġn|ġa`z|bWf`dcfU|b|` |bZU`a`Ucfma`Uf`Yfġ`g`g`W|h|V|`|hm|c`|bZW|cbg`z`UbXfYġc`cbgYġlc`j`UW|bYġ`
- ġi Xn|7CfcbU`=fi`g8|ġYġY`&S`%`f7CJ`-8!`%`Lf|g`UbXa`|h|`U|cb|ġi`U|`|YġZcf`dYcdY k |h`8Gz|bW X|b|`X|Zz`fYb|U`YZZWġcZG5F`G!`7cJ`!&|bZW|cb`cb`dYcdYk |h`8G UMcġġhY`|ZġdUbz|b`j`Uf|ci`g`|j`|b|`ġ|h|b|`g``7cbXl W|U|`cfYXġi X|YġcZYZZW|j`YXcġb|` UbX|a a i bYfYġc`cbgYlc`j`UW|bYġlc`dfy`Yb|7CJ`-8!`%`|b`dYcdYk |h`8G`

%7cbX|h|cbgZcf ġi Xn|W|`X|bW`XYUWYH`W``na`d|c|X`Yi`_Ya`|UzUMY6!`W``na`d|c|X`Yi`_Ya`|UzUMY a nYc|X`Yi`_Ya`|UzWfcb|Wna`d|c|W|h|WYi`_Ya`|UzWfcb|Wá nYc|X`Yi`_Ya`|UzHfUbg|YbA nY`cdfc`|ZfU|j`Y 8|ġcfXfzUbXHFUbg|Yb5`Vbcfa`U`A`nY`cdc|Yġġ`

%7cbX|h|cbgZcf ġi Xn|W|`X|bW`XY|`U|fcYġcd`U`YU`fYzi`l`z`Wfcb|Wb|ġ|d`U|cbz`Wfcb|W|Uf`Uz`Xngd`U`|Uz`W|UW|ġYġz`<|fġWġfi`b|`XġYġz`dncf|W|h|bcġġ|ff|hU`YVck`Y`ġn|Xca`Yz|bZU`a`Ucfm|vck`Y`XġYġz`dYd|W`i`Wfġ|`U`ġcbYġ`Ya`cf`c|XġX|j`Yh|W`|hġX`c`XbU`UfYġ|Uz`ġ|bcġġcf`k`Yz`UbU`ġ|bcġġcf`UfYġ|Uz`Yġcd`U`YU`UfYġ|Uz`Xngd`f|Uz`c|X|b|`Xngz`bW|cbz`|XbYn|XġYġz`Wġ|W`Xngd`U|j|W`|XbYn`nXfcbYd`fcġġ`nXfci`fYhZ`dcġY|cf`cf`U|h|f|cf`i`fYh`fU`j`Uj`Yġz`fYbU`U`YbYġġj`YġW`i`fYh`fU`fYzi`l`z`UbX`cbU`W`c`|WZ|h|mi`|j`Yf`XġYġ`

%7cbX|h|cbgZcf ġi Xn|W|`X|bW`XYUWYz`UcdYMU`fYUz`Ucd|WXYfa`U|h|ġ#WYa`Uz`Vc|`ġ#|XU`Xb|h|ġ`g`ddi`f|h|Uz`|W`|hġW`i`|hġz`dġcf|Uġġz` GHUPGH` -`

Program Portrait 2 Cohort Development

DS-Connect®: The Down Syndrome Registry

Hc`U [a Yb]lgfYgUFW`cb`8GzB=7< 8 `U bWYX8G!7cbbYMi. `H`Y8ck b`GnbXfca YFY [lgfmi
f`hdg #8G7cbbYMi\`" [cj L]b`&S% "" H]gfYgUFW fY [lgfmižg ddcfHXVrh YgYZUj cWNgz
Za]`na Ya Vfgz8G`cf [Ub]nUjcbg`UbXZci bXUjcbgž`UbXB< =7Cgk]h]b h`Y8G`7cbgcfhi a
fgY5ddYbXl 5LzUa g`lc`ZUW]HUY]bZcfa Ujcb`g`Uf]b [`Ua cb [`dMfgcbgk]h`8GzZa]`YgžUbX
fYgUFWYfg`VmW``YMi]b [`Xa c [fUd\]WbX`YUh]bZcfa Ujcb`Uci hdy`cd`Yk]h`8G`h`fci [\ `U
gf]Yg`cZcb`]bYg fj Yng` H]g`WbZ`Xb]UžgW`fYz`UbX`fYg`dcbgj Yk Wg]Yk Ug`Ugc`hUbg`UX
]b`c`GdU]g\]b`&S% " G]bW`&S% žbYf`m) ž`S`]bXj]X U`gk]h`8G`U`Y`fY [lgfYX`"

H`Y8G!7cbbYMi`dfcZgg]cbU`dcfU`k Ug`U bWYX]b`&S% `lc`U`ck`U`d`f`c`j`YX]b`j`Yg] [U`c`f`g`z
W]b]W]bgž`UbX`ch`Y`f`ei`U]Z`YX`d`f`c`Z`g`g]`c`b`U`g`lc`U`W`g`g`h`Y`X`Y`]X`b`h`Z`Y`X`X`U`U`W``Y`M`X`h`f`ci` [`h`Y
fY [lgfmi`a`c`f`Y`h`U`b`(`,`S`f`Y`g`U`f`W`f`g`W`f`f`b`h`m`c`X`U`d`f`c`Z`g`g]`c`b`U`U`W`i`b`h`H`Y`d`f`c`Z`g`g]`c`b`U`d`c`f`U
c`Z`f`g`h`f`Y`Y`Y`g`c`Z`U`W`g`g`%`L`j`]`k`]`b` [`U` [`f`Y`U`h`z`X`Y`]X`b`h`Z`Y`X`X`U`U`c`f`g`f`j`Y`m`W`b`h`b`h`c`b`m`
&L`d`f`Z`c`f`a`]`b` [`W`g`c`a`]n`Y`g`U`f`W`Y`g`c`f`g`U`h`g]W`Y`j`U`i`U`j`c`b`Z`c`f`U`b`U`ng]g`z`d`i`V]W]h`c`b`z`c`f
d`f`Y`g`b`h`U`j`c`b`/`U`X`'`L`f`Y`M`i`]`h`b` [`d`U`h`W`d`U`b`g`Z`c`f`f`Y`g`U`f`W`c`f`W]b]W`g`h`X`m`

UbXyl dUbX]b[\WffYbhW]b]W WfY[i]XY]bYgYgU]g\ \XVmhYdfcZygg]cbU`a YX]W`UbX
V\Uj]cfU`gV]M]YgZcfU`U`U Y[fci dg`cZdYcdYk]h`8G"

Define DS Phenotypes

- 7cbj YbYUdUbY cZYl dYf]g]f]bW`X]b[`Vch`W]b]M]Ubg`UbXfYgYUfWf]g]Lcb`8G`lc`XZ]bY
8Gd\Ybchm]YgU]M`cgg]h`Y`Z]gdUb`i`gb[Uj`U`U`WYW]b]W`UbX[YbY]W]U]U`-bZcfa`h`Y
Xj`Ycda`YbhcZi`dX]U]XW]b]W`[i]XY]bYg]lc`]a`dfcj`YWfYZcf`dYcd`Yk`]h`8G`Vmi
]bW]f]dcfU]b[`X]U]cb`W]Ub[YgfYU]h`X]lc`g]U`YgcZ`Z]Yf]M`["z]bZ]La`a`U]cb`UbX
a`Y]U]c`]ga`Ez`UbX`cb`U`Yf]Ub[Ygk`Yb`Ub`]b]M]j`Yb]h]cb`a`][`h`W]a`cg]h`ZZ]M]j`Y`"
- =>X]b]Z]h`8G`d\Ybchm]Yg`UbX[Ybchm]M`d\Ybchm]YUgg`V]U]h]cbg]z]b]W`X]b[`V\Uj`]cfU`UbX
Xj`Ycda`Yb]U`a`]`Yg]cbYg]z]lc`]bZcfa` . i`bX]Yg]U]b]X]b[`cZb]U]i`fU`\]g]c]f]m]z]V]U`]b]b]b[`]
dfYb]U]U`m]UbX]b]W`X]b[`di`V]f]m]UbX]U]U` `h`ccX`h`Y]h]a`]b[`cZ]UbX]U]f[Y]g]Zcf
]b]M]j`Yb]h]cb]g]lc`]a`dfcj`YW]b]h]cb]cf`]b]M]j`YbY]b]f]Y]f]Ygg]cb/h`Y]Y]c`i`h]cb]cZ
W]a`a`i`b]W]h]cb]g`.]`g`UbX`d]U]h`c`c`[Y]g]h`U]h]U]Z]Y]W`Y]U]f]b[z]V]U]b]W]z]UbX]j`]g]cb"
- 9l`d`cfYX]Z]Z]f]Yb]W]g` `lc`U]g]M]U]b]k`\n]g]d]cb]U]b]Yci`g]Z]H]U` `cgg]c]W]f]g]cb`n]i]b]g]ca`Y
W]g]Yg]c]Z]h]g]ca`m]i]g]z]k`\Y]h`Y]f`h`Y`d`U]W]b]U]W]b`dfcj`]XY]b]g]l`\]g]cb`h`Yg]Y`df]Y`b]U]b]W]h`cgg]Yg]z
UbXk`\Yb`h`Y]U`]b[`dfc]W]gg`V]U`]b]g"

Improve Clinical Research and Therapeutics

- @y`Yf]U`Yh`Yi`b]ei`Ycddcf]i`b]h]Yg]h`U]h]W]a`Y]Z]ca` `dfYb]U]U`g]M]Y]b]b[`Zcf`8G`U]g]d]U]h]cZ
fci`h]b]Y`dfYb]U]U`W]f]Y]UbX]i`bX]Y]g]U]b]X]h`Y]fc`YcZ]h`Y`d`U]W]b]U]b]b`h`Y]X]Y`Ycd]b[`Z]h]g`":`cf
Y]U`a`d`Y]z]X]b]h]Z]h]b[`Z]h]g]Yg]k`]h`8G`]b`W]b]h]bi`]b[`df]Y`b]U]b]W]g]W]U]h]g]h`Y`dcgg]V]U`]h]m]cZ
cZ]Z]f]b[

- 7cbXl WlWlWlWlWl fYgYfWlc UgYgg'hYYZlWlWlZl]bhfj Yb]cbgZcf]a dfcj YXWl b]h]cbž Wl a i b]Wl]cbž\Yf]b] 'UbXVUUbWZUbXj]g]cb"
- =bWlXl'dYcd'Yk]h '8G']b Wl]Wl]f]UgcZj UWl]bYg'UbXlfYUa Yblgž]bWl X]b] '7CJ =8!% ' j UWl]bYgžUg'h YmVWl YUj U'UY'
- =bWlXl'dYcd'Yk]h '8G'UbXhYf'WfYl]j Yfg] ddcf]fghfci [\ci h]hYWl]Wl'fYgYfW' dfcWggžVl]bb]b] 'k]h 'gh XnXg]]bžUbXXj Ycd'gfU]]Yg'lc]bWl]UgYh YdUf]Wl]U]cb' cZdYcd'Yk]h '8G'cZl]Zl]fYbhUj Yžg] žfUW#h]b]Wl]m]bXg'VcYWl]bca]Vg]U]g]b' fYgYfW'
- 7cbg]Xf'Xj Ycd]b] 'di V]Wdf]j UYdUf]bYf]g\]dgk]h 'V]chWl]bc`c] m] Wl dU]Yg# \Ufa UWl]Wl]bX] g]f]m]c]h]g]d]V]Z]Wl YfU]Y]W]Zcf dYcd'Yk]h '8G'""""
- < Ufa cb]nYWl]Wl]f]U' dfc]cW'gžk \Yb'dcgg]V]žk]h]b]YbU]cbU'YZcf]g]lc YbUY a Yb]b]]Z `X]U]g\Uf]b] ""8Yj Ycd'g]g]U]bUYX]U] bcg]Wdf]cW'g'UbXYf m]b]hfj Yb]cb'

hY`Uf Ydfcdcfhcb cZW]`XfYb k Jh` 8G Vcfb`k Jh` Wb] Yb]U` \YfhWbX]hcbg`h YgY
ci hWa Yga Uhj UfmY Yb`La cb] `W]`XfYb`k Jh` 8G`k`c` \Uj Yh YgLa Y`YfhXZYWg UbX
fYWj Yh YgLa YfhYUa Yb]g Ug`hnd]W` mXj Ycd]b] `W]`XfYb`

- Gh Xmi]a a i bY`gn]h`a` X]ZfYbWg]bZ`UbXf]g` ZUMfgUbXdc]h]U` hfYUa Yb]g ZcfzW!
cWff]b] ` a cghWa a cb]b`dYcd`Yk Jh` 8G`%`zUbXXZ]bYh`YZ` ``
Ja dUMcZU`lc]a a i b]hmc]b`h`Y`YUH`cZdYcd`Yk Jh` 8G`" Gh Xnk` \Yh`Yf`hfYUa YbhcZ
U`lc]a a i bY`g`]b`WbX]hcbg`a` UmUXYgg`W`!cWff]b] `U`lc]a a i bY`WbX]hcbg`" 7cbX] W
fYgUFW`lc`X]hfa`]bYk` \Yh`Yf`]b`dYcd`Yk Jh` 8G`Z` \Uj]b] `cbYU`lc]a a i bY`X]gcfXf`
dfY]gdcgYg`h`Ya` `lc`ch`Yf`U`lc]a a i bY`WbX]hcbg`"
- 8YgU]VYa cfYZ` `mi`]b`8Gz`UbXXj` Ycd`hUf]`YXh`YfUd]Yg`h`c`
UXYgg`Jh`" Gh Xn`ck` ZU`YXa`]lc`WcbX]U`Z`bW]cb`UbXfYU`Xcl`]XUj`Yg`fYgg]a`dUM
h`YfYU]hcbg` \d`Wk`Yb`bY`fc`c`]`VZ`bW]cbzW]`b]h]`YXZ]Wg`z`UbX58`"
- 7cbX] WfYgUFW`cb`h`Y`cb]`!hfa` \YUH`]a`dUMcZj`Uf]ci`g`hnd]Yg`cZ` z]bW`X]b]`
k` \Yh`Yf` \Uj]b] `hnd]Y%`X]UW]h]g]bW]UgYg`h`YWUbW`cZ`Xj` Ycd]b]`ch`Yf`U`lc]a a i bY`
WbX]hcbg`z`UbXk` \Yh`Yf`Yf`m`hfYUa`YbhcZ`hnd]Y`&`X]UW]h]g`Wb`fYX`W`cb]`Yf`hfa` \YUH`
]gg`Yg`g`W`Ug` \Yfh`X]g`Ug`z`gfc`_`Yz`]gcb`dfc`V`Ya`g`z`bY`fcd`h`n`z`UbX`_`]b`Ym`X]g`Ug`Y`"
- Gh Xn]h`Y`cb]`!hfa` \YUH` YZ]Wg`cZ`]b`dYcd`Yk Jh` 8G`z]bW]X]b]` .`Wb]g`XfU]hcb`
cZ`g`l`z`fUW`Z`h`b]V]h`z`UbX`g`V`c`Wbca`]V`g`h`g`k` \U]b]h]j`Yb]hcbg`f]j`W`Ug`X]h]UbX`
Y`Yf`Ug`La`]` \h`Ug]g]h]b`a`Ub]`Ya`Yb]h`UbXk` \m`]d]X`Y`Yg]b`dYcd`Yk Jh` 8G`k`c`UfY`
cV`gY`UfY`c`Z`h`k`]h]b`Ub`cfa`U`fub]`Y`"
- Gh Xni`]b`dYcd`Yk Jh` 8G`lc`i`bX]f]g`UbX`ck` ``j]`Yf`
Xng]z`bW]cb`a`Um`Wb]f]V]h`Y`lc`ch`Yf`W`!cWff]b] `WbX]hcbg`"
- 7cbX] WfYgUFW`cb`bi`hf]Ybh`Ug`cdf]hcb`UbXa`YfUc`]ga`]b`dYcd`Yk Jh` 8G`f]gca`Y]a`Yg`
W`YXh`Y`[i`hV]ub`U`]g`lc`i`bX]f]g`UbXdf`Y`Yb]j`YUbXf]g` ZUMfg`Zcf` UbX`
fYU`XX]gcfX]f`g`"
- 7cbX] Wgh`X]Yg`lc`X]hfa`]bYa`cfY`dfW]gY`m]h`Yh`nfc]X]g]a`i`U]b]` \cfa`cbY`Y`Y`U`h`
k` \W` a`Ub]Z]g`g`X]j` Ycd`hfYUa`Yb]g`Zcf`]b`UX]hcb`lc`
g]UbX]fX]h`nfc]X` \cfa`cbYa`Ub]`Ya`Yb]h`"
- Gh Xn]X]ZfYb]U`fYg`dcbgY`lc`hnd]Yg`cZ]bZ]W]hcbg`%`z`Ug`k`Y`Ug`f]g` ZUMfgUbXdc]h]U`
hfYUa`Yb]g`zcf]bX]j`]X]Ug`k`]h` 8G`z]bW]X]b]`Ub]h]V]ch]Vg`z`Ub]h]j`]fU`a`YX]W]hcbg`z`
dfY`Yb]h]j`Yg`f]j`W`Ug`dU]j`]ri`a`UV`Zcf`F`Yg`d]fU`cfm`G`nb`V]h]U`J`]fi`g`G`J`Q`dbY`a`cb]Uz`
UbX]j`UW]bYg`" Gh Xn`ck` a`Um]bZi`YbW`cj`YfU` \YUH`z`cb]`Y`]h`z`UbX`
ei`U]hmcZ`]Z`cZdYcd`Yk Jh` 8G`"

% H`YgY`WbX]hcbg]bW`XZ`Vi`h`fY`bch]a`]h`X]lc` hnd]Y%`X]UW]h]g`z`W]UW]X]g`Ug`z`<`Ug]a`ch`c]h`nfc]X]h]g`z`Ucd`WU`
fYU`Uz`Ucd]VX]Yfa`U]h]g`W]W]a`Uz`X]fa`U]h]g` \Yf`d]h]Z`fa`]g`X]fa`Uca`n`g]h]g` \]X]U`X]b]h]g`g`ddi`fU]j`Uz`]W]Yb`d`Ubi`g`z`
]W]Yb`g`W]f`c`g`g`z`]h`]`c`z`d`g`c`f]U]g`z`d`g`c`f]U]h]W]h]f]h]g`z`U]h`f`cd`h`n`z`f`Y`a`Uc]X]U]h]f]h]g`z`Ug`W]h]g`z`Ya`c`n]h]W]bYa`]Uz`
h`fca`Vc`V]h`c`d]b]W]h]fdi`fUza`n`g]h]g`z`f`Y`g`h]Ygg`Y`g`n]h`X`ca`Y`ff`U`Y`m]U`lc]a`a`i`bY`z`A`Yb]Y`Y`g`X]g`Ug`z`U`lc]a`a`i`bY`
YbW`d`U]h]g`z]bZ`La`a`Ucfm`vck`Y`X]g`Ug`z`#`fc`b`g`X]g`Ug`z`b`f`W`Y`d`g`z`?`Uk`Ug`U]`X]g`Ug`z`D`Y`X]U]f]W]5`Zcf`

- 8 y Ycd dfy Ybhj Ya YUj fYgUbXlfYUa Ybglc UXYgggfi WifU UbXZ bWjcbU
Ubcfa U]hYg]b'hYU X]lcfm]bXj Yg]M `Uf'ng]hYa gcZdYcdYk]h `8G'cj Y'hY`ZgdUb`
lc cd]a]nY
- 8 y Ycd]bhj Ybhcb]gfUM]]Ygi gbl `bcb!d\Ufa UW`c[]W UddfcUWYg]c`a Ub] Y
WbWffYbhW!cWff]bl `WbX]hcbg'g W'UddfcUWYgWi `X]bW XYhWbc`c[]Yg]c`
g]a i `UYVU]bZ bW]cbž hc a Ub] YhmlY&X]UW]YgUbXga]`Uf
WbX]hcbgžUbX , g W UggcV]U Yb[U Ya Ybžd\ng]W
UW]]mžYX] W]cbU]bW g]cbžlc Yb\UbVW] b]hcbUbXV\U]cf" 9j Ui UYbcb!
d\Ufa UW`c[]W UddfcUWYg]b]bXj]X] Ug'k]h `8G!58žZcf Vch]a d]cf]b[W] b]h] Y
Z bW]cbUbX`ef dfy Ybh]b[`W] b]h] YXYh]cfU]cb"

• 8 y Ycd'Udd]WjcbgZcf a cV] YXj]Wg'UbXWa di hf! VgXh YfUd] Ygic]bMMUy
]bXdYbXbWZcf dYcd Yk]h '8G]b'UMj]hYgcZU] m']j]b[žYgdWU`mgYZg ddcfh
hWbc`c[]Ygžic`Wi gX]b`hY`YUhž`ca Y!VgXžUbXgWcc`gM]b] gic`ja dfcj Y
`Yfb]b[`UbXWa a i b]Wjcb" "8 y Ycd'UbXef`UdhUggghj YXj]Wgžg WUg; `cU
Dcg]hcb]b[Gng]a g'UbXa cV] YXj]WgZcf hUbgdchUjcbžcf Xj]WghUh`Yd ic`
ZU]]hUy]bM] fUjcb`cZU`]bXj]X U k]h '8G]b'ic`h Yk cf_d`UWžfYgXb]U`cf`ca Y
Ybj]fcb a YbžUbXWa a i b]h" "

• 8 y Ycd'UbXj U]XUy]bMj Yb]cbgž]bW X]b[`U [a YbUj YUbXU]fbUj Y
Wa a i b]Wjcb Xj]Wg'UbXch Y'icc`gžUa YXU]a dfcj]b[`Ub[i U Yg.]`g'UbX`Yf]b[.
WdU]]hYg]b`dYcd Yk]h '8Gžg W'UgghU]]Ygic`cj YWa YX]Z]W]hYg]b gYyW

- I gY`Yggcbg`YfbYXZca Zã |]YgDM dYf]YbWgk]h h`YG5FG!7CJ !&dUbXa]Wc` Xj Ycd`ghUM]Yg`hU]bW XYdYcd`Yk]h`8G`]b`d`Ubb]b] `Zcf`Z`h`fy`di`V]WYU`h`UbX X]g`g`Yf`dYd`UfYX`b`Ygg`YZc`f`g`g`W`Uga`U`b`h`U`b`]b]` WfY]]j`Yf`UW`W`g`g`c`]b`Xj]X`Ugk]h`8G`k`c`a`Um`Y`]g`c`U`X`]b`h`Y`c`g`]h`U`"'"

Increase Indusion of People with DS in Research

- HU`Y`]b]c`U`W`i`b`z`k` \`Y`b`X`g`]`b`]b]` `g`d`M`Z`W`Y`g`U`f`W`g`h`X`]`g`z` \`c`k` `d`c`h`b`h`U` `d`U`h`]`M`d`U`b`g` j`]`Y`k` `h`Y`a`g`Y`j` Y`g`f`]b`W`X`]b]` `]`X`b`h`]`Y`g`c`Z`f`U`W`Z`]` Y`b`X`f`z`W`U`g`g`U`b`X`g`M`i`U` `c`f`]`Y`b`h`]`c`b`L`U`b`X`Z` l`c` `h`Y`Y`i`h`b`h`Z`U`g`V`Y`z`f`W`i`]h`X`j` Y`f`g`Y`d`c`d`i` `U`h`c`b`g`c`Z`d`Y`c`d`Y`k`]h`8G`]b]c`f`Y`g`U`f`W`g`h`X`]`g`'`
- 8`y`Y`c`d`f`Y`g`U`f`W`g`h`X`r`i`a`U`h`f`]`U`g`h`U`h`U`f`Y`U`W`g`]`V`Y`l`c` `]b`X`j`]X`U`g`k`]h`8G`z`]b`W`X`]b]` `g`h`X`m`X`Y`g`M`d`h`c`b`g`z`]b`Z`c`f`a`Y`X`W`b`g`Y`b`h`f`g`Y`b`h`X`c`W`a`Y`b`g`z`U`b`X`]b`Z`c`f`a`U`h`c`b`c`b` `W`b`Z`X`b`h`U`]m`i`U`b`X`d`f`]j`U`w`i`c`Z`X`U`U` `9`b`]`U`Y`d`Y`c`d`Y`k`]h`8G`U`b`X`h`Y`f`W`f`Y`]`j`Y`f`g`]b`g`h`X`r`i` X`]g`]`b`]c` `]b`W`Y`g`Y`h`Y`U`d`f`c`d`f`]`U`h`b`Y`g`c`Z`h`Y`g`Y`a`U`h`f`]`U`g`U`b`X`Y`b`g`f`Y`h`U`h`Y`d`f`Y`g`Y`b`h`]`c`b` `c`Z`f`Y`g`U`f`W`h`c`d`]`W`U`b`X`f`Y`g` `h`g`X`c`Y`g`b`c`h`i`b`]b`h`b`h`c`b`U` `m`M`g`Y`d`g`i`W`c`c`]`]`W`g`h`Y`g`]b` `d`c`h`b`h`U` `d`U`h`]`M`d`U`b`g`]`U`h`]`M`d`U`Y`]b`8G`f`Y`U`h`X`c`i`h`Y`U`W`Y`Z`c`f`g`g`U`f`Y`h`Y`U`h`g`h`

]bZcfa U]cb`UbX`Yd`]bZcfa `]bXj]X`Ugk]h`8G`U`g`U`f`W`Z`ã |]Yg`U`c`i`h`

h`i`g`Y`b`W`i`f`U`]b]`U`X`]h`c`b`U` `d`U`h`]`M`d`U`h`c`b`]b`g`h`X`]`g`":`c`g`h`f`U`X`]h`c`b`U`Y`Z`c` `h`g`Y`X`i`W`f`Y`W`f`Y`]`j`Y`f`g`c`Z`d`Y`c`d`Y`k`]h`8G`U`c`i`h`h`Y`j`

Expand Knowledge on DS, Aging and

- 9l d'cfYdchHh]U dfchWj YZUc'fgZcf U Y'fYUXXXa Yb]U]bW X]b['Wa d'Ya YbUfmi UbX]bH] fUj Y\YUh UddfcUWYg'Y YfV]gZUbXX]Yi'
 - Gh Xmih YgdWZ]W]a dUWcZdcga YbcdU gU \cfa cbYfyd'UWa Ybhih YUdmfk FHLi gYVmi k ca Yb'k]h '8G'hc X]Yfa]bY]Z]hfYi Wgh YWa i 'Uj Y
-

HAY567!8G!fYgUfWfYgk] ``Zc`ck hYw\cfhcZdYcdYk]h`8G!e WbXl WlhfYdfc^Mg

- -bj Yg]l UY`ck 8G!58 dUf`YgUbxXjZfZca`gdcfUjW58`k]h]b`U`l`a`m`c]XZlU`z`
bY fcX] YbYUjcbZl`a`Yk cf_`zUbxlc`]Xb]Zna`cX]ZfYg`cZf]g`_`cZWb] Yfgcb#tfc[fYg]cb`
- =>Xb]Zn[YbY]W`a`cX]ZfYg`cZl`YXj`Ycda`YbhcZ8G!58
- HfUgUYci hW`a`Yg!e UdfW]g]cb`a`YX]WbYZl`a`Yk cf_`UbxYl`dYX]YW]b]W`h]Ug

=a dcfUbnzlhYbYl h]hYUjcb`cZ567!8G]bW`XgU`b`Ya`d`Uj]g]cb]bW]U]b[`h`YX] Yfg]m]cZ`
]bX]]X] U]g]b`h`Yw\cfhcZU`]g`k]h`8G`" HAY58#8G`Ci`hYUWZFW`W`]la`YbZ`U`X`
9b[U`Y`a`Yb7cfYk] ``fU]XmX]ggYa]bUY]bZ`fa`U]cb`lc`8G`Wa`a`i`b]h]YgU`bX`Yb[U`Y`
i`bX]fYdfYg]b]X`fU]U`Y`h`b]W`fci`dg`"

E. Research Infrastructure and Tools

8]U`bcg]W`bX`g`W`Y`b]b[`a`Y`U`g`f`Y`g`i`g`X`Z`c`f`8`G`U`b`X`f`Y`U`X`W`b`X`h`c`b`g`^`U`j`Y`W`b`h`i`Y`X`l`c`Y`j`c`j`Y`
]b`f`Y`W`b`h`i`m`U`f`g`" <`c`k`Y`j`Y`f`z`i`h`]"`n`U`h`c`b`c`Z`a`c`f`Y`g`d`Y`U`]n`Y`X`a`Y`U`g`f`Y`g`c`Z`Z`b`W`]c`b]b[`U`M`c`g`g`
X`c`a`U`j`b`g`W`i`X`Z`W`]h`U`Y`a`c`f`Y`f`Y`Z`b`Y`X`d`Y`b`c`h`m`]b]b[`U`b`X`]X`b`h`Z`W`h`c`b`c`Z`V`c`a`U`f`Y`g`Z`c`f`a`Y`X]W`z`
W`[`b]h]j`Y`Z`U`b`X`V`Y`j`]c`f`U`W`b`X`h`c`b`g`f`Y`U`X`l`c`8`G`"

=b`h`Y`b`Y`U`f`h`f`a`z`h`Y`g`W`b`h`Z`W`W`a`a`i`b]m`b`Y`X`g`l`c`Z`f`h`Y`f`]a`d`f`c`j`Y`l`c`c`g`z`h`W`b]e`i`Y`g`z`a`Y`h`c`X`g`z`
U`b`X`a`Y`U`g`f`Y`g`l`c`a`c`j`Y`l`c`k`f`X`U`a`]b]a`i`a`g`h`c`Z`W`a`a`c`b`a`Y`U`g`f`Y`g`Z`c`f`i`g`Y`U`M`c`g`g`g`i`X]Y`g`z`U`Y`
[`f`c`i`d`g`z`U`b`X`X`j`Y`c`d`a`Y`b`U`U`b`X`W`Y`j`]c`f`U`X`c`a`U`j`b`g`" HAYZ]Y`X`a`U`h`V`b`Z`h`Z`c`a`U`b`U`f`Y`a`Y`b`h`
c`b`W`a`a`c`b`X`c`a`U`j`b`g`U`b`X`c`b`U`W`f`Y`g`h`c`Z`g`U`b`X`f`X`n`X`h`g`g`U`b`X`a`Y`U`g`f`Y`g`h`U`h`W`b`V`Y`U`g`Y`g`g`X`]b`
W`]b]W`f`Y`g`U`f`W`c`b`8`G`l`c`U`c`k`Z`c`f`W`a`d`f`U`]`]m`U`M`c`g`g`g`i`X]Y`g`z`c`h]b[`h`U`h`X`c`a`U`j`b`g`
U`d`f`c`d`f`]U`Y`Z`c`f`c`b`Y`g`U`Y`c`Z`]Z`a`U`h`b`c`h`V`U`d`f`c`d`f`]U`Y`Z`c`f`c`h`Y`g`" =b`U`X`h]c`b`z`a`U`]b[`W`a`a`c`b`
f`Y`g`U`f`W`f`Y`g`c`i`f`W`g`U`j`U`V`Y`l`c`f`Y`g`U`f`W`f`g`z`g`W`U`g`b`k`a`c`X`Y`g`Z`c`f`8`G`z`f`Y`g`U`f`W`]b`Z`U`g`h`W`i`f`z`
U`b`X`X]U`U`b`X`h]g`g`Y`f`Y`d`c`g`]h`c`f`]Y`g`z`k`]"`U`c`k`f`Y`g`U`f`W`l`c`a`c`j`Y`Z`c`k`U`X`a`c`f`Y`f`U`]X`n`i`

Expand Research Tools

- 8`Y`Y`c`d`U`X`h]c`b`U`b`Y`k`a`c`X`Y`g`n`g`h`a`g`Z`c`f`g`i`X`n]b[`8`G`U`h`h`Y`W`i`U`f`z`c`f[`U`b`f]b`U`X`h]c`b`
l`c`V`U`j`b`z`U`b`X[`Y`b`Y`h]W`Y`j`Y`g`"
- G`h`X`n`h`Y`Y`Z`Z`W`g`c`Z`d`f`h`f`U`h]c`b`c`Z`]b`X`j`]X`i`U`W`f`c`a`c`g`c`a`Y`&%[`Y`b`Y`g`c`b`h`Y`
X]Z`Z`f`Y`b`h]U`h]c`b`U`b`X`a`U`i`f`U`h]c`b`c`Z`b`Y`i`f`c`b`g`z`[`]U`z`U`b`X`g`n]U`d`Y`g`]b`V`U`j`b`c`f[`U`b`c]X`g`z`U`g`k`Y`
U`g`]b`a`c`X`Y`c`f[`U`b]g`a`g`g`W`U`g`C`U`b`X`8`f`c`g`c`d`]"`U`
- 8`Y`Y`c`d`U`b`X`g`d`d`c`f`h`b`Y`k`U`b]a`U`f]`Y`z`a`c`i`g`z`f`U`z`c`f`B`<`D`L`a`c`X`Y`g`Z`c`f`W`b`X`i`W`]b[`
d`f`Y`W`]b]W`f`Y`g`U`f`W`c`b`8`G`z`]b`W`X]b[`h`g`]b[`d`U`f`a`U`W`c[`]W`U`b`X[`Y`b`Y`h]W`b`h]f`Y`b`h]c`b`g`z`
U`b`X`W`b`X`i`W`]b[`U`b`U`c`a`]W`U`b`X`W`Y`j`]c`f`U`U`b`U`n`g`Y`g`c`Z`V`U`j`b`X`j`Y`c`d`a`Y`b`h`D`f`c`f`]h`n`Y`h`Y`
X`j`Y`c`d`a`Y`b`h`c`Z`a`c`X`Y`g`h`U`h`a`]b]a`]n`Y`b`c`b`!`W`f`c`a`c`g`c`a`Y`&%[`Y`b`Y`h]W`W`U`b[`Y`g`z`U`b`X`h`c`g`Y`
h`U`h`W`b`f`Y`Z`W`h`h`Y`g`f`i`W`i`f`U`W`U`b[`Y`g`]b`h`Y`i`a`U`b`V`U`j`b`U`b`X`]a`a`i`b`Y`g`n`g`h`a`k`]h`c`i`h`
]b]f`i`c`X`i`W`]b[`Y`i`h`f`U`Y`c`i`g[`Y`b`Y`h]W`a`U`h]f`U`"..."

- 8Y Ycd'UbXg ddcfhibYk `i a UbW`i `U#ef[Ubc]XW`hi fygZcf`WbX W|b[`dfYW|b|W
fygUfW cb 8G"
- 8Yg[b'bYk `fYUa YbhdUfU| a g'UbXdUk UngZcf`Yg|b| `]b'8G'a ci gYa cXYg
fg|W|W`nāXcg!fygcbgYUbXlcl |W|mg|X|Yg|"
- 8Y Ycd'bUbchYWbc`c[mUbXchYf ga U`!a c`YW`YUdfcUWYg|c`Yb\UbW`Wb|f|g|cZ
Ua mc|X|a U |b| `fYU`YbgZcf ZbYf`fYc`i hcb`g|X|Yg|b`nci b| Y`|bXj |X| Ugk |h 8G"
- 8Y Ycd`i a Ub'8GW`i `U`a cXYg|f| [`z|DG7gX|ZZfYb|U|X|]b|c bY fcbU`W`hi fyg|c
g|Xnj Uf|U|cbgVmg| UbXUbW|fm|
- I gYVch` UbX a cXY`g|Y`g|c`g|Xm|W|X|c| UgW`Uf`Z`bW|cb`UbX`h`YfU|ni
fygcbgY"
- FYZ|bYci hWa Ya YUj fygUfYU|nj U|X|hXZcf`g|X|b| `dYcd`Yk |h`8Gz`UbX|ggYa |bU|Y
hYgYci hWa Ya YUj fyg|c`h`YfYgUfW`Wa a i b|lm| 9a d`UgnYa YUj fyghU`U`Y
X|a cbg|U|Y|W|b|W`i |h`|h|z`g`W`Ug|X|b|Z|b| `WUb| Yg|b`Ub| i U`Y`V`U`j |cfz
W| b|]hcbzcf`U|U|h|j`Yg_|`g|`6i |`Xcb`h`YB`= `Hcc`Vcl `7c| b|h|j`Y6U|h`f|c`Xj`Ycd`cf
U|U|h|X|]hcbU ci hWa Ya YUj fygZcf`g|X|b| `ck`!Z`bW|cb|b| zj`Yf|nci b| `W|`X|Y|zcf
Uc`Yg|W|g|k`|h`8G|`H|U|`ci hWa YgX|f|b| `Yf`n|X|j`Ycda`Yb|ic`U`ck`Y`U`i`U|cb`cZ
hY|a`dU|icZ

- 8 Yj Ycd:gMYb]b['hcc`g`Zcf`XdfYgg]cbžUbl]YmžUbXch.Yf`W!cWff]b['a YbU`YUk` WbX]hcbg]b`dYcd`Yk]h`8G""
- 8 Yj Ycd`X]U bcg]WbXgMYb]b['hcc`g`Zcf`Ya Ue`c[]W]gcfXfg]b`dYcd`Yk]h`8Glc dYfa]hU`cfYXlfYUa Ybñ
- FYZ]bYh`YX]U bcg]WbXgMYb]b['hcc`g`Zcf`j]gcb!fYU`XWbX]hcbg]b`dYcd`Yk]h`8G"
-

- K cf_ k]h '8G'cf[Ub]nUjcbg'UbXY dYf]YbWXWb]W' hf]U g]WU]g]g'lc WUYUWYgg]VY UbXUddfcdf]UYfYMi]la Ybha UYf]UgZcf 8G'gh X]Ygzh Uii gY'Ub[i U YhU]lgYUj'm i bXf]g'UbXUVYlc`dYcd'Yk]h '8G'UbXh Yf'Za]']Yg'WbgXf'Vch'j]g' U'UbXbcb]j]g' U a Uhf]Ug'"`Gh Xn'ck ` \YU' WfYdfUW]W'a UmVg]ZcgYf'h YYb[U Ya YbU'X]bX'dYbXbW'cZdYcd'Yk]h '8G'"`=Xbh]Znk Ung'lc`ZcgYf'Wa a i b]m]Yb[U YXfYgYUfWz W'`U'cfU]b['k` \YfYdcgg]VYk]h `dYcd'Yk]h '8G'ZWY]j Yfg]j ddcfYf'g'z'UbXW'a a i b]m] dUfhYfg/i gY'Wa a i b]m]Uj]gcfm'VcU'Xg'lc`U [a YbhYh]W' fY]Yk'g'cZfYgYUfW'Vmi]bg]h]hcbU'fY]Yk' VcU'Xg'"`
- 5i [a Ybhgn]Ya g'Zcf'XUJg'Uf]b[`cZdi V]g' \YXW'cf]g'UbXa U`YfYg']g'U' U'UY]bU gYUfWUYZcfa Uz]bW'X]b[`ZcgYf]b[]b]m]bU]cbU`XUJg'Uf]b["'7cbg]Xf'Yg]U]g']b[`U di V]Wm]U' U'UY'Z'Wb]U]n]XfYdcg]l'cfm]Zcf 8G'XU]Z]Y]h Yf'h'fci [`cf]]b'Wb'i b]m]cb' k]h h'Y8G'7cbbYMi' fY]g'f'n]z'g' h'UhfYgYUfWYfga UmWa dUfYh'cgYXU]k]h XU]cb h'Y[YbYU' dcdi `U]cbz'dYcd'Yk]h]b]Y' YMi' U'UbXXj Ycda Yb]U'X]g]U]]h]Yg'ch'Yf'h'Ub' 8G'z]g]V]b[g'cZdYcd'Yk]h '8G'Z'UbX'dYcd'Yk]h '58'"`8 Yj Ycd'hf]b]b[`UbX'ch'Yf'g' ddcfh Zcf'8G'W]b]W]g'lc`U'ck h'Ya `lc`X[]h]n]Yh'Yf'W]b]W'XU]Zcf'g'Va]gg]cb'lc`U'Wb]U]n]X fYdcg]l'cfm]XU]U]g'z'UbX'YbWi' fU' Yh'Yi' g'YcZ[`cW']Xbh]Z]Yfg'h'U'ck XU]g'Uf]b[` V]k' Yb'XU]U]g'Yg'k]h'ci' hf'Y' YU]b[`dYf'g'cbU'`m]Xbh]Z]UY]b]Zcfa U]cb'"`
- H'fci [`h'Y`B7@ 89 8UU'7ccfX]b]U]b[`7Yb]m]Z'WUYU'Uf] YW'cf]h]g'h'XmcZ]b]Xj]X' U'g'k]h '8G'U'W'cg'h'Y']Z]g]U]b'lc`U'WY'YU'f'Yg'UfW]b]lc`W'!c'W'ff]b[` Wb]X]h]cbg'"`Dfcj]X'Yf'Yg'UfWYfg'UbX'h'Y'V'c'U'Xf' 8G'Wa a i b]m]k]h 'U'W'g'lc`h'Y'W'cf]h XU]U'UbXXU]U'a]b]b[`UbX'Ub'Ung]g'lc`g'z'UbX'Z]W]]h]Y'XU]g'Uf]b[`UbX']b_ U'Yg'cZ XU]U]g'Yg'i'g]b[`i' b]ei Y]Xbh]Z]Yfg'h'U'nd'f'Yg'f]Y]b]Xj]X' U' Wb]Z'Xbh]U]m]"`
- 9l dUbX'h'Yf'Yg'UfW]b]Z]U]fi W'f'Y'Zcf'8G'Vm]Yg]U]g']b[`cf'U [a Ybh]b[`W'`U'cfU]h]cbg Ua'cb[`Y]g]b[W]b]W'g]h]g'UbX'f'Yg'UfW'b]Yk'cf_g'U'ia YX]W'#U'X'Ya]W]bg]h]h]cbg U'W'cg'h'Y'W'i b]f]m]h'U'Wb]X' W'f'Yg'UfW'f'Y'U'X'lc`8G'UbX]]g'W'!c'W'ff]b[`Wb]X]h]cbg'"` 9b'Wi' fU' Yh']g'Z'X'f'U]cb'c'Z]g]h]g'lc`Wb]X' W'f'Uf] Y'g'i'X]Y'g'z'g' W'U'g'U'cb[]h'X]bU' W'cf]h g'h'X'mc'f' a i `h]g]h'W]b]W' hf]Ug'` H'c'Z]W]]h]U'Y'h'Y'f'U'bg'U]cb'c'Z]U]g]W'b]X'h'f'U'bg'U]cbU' f'Yg'UfW'lc`W]b]W' d'f'U'W]W'z'g' W'g]h]g'g'ci`X
 - Gi ddcfhUb]b]m]X]g]M']b]f]m]U'a cZf'Yg'UfWYfg'UbX'W]b]W]U'bg'z]b]W'X]b[`h'Y Xj Ycda Yb]c'Zb]Yk' f'Yg'UfWYfg]'b'8G'z'g'ca YcZk`ca `a Um]Wb]X' W']a d'Ya Yb]U]cb'g]W]b]W'dfc`Y'W'g'lc`Y'bg'f'Y'h'U'h'Y'i bX'f' n]b[`f'Yg'UfW'f'Y'g']g' Vb]Z]h]h'Y8G'Wa a i b]m]"`
 - : U]W]]h]U'Y'Yb'c'`a Yb]c'Z'Wb]X]h]cb!g]W]Z]W]g' V] fci dg'z'U' Yf'Ub[Yg'z'cf`

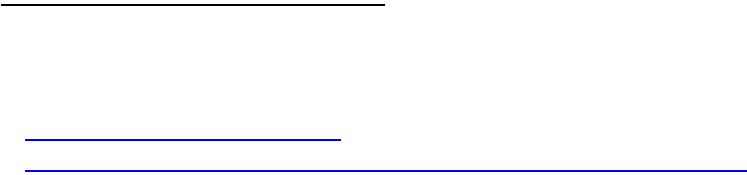
- 9gUW]g\ UZXXfU]cb:cZV]cfYdcg]hcf]Yg]hUk]``dYfa]hV]cU_b]b[:cZW`gřd`Uga Uř
 gfi a žVMfWfcd]bU`Zi]XžUbXVfU]b`UbXchYf`hgg YgZcf`fYgUfW`di fdcgYg`]bW`X]b[`
 glā d`YgZca`]bXj]X] Ugk]h` WbWf`k]h` 8G``=b]h[fUfV]cfYdcg]hcfm]XUk]h` h`Y8G!
 7cbbWf] fYgUfW`fY]]gfm]gZU]gVY` G]hU]X]nYglā d`YW` Y]cb`UbXdfcWgg]b[`
 a`YhcX`c[]Yg]UbXdc`]W]gZcf`Wb]g]h]bz`Yei]hU]Yglā d`YX]gf]Vi`hcbžUbX]gU]g\`
 fYj]Yk` UbX]gf]Vi`hcb`dfcWggYgZcf`fYgUfWYf`UWgg]h` h`Yglā d`Yg]XU` =Xb]ZnUbX`
 UXXYgg`Uff]Yfg]UbXa`chj`U]b[`Z]Wf]g]h`Xcb]h]cb``7cb]XfU]cb`g`ci`XUgc`W]]j`Yb`
 h`.
- @]b_]b[` h`Y8G`fYdcg]hcfm]k]h` h`YB<` B`Y`fc6]c6Ub_`⁸⁵UbXh`Yi`]g]b[` 58`
 F`YgUfW`7Yb]Yg`6fU]b`6Ub_g`⁸⁵žg`h`Uh]gg] YZca` d`Ycd`Yk]h` 8G`Wb`W`
 Wā d`UfYX`h`h`cgY`cV]b]YXZca`]bXj]X] Ugk]h` 58` UbXchYf`X]gfX]fg`
- 7c``W]b[` bY`fchm]W`Wb]h`c`glā d`Yg`
- 9l`dUbX`ZXXfU`m]Z`bXX`fYgUfW`hU]b]b[` d`fc[`fUā`g]h`Ybg`fYUj`]M]b]h]d]dY]]bYcZ`
 fYgUfWYf]g`Xc]b[` k`cf_`]b`8GžUbX`cg]h]Wb]h]Z]Wk`cf_g`cdg]h`U]V]b[` Yā`Yf]]b[`
]b] Yg]]Ucf]g]h` Yā`Yf`k]h` YgU]g\`YXg]Wb]h]g]b]h`YZ]YXZcf`hU]b]b[`]b`W]b]W`h]Ug`

ProgramPortrait 5 Research Infrastructure and Tools

Using the Pediatric Trials Network (PTN) to Test Therapeutics for Children with DS

Cb`m]Uga`U`d`YfWb]h] YcZXi`]g]UbXXj`]Wg]Ud]fcj` YXV]h`YI` "G":` ccXUbX8fi`]`
 5Xa`]b]g]fU]cb`f] 85E`Uj` YVYb`U`Y`YXZcf`dY]Uf]W`gY` B=7<8` YgU]g\`YXh`YDHB`]b`&5%\$`
 h` WbXi` W]W]b]W` fYgUfW`UbXW` Y]h]XU]h` Ugg]g]h`Y: 85`]b`fYj`]g]b[` a` Y]W]h]cb` UYgZcf`
 gZf` UbXa` cfYZZ]M]j` Yi` gY]b`W]` XfYb` "K`cf_]b[` k`]h` fYgUfW`g]h]g]Ufci` bXh`YWi` b]m]ž`h`Y`
 DHB` g]i` X]Yg]h`YZca` i` U]cbž`Xc]g]b[` žYZZ]W]m]ž`UbXg]Z]hmcZXi`]gž`Ugk`Y` Uga` Y]W` Xj`]Wgž`
 Zcf`i` gY]b`W]` XfYb`" H]]g]g]fi` W] fYU`ck`g]h`Yb]Yk`cf_` h` UXXYgga` U]mcZ]h`YWU`Yb[` Y>` f`

h if



- ðUX]hcbzXi Ylc`gy YFU`Uf YW^cfhgh X]YgžfYgUFWYfg`Uj YUWihf`i bXfghUbx]b|`cZ hYdUhc d\nglc`c[mcZ8G!58ž&`Vi ha cfYfYWbhfWw[b]hcb`cZUk cff]gca Y ÍfY] fYg]cb|`d`YbchmYfYa]bXgi`g`cZ`ck`a i Wk Y`Uj YmYhlc`YufUvci hgca YcZ hYgYw!cWff]b|`bY fc`c[]W`WbX]hcbg`"
- K \]Y]b hYfYWbhdUgh hYfY`Ug VYb UdU WmcZa YX]W]hcb hf]UghU]`cfYXlc dYcd`Y k]h 8Gfk]h`h`Yi Wdhcb`cZgy YFU`Y d`cf]b|`hYcd]a U`WYa chYfUdmZcf`W]`X`ccX`Y`_Ya]U]b`8GžUbxgca YZU]`YXhf]Ug]lc`]a dfcj YWw[b]hcb`cf`y Yb`dfy YbhXa Ybh]Už` h]gg]h U]cb]g]a dfcj]b|`ždu]h]W`Uf`mk]h`g ddcfhZca hY`B7@ 89 Dfc`Ww

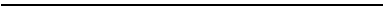
H`Y]a dUwicz hY`B7@ 89 Dfc`WwWbchVYi bXfYg]a UYXžUg]h`Ug]bZ gXh YZ]YXk]h bYk`Z bX]b|`žvci [\hbYk`]bj Yg]]Uc]g]b]lc`8GfYgUFWžUbxYbwi fu YXbYk`Ubx]ci hcZ hY Vcl`Í`UddfcUWYg]lc`h]gk Y`!_bck bWfca cgca U`X]gcfXfzZ bX]a YbU`mWU]]b|`hYw`h`fY cZ8GfYgUFW WbX] W]XUbxg ddcfhXVriB`="`H`Y]a d`Ug]g`cb`g ddcfhcZhf]bYg]Ubx`'1 b]cf`ZUW`hm]b|`U]b|`]b`8GfYUHXfYgUFWžh`fci [\]bg]h`hcbU`hf]b|`]`fubhg`dd`Ya Yb]gž`7]b]W`Ubx]hf]Ug]U]cbU`G]WbW5k UfXg]hf]b|`]g`dd`Ya Yb]gž`h`YD< B`Gw`Uf]g]d]c[f]a`fgY` [Dfc\] f\]a` Dc\]ff\]Uj`](#)]zUbx]bX]]X] U`Z`ck`g`d`UbxW]Yf`X] Ycda YbhUk UfXgž]g`fYg`]b|`]b`nci b|`Y`g`W]b]g`g`c]b|`]h`Y8GfYgUFW W]a`a`i`b]m`i`H`YUXX]hcbU`Ya d`Ug]g`cb` hf]Ug]Zca U]j`YfYgUFW]gYbwi fu]b|` bYk`UbxYg]UW]g`YX]bj Yg]]Uc]g]lc`VfcUW`Y`W]b|` bYk`UfYg]cZ]bei]fm]b`h`YUg]W]W]bW]Xca U]b`"5`" cZ h`Yg`a`Ug`fYg]bW]Ug]h`Yd`c`cZ]bj Yg]]Uc]g]bj`c`j`YX]b`8GfYgUFW UbxZ`Z`" h`Yw]b|`fYg]cbU`a`Ubx]U]lc`Í`Y`dUbx`h`Y`WffYbhd]dY]bYcZ8GfYgUFW]`fgY`5`d`YbX]`9E`"

8Yg]]Ycb`mY]b|`]b`]lg]]bZU]W]k]h`h`YZ]fghg`dd`Ya Yb]g]Z bXXUg`cf]h]a YU`cž`h`Y`B7@ 89 Dfc`WwWb`g]`" V]YU`]a]hX]bi`a`Vf`cZgdW]Z]W]i`h`Wa`Yg`UbxX]gW] Y]Yg]b`h`g`

g`YbWb|`|bUa ci gYa cXY`cZ8G`lc`dfj YbhUa nìc|Xd`Uei YXdcg|cb|`b`h`YVUj`UbXcbgYhcZ
Xa YbhUgna d|ca g`k ci `XVYUgf|`|b|`UW`a d`|g`a YbhUbXUVYU`h`fci [`|b`h`YZYX`

Cb`h`YW|b|W`g|XZ|a dfcj YXlfYUa YbgZcf`gca YcZ`h`Ya cghWU`Yb|`|b|`Ug`W`g`cZ8G`|gU
k`cf`h`m|`cUzZcf`k`|`|W`W`a a i b|`m|`bdi`h|g`W|`h`W`" DUFYb|g`cZ`b`fYdcfh`h`Uidccf
W`a a i b|`W|`cb`UbXg`Y`W`U`f`h`W`U`h`cbz`Ug`k`Y``Ug`d`ccf`g`Yd`ei`U|`m|`f|`b`W`X|`b|`V`Y`U`h`|`b|`d`U`g`y`g
UbXgbcf|b|`EzUfYgca YcZ`h`Ya cgij`Y|`|b|`d`fcV`Ya`g`Zcf`Z`a`|`Y`g`V`W`M`g`Y`h`Y`m`W`b`|`U`j`Y`U`a`U`cf`
|a`d`U`m`b`c`h`c`b`m`c`b`h`Y`k`Y`!`V`|`b|`c`Z`h`Y`d`f`g`c`b`k`|`h`8`G`z`V`i`h`U`g`c`h`U`h`c`Z`c`h`Y`f`Z`a`|`m`a`Y`a`V`f`g`"
A`U`m`Z`a`|`|`Y`g`U`g`c`Z`U`f`h`Y`d`c`g`g`|`V`|`h`m`c`Z`X`j`Y`c`d`a`Y`b`U`f`Y`f`Y`g`g`|`c`b|`b`h`Y`f`h`Y`b`g`U`b`X`n`c`i`b|`
U`X`i`g`k`|`h`8`G`z`U`b`X`h`Y`c`b`g`Y`h`c`Z`X`a`Y`b`h`U`g`h`Y`f`c`j`Y`X`c`b`Y`g`k`|`h`8`G`U`Y`" H`Y`V`f`c`U`X`f`8`G
W`a a i b|`m`W`i`X`Y`b|`U`Y`k`|`h`f`Y`g`U`f`W`f`g`l`c`|a`dfcj`Y`i`b`X`f`g`U`b`X|`b|`c`Z`h`Y`W`g`Y`g`U`b`X`f`U`b|`Y`c`Z
W|`b|`W`d`f`Y`g`b`h`|`c`b`g`Z`c`f`h`Y`g`Y`g`g`Y`g`z`k`|`h`h`Y`d`f`|a`U`f`m|`c`U`c`Z`X`j`Y`c`d|`b|`W|`b|`W`h`f|`U`g`c`Z`h`Y`g`Y`
W`b`X|`h`c`b`g`g`d`Y`W`Z`W`m`|`b`8`G`" G`c`a`Y`f`Y`g`U`f`W`f`g`U`f`Y`U`k`m`f`Y`X`j`Y`c`d|`b|`U`b`5`8`d`f`j`Y`b`h`c`b`h`f|`U
i`g`b|`U`b`U`h`!`U`a`n`ìc`|`X`h`Y`f`U`d`n`z`U`b`X`h`Y`g`W`g`g`c`Z`g`W`U`h`f|`U`k`ci`X`V`Y`U`g`|`b|`Z`W`b`h`V`b`Z`h`Z`c`f
|`b`X`j`|`X`U`g`U`b`X`Z`a`|`|`Y`g`"

H`Y`i`b`|`e`i`Y`W`U`Y`b|`Y`g`d`c`g`X`V`m`h`Y`7`C`J`-8`!`%`d`U`b`X`a`|`W`U`g`c`d`f`c`j`|`X`Y`c`d`d`c`f`h`i`b`|`h`Y`g`l`c`
i`b`X`f`g`U`b`X`h`Y`Y`|`|`h`b`Y`X`f`|`g`Z`U`m`f`g`Z`c`f`a`c`f`Y`g`j`Y`f`Y`c`i`h`W`a`Y`g`B` Yh`



hf]Ug'cZ]bhfj Yb]cbg'bch'i ghZcf'W[b]hcb'UbXX'a Yb]UhfYUa Yb]g'Vi hUgc'Zcf']a a i bY
X]gcfXf'g'g'Yd'UbYU'Z'YnYX]gcfXf'g'UbX'a Ubmich'Yf'WbX]hcbg'' H\Yg'YZcf]gi bXf'g'Wf'Y'h'Y
]a dcf]UbW'cZ'X]j Yfg]h'z'Yei]h'z'UbX]bW' g]cb']b'ci f'k cf_Zcf'W'UbX]b'h'Yf'Yg'Uf'W d]f]h]d]Ub]g
f'Y'W']h'X'Zcf'8G'gh'X]Yg'

- E* • BUhcbU =bgjhi h'cb'7\]X< YUh UbX< i a Ub'8Yj Ycda Ybh
 fB=7< 8L
- BUhcbU =bgjhi h'cb'8YUzYgg'UbXch Yf'7ca a i b]Wjcb'8]gcfXf'gfb=878L
 - BUhcbU =bgjhi h'cZ8Ybh UbX7fUb]cZMU FYgYUFW fB=87FL
 - BUhcbU =bgjhi h'cZ8]UWYg'UbX8][Yghj YUbX?]XbYm8]gYUg'fb=88?L
 - BUhcbU =bgjhi h'cZA Ybh'< YUh fB=A < L
 - BUhcbU =bgjhi h'cZA]bcf]hm< YUh UbX< YUh 8]gUf]h]Yg'fb=A < 8L
 - BUhcbU =bgjhi h'cZBYi fc`c[]W'8]gcfXf'g'UbXGfc_Yfb=B8GL
 - BUhcbU`7Ybhf`Zcf`5Xj Ub]b[HFUbg'UhcbU GVMbWg'fb75HGL

Appendix C: Investigation of Co-occurring conditions across the Lifespan to Understand Down syndrome (INCLUDE) Project Funding Opportunity Announcements Since 2018

Fiscal Year 2018

- [BCHC8!%!% \(.](#) BchWcZ5j U`U`]lmcZ5Xa]blghUj YGi dd`Ya YblgZcfB< ; fUblg hUfYBCH: cWgYXcb8ck b`GnbXca Ylc`5XXYgg`GdVWZV8ck b`GnbXca Y FYgUFWCVYmj Yg
- [BCHC8!%!% .](#) BchWcZ5j U`U`]lmcZ5Xa]blghUj YGi dd`Ya YblgZcfB< ; fUblg : cWgYXcb8ck b`GnbXca Ylc`5XXYgg`GdVWZV8ck b`GnbXca Y FYgUFWCVYmj Yg

Fiscal Year 2019

- [BCHC8!%!\\$+% .](#) BchWcZ5j U`U`]lmcZ7ca dYhUj YGi dd`Ya YblgF`Y]gcbgZcf hY =B7@ 89 Dfc`Ymff7ca dYhUj YGi dd`Ya YblgF`Y]gcb 7`]b]W`HF]U`CdhcbUL
- [F: 5!C8!%!\\$% .](#) 7`]b]W`HF]Ug8Yj Ycda YbhZcf 7c!CVWff]b] `7cbX]hcbg]b` =bXj]X Ug`k]h`8ck b`gnbXca Y`D`UgX5k UfXgZcf =B7@ 89 ff`*%#`' `7`]b]W`HF]UgFYei]fYXL
- [F: 5!C8!%!\\$% .](#) HFUgZfa Uj FYgUFW 5k UfXZcf hY =B7@ 89 Dfc`Ymff \$% 7`]b]W`HF]U`Bch5`ck YXL
- [F: 5!C8!%!\\$% .](#) =B7@ 89 7`]b]W`HF]U FYU]bYggff &%7`]b]W`HF]U`Bch5`ck YXL
- [BCHC8!%!\\$% \(.](#) BchWcZ7`Uf]Z]W]hcb`cZ5dd`]W]hcb`Gi Va]gg]cb`bZcfa U]cbZcf BCHC8!%!\$+% ÍBchWcZ5j U`U`]lmcZ7ca dYhUj YGi dd`Ya YblgF`Y]gcbgZcf hY =B7@ 89 Dfc`Ymff

Fiscal Year 2020

- [F: 5!C8!&\\$!\\$\\$+ .](#) 8Yj Ycda YbhcZhY =B7@ 89 Dfc`Ym8UU7ccfX]bU]b] `7Ybhf fi &7L
- [BCHC8!&\\$!\\$\\$.](#) BchWcZGdWU =bMYghfBCG=L 5Xa]blghUj YGi dd`Ya Yblg`c BU]cbU`7YbhfZcf`5Xj Ub]b] `HFUg`U]cbU`GM]bWgfb75HGL7`]b]W`UbX HFUg`U]cbU`GM]bW5k UfXgff7HG5LDfc[fUa `? @&=bg]h]hcbU`7UfYf 8Yj Ycda Ybh

- [BCHIC8!&S!S&.](#) : BCG= 5j U`UW`]hmcZ5Xa]b]ghUj YGi dd`Ya Yb]gZcf hY=B7@ 89 Dfc^WM
- [BCHIC8!&S!S&.](#) : BCG= B< FYgUfW Dfc^WM; fUblgcb'8ck b'GnbXca Yff \$%LZcf hY=B7@ 89 Dfc^WM
- [BCHIC8!&S!S&S.](#) : BCG= `Fi h`@'?]fgWgY]bBU]cbU FYgUfW Gfj]W5k UfX fBFG5E: Y`ck g`]d'5k UfXg'c`Gi ddcfhHfU]b]b|]b FYgUfW FYUfXlc`8ck b'GnbXca Y UgDufhcZhY=B7@ 89 Dfc^WM
- [BCHIC8!&S!S&%.](#) : BCG= `A Yb]cfYX7UfYf 8Yj Ycda Ybh5k UfXg'c : cgMf hY7UfYfg cZ=bj Yg]] Ucf]gDi fg]b| FYgUfW FYUfXlc`8ck b'gmbXca YUgDufhcZhY=B7@ 89 Dfc^WM
- [F: 5!C8!&S!SS*.](#) : Ga U` FYgUfW; fUblgZcf 5bUngYg'cZ8ck b'GnbXca YfYUfX FYgUfW8UfZcf hY=B7@ 89 Dfc^WMf \$' 7`]b]W Hf]U Bch5`ck YXL
- [F: 5!C8!&S!SS\).](#) : HfUbgZcfa Uj YFYgUfW5k UfXZcf hY=B7@ 89 Dfc^WMf \$% 7`]b]W Hf]U Bch5`ck YXL
- [F: 5!C8!&S!SS\(.](#) : =B7@ 89 7`]b]W Hf]U FYU]bYggfF &%7`]b]W Hf]U Bch5`ck YXL
- [F: 5!C8!&S!SS.](#) : 7`]b]W Hf]Ug8Yj Ycda YbhZcf 7c!CVWff]b| 7cbX]hcbg]b' =bXj]X Ug'k]h`8ck b'GnbXca Y D`UgYX5k UfXg'Zcf =B7@ 89 ff*%#F' ' 7`]b]W Hf]U FYei]fYXL
- [BCHIC8!&S!%&.](#) : BCG=fM UfX]b| `hY5j U`UW`]hmcZI f] Ybh7ca dY]hj YFYj]g]cbg'UbX 5Xa]b]ghUj YGi dd`Ya Yb]gZcf FYgUfW'cb'7cfcbU]fi g8]gUgY&S% 'f7CJ =8!%L]b' =bXj]X Ug'k]h`8ck b'GnbXca YZcf hY=B7@ 89 Dfc^WM

Fiscal Year 2021

- [BCHIC8!&S!SS%](#) : BCG= `5Xa]b]ghUj YGi dd`Ya Yb]g'c B75HG`7HG5 Dfc[fUa ? @& =bg]h]cbU`7UfYf` 7`]b]W [fUa F

Appendix E: Congressional Directives

fYgMfWzUgkY`Ug`hY|a d`Ya YbU|cb`cZhYbYk`hfUbgB<`|b|hU|jY`-b`UXX|hcbzhY
7ca a |hYyYbWwifU`YgB<`lc`df|cf|hYnYZ`bX|b|`Zcf`fYgMfW`lc`|a`dfcj`YhY`YUH`UbX
bY`fcXj`Ycda`YbhcZ|bXj`|X`Ugk`|h`8ck`b`gnbXca`YUbXhnd|W`|bXj`|X`Ug`Uhf|g`Zcf
|a`a`i`bY`gnghA`XngfY`i`U|cbz5`n`|Ya`Yffg`XlgMgYzWbWfzWfXcj`UgW`Uf`XlgMgYzUbXU`hga`"

Fiscal Year 2019 Conference (House) Report 115 952

.....Hf|gca m%!!H`Y`WbZfYg`Udd`U`Xh`YB<`Zcf`g|`b|Z`Wbhm|bWUg|b|`|lg|bj`Yga`Yb|h|b
8ck`b`gnbXca`YfYgMfW`UbX`Zcf`h`YB<`8`|fY`Mf`fg`Y`U`X`f`g`|d`|b`U`j`U`b`W`b|`h`Y`h`f`U`g`B<
|b|hU|j`Y`h`Y`7ca`a`|hYy`|bW`XX|`|b`h`YZ`gW`nYU`f`&S%`Udd`f`c`d`f`|`U`|`c`b`"H`Y`WbZfYg`X`|`f`W`M
B<`lc`W`b`h`b`i`Y`h`c`a`U`_`Y`|`b`j`Y`g`a`Y`b`g`|`b`8`c`k`b`g`n`b`X`c`a`Y`f`Y`g`M`f`W`h`U`d`f`|`c`f`|`h`n`Y`Z`b`X`|`b`|`Z`c`f`V`c`h`
f`Y`g`M`f`W`|`f`U`b`g`U`b`X`Y`U`f`m`g`h`U`Y`|`b`j`Y`g`|`U`c`f`g`h`U`h`k`|`Y`d`U`b`X`h`Y`W`f`f`Y`b`h`d`|`d`Y`|`b`Y`c`Z`8`c`k`b`
g`n`b`X`c`a`Y`f`Y`g`M`f`W`z`U`g`k`Y`U`g`h`Y`|`a`d`Y`a`Y`b`U`|`c`b`c`Z`h`Y`b`Y`k`h`f`U`b`g`B<`|`b`|`h`U`|`j`Y`-`b`U`X`|`h`c`b`z`
h`Y`W`b`Z`f`Y`g`Y`b`W`i`f`U`Y`B<`lc`d`f`|`c`f`|`h`n`Y`Z`b`X`|`b`|`Z`c`f`f`Y`g`M`f`W`Z`c`f`Y`a`Y`f`|`b`|`g`M`b`h`Z`W`
c`d`d`c`f`h`b`|`h`Y`g`|`c`|`a`d`f`c`j`Y`h`Y`Y`U`h`U`b`X`b`Y`f`c`X`j`Y`c`d`a`Y`b`h`c`Z`|`b`X`j`|`X`U`g`k`|`h`8`c`k`b`g`n`b`X`c`a`Y`
U`b`X`h`n`d`|`W`|`b`X`j`|`X`U`g`U`h`f`|`g`Z`c`f`|`a`a`i`b`Y`g`n`g`h`A`X`n`g`f`Y`i`U`|`c`b`z`5`n`|`Y`a`Y`f`f`g`X`l`g`M`g`Y`z`W`b`W`f`z`
W`f`X`c`j`U`g`W`U`f`X`l`g`M`g`Y`z`U`b`X`U`h`g`a`"

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Hf|gca m%!!H`Y`7ca`a`|hYy`W`a`a`Y`b`X`g`B<`Zcf`|`g`g`d`d`c`f`h`c`Z`h`Y`-`b`j`Y`g`|`U`|`c`b`c`Z`7`c`|
C`W`f`f`|`b`|`7`c`b`X`|`h`c`b`g`5`W`c`g`g`h`Y`@`|`Z`g`d`U`b`|`c`I`b`X`f`g`U`b`X`8`c`k`b`g`n`b`X`c`a`Y`f`B`7`@`8`9`L`
-`b`|`h`U`|`j`Y`H`Y`7ca`a`|hYy`|`b`W`X`g`b`c`Y`g`g`h`U`b`~`*`\$`S`S`S`S`S`S`k`|`h`|`b`h`Y`C`Z`|`W`c`Z`h`Y`8`|`f`Y`M`f`Z`c`f`
h`Y`-`B`7`@`8`9`-`b`|`h`U`|`j`Y`z`U`b`|`b`W`U`g`y`c`Z`&`z`S`S`S`S`S`S`U`c`j`Y`h`Y`l`d`Y`M`X`Z`g`W`n`Y`U`f`&`S`%`Z`b`X`|`b`|`
Y`j`Y`"H`Y`7ca`a`|hYy`l`d`Y`M`g`h`U`h`|`g`a`i`h`l`n`Y`f`z`h`f`U`b`g`B<`f`Y`g`M`f`W`|`b`|`h`U`|`j`Y`a`U`h`n`|`Y`X`
g`M`b`h`Z`W`X`l`g`W`j`Y`|`Y`g`h`U`h`i`X`g`|`b`|`Z`W`b`h`m`|`a`d`f`c`j`Y`h`Y`Y`U`h`U`b`X`e`i`U`|`h`m`c`Z`|`Z`c`Z`|`b`X`j`|`X`U`g`
k`|`h`8`c`k`b`g`n`b`X`c`a`Y`U`g`k`Y`U`g`a`|`|`c`b`g`c`Z`h`n`d`|`W`|`b`X`j`|`X`U`g`"

Fiscal Year 2021: House Report 116 450

Hf|gca m%!!H`Y`7ca`a`|hYy`W`a`a`Y`b`X`g`B<`Zcf`|`g`W`b`h`b`i`|`b`|`g`d`d`c`f`h`c`Z`h`Y`-`B`j`Y`g`|`U`|`b`|`
7`c`|`c`W`f`f`|`b`|`W`b`X`|`h`c`b`g`U`W`c`g`g`h`Y`@`|`Z`g`d`U`b`|`c`I`b`X`f`g`U`b`X`8`c`k`b`g`n`b`X`c`a`9`f`B`7`@`8`9`L`
-`b`|`h`U`|`j`Y`"H`Y`7ca`a`|hYy`|`b`W`X`g`b`c`Y`g`g`h`U`b`~`*)`z`S`S`S`S`S`S`U`b`|`b`W`U`g`y`c`Z`~`z`S`S`S`S`S`S`U`c`j`Y`
h`Y`Z`g`W`n`Y`U`f`&`S`&`S`Y`Y`z`k`|`h`|`b`h`Y`C`Z`|`W`c`Z`h`Y`8`|`f`Y`M`f`Z`c`f`h`Y`-`B`7`@`8`9`-`b`|`h`U`|`j`Y`"H`Y`
7ca`a`|hYy`l`d`Y`M`g`h`U`h`|`g`a`i`h`l`n`Y`f`z`h`f`U`b`g`B<`f`Y`g`M`f`W`|`b`|`h`U`|`j`Y`a`U`h`U`j`U`b`W`g`M`b`h`Z`W`
X`l`g`W`j`Y`|`Y`g`h`U`h`i`k`|`X`U`a`U`|`W`m`|`a`d`f`c`j`Y`h`Y`Y`U`h`U`b`X`e`i`U`|`h`m`c`Z`|`Z`c`Z`|`b`X`j`|`X`U`g`k`|`h`8`c`k`b`
g`n`b`X`c`a`Y`U`g`k`Y`U`g`a`|`|`c`b`g`c`Z`h`n`d`|`W`|`b`X`j`|`X`U`g`"H`Y`7ca`a`|hYy`f`Y`e`i`Y`g`g`h`Y`8`|`f`Y`M`f`
d`f`c`j`|`X`Y`U`d`U`b`k`|`h`|`b`*`\$`X`l`h`g`c`Z`Y`b`U`M`a`Y`b`h`c`Z`h`|`g`5`W`h`U`h`|`b`W`X`g`U`h`a`Y`|`b`Y`X`g`W`d`h`c`b`c`Z`
d`c`h`b`h`U`|`f`U`b`h`c`d`d`c`f`h`b`|`h`Y`g`U`b`X`X`U`X`|`b`Y`g`Z`c`f`U`Y`l`d`Y`M`X`Z`b`X`|`b`|`c`d`d`c`f`h`b`|`h`Y`g`g`h`U`h`i`c`i`b`|`
|`b`j`Y`g`|`U`c`f`g`U`b`X`b`Y`k`f`Y`g`M`f`W`|`b`g`|`h`h`c`b`g`a`U`h`Y`Z`f`h`Y`Y`b`W`i`f`U`Y`X`h`c`Y`l`d`c`f`Y`f`Y`g`M`f`W`|`b`h`|`g`
g`d`U`W`"H`|`g`d`U`b`g`c`i`X`U`g`c`|`b`W`f`d`c`f`U`Y`U`b`X`|`b`W`U`g`y`d`j`d`Y`|`b`Y`f`Y`g`M`f`W`|`b`|`h`U`|`j`Y`g`g`d`Y`W`Z`W`c`
8`c`k`b`g`n`b`X`c`a`Y`"

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Appendix F: Selected Research Accomplishments/Bibliography

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