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# ADVANCED MATERIALS

### **Supporting Information**

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DNA Origami Penetration in Cell Spheroid Tissue Models is Enhanced by Wireframe Design

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#### Methods

Structure preparation. Scaffold DNA was extracted and purified from M13 phage variants according to our previous study.<sup>[1]</sup> Staple DNA oligos were synthesized by Integrated DNA Technologies. HR structures were folded in PBS (pH 7.4) by an annealing program (80 °C for 5 min followed by cooling from 80 °C to 60 °C over 20 min and then a slow cooling from 60 °C to 24 °C over 14 h) with p8064 scaffold DNA (20 nM) and each staple DNA (100 nM). By using the same folding program, 18HB structures were folded in Mg<sup>2+</sup> containing buffer (MgCl<sub>2</sub> (13 mM, Sigma-Aldrich), TRIS (5 mM, VWR), and EDTA (1 mM, VWR), pH 7.8) with p7560 scaffold DNA (20 nM) and each staple DNA (100 nM). For Cy5-labeled structures, 8 staple DNAs of the structure were replaced by the same sequences but modified with Cy5 at their 5 primes. For Dox-loaded structures, Dox (100 µM) was added to the scaffold and staple DNA mixture before the folding. After folding, structures were purified and concentrated by the ultrafiltration method. Briefly, the sample was transferred from the PCR tube to an Amicon 100K filter tube (Millipore) and then diluted to 500 µL with the folding buffer. Then it was centrifuged at 8000 g for 2 minutes, and the flow through was discarded. After repeating this process for 6 times, the purified and concentrated structures were collected and the Dox concentrations measured.

**Doxorubicin intercalation efficiency and its release profile.** To calculate the intercalation efficiency of Dox, Dox-loaded 18HB or HR (100  $\mu$ L) was added into Amicon 100K filter tube (Millipore) and centrifuged at 3000 g for 30 minutes. The filtrate was collected. Dox in the filtrate as non-intercalated drug was measured using fluorescent spectrometer with a maximum excitation and emission wavelength of 470 and 560 nm. The Dox release profiles were studied in cell culture medium (Phenol red free DMEM with 20% fetal bovine serum, 100 U mL<sup>-1</sup> penicillin and streptomycin). At 37 °C, the Dox-loaded DNA origami structures were incubated in the medium for 1, 2, 3, 4, 5, 6, 8, 10 and 24 hours followed by transferring

into Amicon 100K filter tube and then centrifugation at 3000 g for 30 minutes. The released Dox in the filtrate was measured using fluorescent spectrometer.

Agarose gel electrophoresis. 2% agarose gels were cast using agarose (Sigma-Aldrich) in  $0.5 \times$  TRIS/borate/EDTA (TBE buffer) supplemented with 10 mM MgCl<sub>2</sub> and 0.5 mg ml<sup>-1</sup> ethidium bromide (Sigma Aldrich). Within the ice water bath, gels were run in  $0.5 \times$  TBE buffer supplemented with 10 mM MgCl<sub>2</sub> at 70 volts for 4 hours. After running, gels were imaged under corresponding imaging channel by using a GE LAS 4000 imager.

**Hydrodynamic size and zeta potentials.** After purification and concentration, DNA origami structures were diluted in different buffers, including 1× PBS, Mg<sup>2+</sup> containing buffer (13 mM MgCl<sub>2</sub>, 5 mM TRIS, and 1 mM EDTA) and cell culture media (DMEM with 20% FBS), to 20 nM. After 4-hour incubation under 37 °C, hydrodynamic size and zeta potential measurements were performed on a dynamic light scattering analyzer (Malvern Nano ZS, Malvern).

**Negative-stain TEM.** A  $3-\mu$ L aliquot of 5 nM structure sample was spotted on a glowdischarged, carbon-coated, formvar resin grid (Electron Microscopy Sciences) for 20 seconds before blotting on a filter paper, and then stained with aqueous uranyl formate solution (2% (w/v)). The stained sample was imaged using a FEI Morgagni 268 transmission electron microscope at 80 kV with magnifications between 12,000 and 28,000.

Atomic force microscopy. The mechanical properties of DNA origami structures were measured using a JPK instruments Nanowizard<sup>®</sup> 3 ultra in QI<sup>TM</sup> mode. To prepare the specimens, the HR and 18HB structures were mixed first and then diluted to 1.5 nM in the filtered imaging buffer (10 mM MgCl<sub>2</sub> (Sigma-Aldrich), 5 mM TRIS (VWR), and 1 mM

EDTA (VWR). Sample (10  $\mu$ L) was applied to freshly cleaved mica. After 30 seconds of incubation, NiSO<sub>4</sub> (4  $\mu$ L, 5 mM, VWR) was added, and the sample was incubated for further 5 minutes. After this, the mica surface was washed by filtered imaging buffer (1 mL). Finally, filtered imaging buffer (1.5 mL) was added to the sample for imaging. Cantilever AC40 (Bruker) with a nominal spring constant (0.09 N m<sup>-1</sup>) was used. In QI<sup>TM</sup> mode, force-identification profiles were obtained by positioning the AFM probe above the sample and pressing the sample at a velocity (5  $\mu$ m s<sup>-1</sup>) and a setpoint (0.12 nN). The raw data was processed using Gwyddion. To statistically compare the elastic moduli between the two types of structures, we extracted the elastic moduli information from 100 structures for each type from the apparent elastic modulus map: For each single structure, its elastic modulus distribution was represented by values along the longitudinal axis of the structure. From this, one averaged elastic modulus value for a single structure was calculated as the mean of the values along its longitudinal axis. The resulting analysis is shown in Fig. 2E.

**Coarse grained molecular dynamics simulations of DNA nanostructures.** The structures were converted to the oxDNA simulation format using the webserver tacoxDNA.<sup>[2]</sup> The structures were relaxed in two steps, first the simulation type min was run for  $2 \times 10^5$  steps to remove potentially overlapping nucleotides. Then a molecular dynamics simulation with a maximum backbone force of 50 was run for  $5 \times 10^6$  to reduce over-stretched bonds. After this, the structures were simulated for  $1 \times 10^8$  steps with a time step of 0.005 oxdna time units. Simulations were performed with the oxdna2 model at 30°C and with a salt concentration of 0.5M Na, simulation states were saved to a trajectory file every  $2 \times 10^4$  step. After simulation, the average structure and root-mean-square fluctuation (RMSF) of the structures was calculated using the oxDNA analysis tools.<sup>[3]</sup>

**Cell culture.** MCF-7, SK-BR-3 and Hela cell lines were obtained from ATCC. The cell lines were cultured in DMEM (Sigma-Aldrich) with 20% FBS (Gibco. Before use, FBS was inactivated by incubation at 56°C for 30 minutes.), 100 U mL<sup>-1</sup> penicillin and streptomycin (Gibco) in a humidified atmosphere containing 5% CO<sub>2</sub> at 37 °C.

Structure stability in cell culture medium. Cyanine 5-labelled HR or 18HB was (20  $\mu$ L, 100nM) added into DMEM with or without 20% FBS (160  $\mu$ L, inactivated by incubation at 56 °C for 30 minutes), penicillin and streptomycin (100 U mL<sup>-1</sup>, Gibco). The samples were incubated, in a humidified atmosphere containing 5% CO<sub>2</sub> at 37 °C, for up to 72 hours. After the incubation, the samples (50  $\mu$ L) was taken for electrophoresis in agarose gel (2% (w/v)). A GE LAS 4000 imager was used to image the gel.

**Fluorescence microscopy.** Cells (10,000k per well) were cultured in 8-well chamber (Millicell<sup>®</sup> EZ SLIDES, Merck Millipore) 24 hours prior to adding DNA origami. Cells were incubated for different periods with Cy5 labeled DNA origami (5 nM). To avoid any effects caused by the ion difference of final medium between Cy5-HR-treated and Cy5-18HB-treated wells of cells, we came up with the buffer supplement idea: Cy5-HR (purified in 1× PBS) was added to the cells with the supplement of the same volume of Cy5-18HB's purifying buffer; Cy5-18HB (purified in 13 mM Mg<sup>2+</sup>, 5 mM TRIS and 1 mM EDTA) was added to the cells with the supplement of Cy5-HR's purifying buffer. The final ion condition after adding DNA origami is listed in **Table S1.** The cells were then washed three times in cold PBS. To degrade extracellular DNA origami, PBS containing Benzonase (0.5 U  $\mu$ L<sup>-1</sup>, Invitrogen) and MgCl<sub>2</sub> (2 mM) was added onto the cells for 15-minute incubation. After another three times' washing in cold PBS, cells were fixed in paraformaldehyde (4% (w/w))

for 15 minutes at 37 °C. The cells were then washed with cold PBS, and stained by Alexa Fluor<sup>®</sup> 488 conjugate of WGA (ThermoFisher SCIENTIFIC) for 10 minutes. The stained cells were washed with cold PBS for three times again to remove the excess dye. The nucleus of the cells were stained by Fluoroshield Mounting Medium with DAPI (Abcam). Cells were imaged on Axio Imager.M2 (Zeiss).

qPCR for the cell uptake of DNA origami. In 96-well plate, MCF-7 or SK-BR-3 cells (50k per well) were seeded for 24-hour culture. Then the cells were incubated with DNA origami (5 nM) for different periods (30 minutes, 1 hour, 2 hours, 4 hours, and 6 hours). To avoid any effects caused by the ion difference of final medium between DOX-HR-treated and DOX-18HB-treated wells of cells, the buffer supplement idea as described in Fluorescence microscopy of Experimental Section was carried out. The final ion condition after adding DNA origami is listed in Table S2. After treatment, the media was removed, and the cells were washed three times with cold PBS. PBS containing Benzonase (0.5 U  $\mu$ L<sup>-1</sup>, Invitrogen) and MgCl<sub>2</sub> (2 mM) was added to degrade structures outside cells. Cells were subsequently washed with PBS for 3 times, then lysed by using DNAzol<sup>®</sup> Reagent (250 µL, Invitrogen) for 10 minutes. After careful mixing, lysates were transferred to new 1.5-mL Eppendorf tubes and left for 30 minutes. To precipitate the DNA, absolute ethanol (50 µL) was added and the tubes were inverted 3 times, then they were kept at room temperature for 3 minutes. The samples were centrifuged for 2 minutes at 4000 g. The precipitated DNA (invisible) was collected by removing the supernatant. The precipitate was gently washed in ethanol (75% (v/v)) one time and then left for air dry. DNA was finally re-dissolved in NaOH for (50  $\mu$ L, 8 mM) qPCR analysis. Scaffold DNA or DNA origami structure solutions with known amount were used as standards. Primers (Integrated DNA Technologies) for M13 amplicon (163bp) (a consistent sequence of the scaffold DNA) the forward primer have ACTCGTTCTGGTGTTTCTCG and reverse primer TGAAAGAGGACAGATGAACGG. In

96-well PCR plate, reactions were performed in 20- $\mu$ L total volume containing Platinum<sup>TM</sup> SYBR<sup>TM</sup> Green qPCR SuperMix-UDG (10  $\mu$ L of, ThermoFisher SCIENTIFIC), template/sample (1  $\mu$ L), primers (5  $\mu$ M, 0.2  $\mu$ L), and DEPC-treated water (8.8  $\mu$ L). The thermo conditions for the reaction were as following: 50°C for 2 minutes hold, 95°C for 2 minutes hold, then 40 cycles (95°C, 15 seconds; 60°C, 30 seconds). Each reaction was run in triplicates. Ct values were used for standard curve plotting and copy number calculation of DNA origami structures.

**Cell uptake mechanism study.** We pre-treated cells with reagents for the saturation/inhibition of specific uptake pathways: Polyinosine (Poly-I, 40  $\mu$ g mL<sup>-1</sup>, 30-min pretreatment) to bind and saturate scavenger receptors; Cytochlasin D (CytoD, 0.25  $\mu$ M, 15-min pretreatment) to inhibit the non-receptor mediated endocytosis; Methyl- $\beta$ -cyclodextrin (M- $\beta$ -cycl, 625 nM, 30-min pretreatment) to inhibit the caveolin-dependent endocytosis; Sucrose (100 mM, 30-min pretreatment) to inhibit the clathrin-dependent endocytosis. We then added 5 nM 18HB or HR to the cells for 4 hours' incubation. After digesting by DNase I (to remove potential structures outside of the cells and on the cell membrane), we then quantified the internalized DNA origami by qPCR method as described above.

Cell viability assay. To evaluate the cytotoxicity of Dox-loaded DNA origami, the formazan dye Cell Proliferation Kit I (MTT) (Sigma-Aldrich) was used according to manufacture's instructions. Briefly, 50,000 cells in media (200  $\mu$ L) per well were seeded in a 96-well plate and cultured for 24 hours. Cells were treated with various concentrations of Dox-loaded DNA origami. To avoid any effects caused by the ion difference of final medium between DOX-HR-treated and DOX-18HB-treated wells of cells, we used the buffer supplement idea as described in Fluorescence microscopy of Experimental Section. After the 24-hour incubation, 10  $\mu$ L of the MTT labelling reagent was added to each well and the plate was kept in the

incubator overnight. Absorbance was measured at 580 nm on multimode microplate reader (Varioskan<sup>TM</sup> LUX). % viable cells =  $(ABS_{sample} - ABS_{blank}) / (ABS_{control} - ABS_{blank}) \times 100$ .

**CSTM culture.** 3,000 cells per well [in DMEM (Sigma-Aldrich) with heat-activated 20% fetal bovine serum (FBS) (Gibco), 100 U mL<sup>-1</sup> penicillin (Gibco) and 100  $\mu$ g mL<sup>-1</sup> streptomycin (Gibco)] were seeded into Ultra Low Attachment 96-well plate with round bottom (Corning) for CSTM establishment. After 7 days' culture, the spheroids were collected for DNA origami test.

**Stability of structures co-cultured with CSTM.** We added DNA origami structures (5 nM) to cell spheroids for co-incubation. At the end of the incubation, we trypsinized spheroids to single cell suspensions. Then we collected all of the culture medium to check DNA origami nanostructures in it by electrophoresis on agarose gel (2% (w/v)).

**Stability of structures internalized into cells of CTSM.** We added 5nM of biotin-modified DNA origami nanostructures to cell spheroids for incubations. We then trypsinized the cell spheroids to single cells. After incubating the collected cells with DNase I (to remove DNA origami nanostructures on cell membrane) and washing, we extracted the structures from cells.<sup>[4]</sup> After agarose gel (2% (w/v)) electrophoresis and transferring to a positively charged nylon membrane, we detected the signal via biotin-streptavidin assay.

**Penetration ability in CSTM.** The spheroids were moved into fresh medium containing Cy5labeled 18HB or HR for co-culture for 4 hours. We used the buffer supplement idea as described in Fluorescence microscopy of Experimental Section to avoid any effects caused by the ion difference of final medium between Cy5-HR-treated and Cy5-18HB-treated wells of cells. The final ion condition after adding DNA origami is listed in **Table S3.** After incubation,

spheroids were washed with PBS for 3 times before they were fixed in paraformaldehyde (4% (w/v)). Data collections were implemented by scanning the spheroids with Axio Imager.M2 (Zeiss).

**CSTM availability assessment.** In same but fresh medium of Hela cell spheroids culture, Dox-loaded DNA origami nanostructures were added, with the final Dox concentration at 5  $\mu$ M, to the spheroids for 4-hour incubation, then the cell spheroids were taken out from the original wells and put into wells containing fresh culture media for another 4-hour treatment. The technical repeat was 6. Then we collected the spheroids, including the supernatant, washed the sample with 1× PBS, and trypsinized [with Trypsin-EDTA (0.25%) form Gibco] the spheroids into single cell suspensions. The same number of freshly cultured Hela cells were used as the negative control. The cell viability assessments were then conducted according to our cell viability assay section. 3 biological repeats were conducted.

**Image processing and analysis for CSTM.** Fluorescent microscopic profiles of CSTM treated with Cy5-labled DNA origami were analyzed in a semi-automated fashion. By implementing the Multi-Clock-Scan plugin in ImageJ, spheroids in cross-section images were outlined on the image, then a center of outline was identified automatically. By using the identified center as the origin, the spheroid image could then be transformed into its polar profile. The radial scanning of pixel intensity then started in a direction from the center to the first pixel of the outline and continued clockwise pixel-by-pixel along the outline until 120% of the radius were scanned. Collected radial profiles were averaged to produce the integral clock scan intensity profile in 256 intensity levels of grey scale units. This method was described in details by Maxim et al.<sup>[5]</sup> To comparatively analyze average multi clock scan intensity profiles between Cy5-HR and Cy5-18HB treated spheroids, the normalized variance of each profile was calculated by implementing the script presented in Supplementary Script 1.

**Statistical analysis.** Data were analyzed using two-tailed Student's t-tests for 2 groups and one way ANOVA followed by Turkey post tests for multiple groups. Probabilities less than 0.05 were considered significant.



Figure S1. Scaffold DNA routing of HR.





Figure S2. Scaffold DNA routing of 18HB.

caDNAno design scheme of 18HB (left). The blue line indicates the scaffold p7560 ssDNA; the grey lines indicate staple oligonucleotides; the red lines also indicate staple oligonucleotides but their 3 primes have or do not have Cy5 modifications.

The intersection view of 18HB (right top) in caDNAno.

The 3D rendering of 18HB (right bottom) in caDNAno.



**Figure S3.** Diameters of HR and 18HB structures under cryoEM. 20 structures for each were submitted for their diameter measurements.



**Figure S4.** 2% agarose gel electrophoresis with a 1-kb DNA ladder (1), scaffold DNA (2), 18HB with excess staples (3), purified 18HB (4), Cy5-18HB with excess staples (5), purified Cy5-18HB (6), scaffold DNA (7), HR with excess staples (8), purified HR (9), Cy5-HR with excess staples (10), purified Cy5-HR (11), 1-kb DNA ladder (12). The gel was imaged under UV channel and Cy5 channel.



Figure S5. Trajectories and predicted persistence lengths of 18HB and HR. Scale bars are 100

nm.



Figure S6. The example raw TEM data for persistence length estimation of 18HB.



Figure S7. The example raw TEM data for persistence length estimation of HR.



**Figure S8.** PDI of DNA origami measured in in buffer 1 ( $1 \times$  PBS), buffer 2 (13 mM Mg2+, 5 mM TRIS, 1 mM EDTA) and buffer 3 (DMEM with 20% FBS, 100 U mL<sup>-1</sup> penicillin and streptomycin).



**Figure S9.** Characterization of Cy5-18HB on 2% agarose gels after incubation with DMEM no FBS or DMEM +FBS (heat inactivated at 56C for 30 min) for different periods (0 hour, 0.5 hours, 1 hours, 2 hours, 3 hours, 4 hours, 5 hours and 6 hours). The gels were imaged both under UV channel for DNA visualization and Cy5 channel for Cy5-labled DNA origami visualization. The DMEM (-FBS) or DMEM (+FBS) was also included to help understanding the signals from medium itself.



**Figure S10.** Characterization of Cy5-HR on 2% agarose gels after incubation with DMEM no FBS or DMEM +FBS (inactivated at 56C for 30min) for different periods (0 hour, 0.5 hours, 1 hours, 2 hours, 3 hours, 4 hours, 5 hours and 6 hours). The gels were imaged both under UV channel for DNA visualization and Cy5 channel for Cy5-labled DNA origami visualization. The DMEM (-FBS) or DMEM (+FBS) was also included to help understanding the signals from medium itself.



**Figure S11.** Stability of 18HB and HR in cell culture medium. Representative 2% agarose gel electrophoresis results of 18HB (A) and HR (B) incubated with DMEM medium containing 20% heat-inactivated (56C for 30min) FBS for 1, 3, 6, 12, 24, 48 and 72 hours. "DMEM ++" stands for the Dulbecco's Modified Eagle Medium supplemented with 20% FBS and 1% Pen&Strep, which is used as a control well on the gel.



**Figure S12.** Absolute quantification of DNA origami structures by qPCR method after MCF-7 cells and DNA origami structures incubation for different periods as indicated.



**Figure S13.** Absolute quantification of DNA origami structures by qPCR method after Hela cells and DNA origami structures incubation for different periods as indicated.



100 nm HV=80kV Direct Mag: 18000x Figure S14. Dox-18HB under TEM. The bar is 100nm. The magnification is 18000×.



100 nm Direct Mag: 18000x

**Figure S15.** Dox-HR under TEM. The bar is 100nm. The magnification is 18000×.

![](_page_25_Figure_1.jpeg)

**Figure S16.** Stability of 18HB and HR co-cultured with cell spheroids. Representative 2% agarose gel electrophoresis results of 18HB (A) and HR (B) co-cultured with cell spheroids for 1, 3, 6, 12, 24, 48, 72 and 96 hours. "DMEM ++" stands for the Dulbecco's Modified Eagle Medium supplemented with 20% FBS and 1% Pen&Strep, which is used as a control well on the gel.

![](_page_25_Picture_3.jpeg)

**Figure S17.** Intracellular stability of 18HB and HR. Representative DNA blots of cell extracts obtained from cell spheroids incubated with 5nM of biotinylated 18HB (A) and HR (B) for 1, 3, 6, 12, 24, 48, 72 and 96 hours. Biotins on DNA origami nanostructures were detected with streptavidin-HRP.

![](_page_26_Figure_1.jpeg)

**Figure S18.** Penetration ability of DNA origami in SKBR3 CSTM. (**A**), fluorescence microscopic images scanned at different depths of CSTM showing the distributions of Cy5-18HB. (**B**), fluorescent microscopic images scanned at different depths of CSTM showing the distributions of Cy5-HR. (**C**), normalized variances of Cy5 signal distribution curves on CSTM. (**D**), viability of cells from 3D spheroids (n = 3). Scale bars are 400  $\mu$ m. \*p < 0.05, \*\*\*p < 0.001. Data represents mean ± SD.

![](_page_27_Figure_1.jpeg)

**Figure S19.** Penetration ability of DNA origami in MCF7 CSTM. (**A**), fluorescence microscopic images scanned at different depths of CSTM showing the distributions of Cy5-18HB. (**B**), fluorescent microscopic images scanned at different depths of CSTM showing the distributions of Cy5-HR. (**C**), normalized variances of Cy5 signal distribution curves on CSTM. (**D**), viability of cells from 3D spheroids (n = 3). Scale bars are 400  $\mu$ m. \*\*p < 0.01, \*\*\*p < 0.001. Data represents mean ± SD.

```
import pandas as pd
import numpy as np
#import data from excel:#
data = pd.read excel("Clockscan.xlsx")
Ra = data["Radius"].tolist()
HB = data["18HB"].tolist()
#tranform to np array:#
np_Ra = np.array(Ra)
np_HB = np.array(HB)
#Normalize the data in Radius:#
Sum = np.sum(np_Ra * np_HB)
Final_Ra = np.array(Ra / Sum)
#Caclulate the final_sum and final_average:#
Final_sum = np.sum(np_HB * Final_Ra)
Final_average = Final_sum / (np.sum(HB))
#Caclulate the variance:#
Variance = np.sum(np HB * (np.square(Final Ra - Final average)))/(np.sum(HB))
```

Script S1. Calculation of normalized variances of Cy5 signal distribution curves on CSTM.

Table S1. Detailed ion conditions after adding DNA origami for fluorescence microscopy

experiment.

	Complete DMEM medium	<b>50 [nM] Cy5-HR</b> (in 1× PBS)	1× PBS	<b>50</b> [nM] Cy5- 18HB (in 13 [mM] Mg <sup>2+</sup> , 5 [mM] TRIS and 1 [mM] EDTA)	13 [mM] Mg <sup>2+</sup> , 5 [mM] TRIS and 1 [mM] EDTA	Final condition
Cy5-HR treated cells	320 [μL]	40 [μL]	\	\	40 [μL]	5 [nM] Cy5-HR (1/8× PBS, 13/8 [mM] Mg <sup>2+</sup> , 5/8 [mM] TRIS, 1/8 [mM] EDTA)
Cy5- 18HB treated cells	320 [μL]	\	40 [μL]	40 [μL]	\	5 [nM] Cy5-18HB (1/8× PBS, 13/8 [mM] Mg <sup>2+</sup> , 5/8 [mM] TRIS, 1/8 [mM] EDTA)

**Table S2.** Detailed ion conditions after adding DNA origami for qPCR DNA origami cell

 uptake assessment.

	Complete DMEM medium	50 [nM] Cy5- HR (in 1× PBS)	1× PBS	50 [nM]         Cy5-           18HB (in 13 [mM]           Mg <sup>2+</sup> , 5 [mM]	13 [mM] Mg <sup>2+</sup> , 5 [mM] TRIS and 1 [mM]	Final condition
				and 1 [mM] EDTA)	EDTA	
Cy5-HR treated spheroids	160 [μL]	20 [µL]	\	\	20 [µL]	5 [nM] Cy5-HR (1/8× PBS, 13/8 [mM] Mg <sup>2+</sup> , 5/8 [mM] TRIS, 1/8 [mM] EDTA)
Cy5-18HB treated spheroids	160 [μL]		20 [μL]	20 [μL]	\	5 [nM] Cy5-18HB (1/8× PBS, 13/8 [mM] Mg <sup>2+</sup> , 5/8 [mM] TRIS, 1/8 [mM] EDTA)

 Table S3. Detailed ion conditions after adding Cy5-labled DNA origami for CSTM

 penetration assessment.

	Complete DMEM medium	<b>100 [nM] Cy5-</b> <b>HR (</b> in 1× PBS)	1× PBS	<b>100 [nM] Cy5-</b> <b>18HB (</b> in 13 [mM] Mg <sup>2+</sup> , 5 [mM] TRIS and 1 [mM] EDTA)	13         [mM]           Mg <sup>2+</sup> ,         5           [mM]         TRIS           and         1           EDTA	Final condition
Cy5-HR treated spheroids	160 [μL]	20 [µL]	λ	λ	20 [μL]	10 [nM] Cy5-HR (1/8× PBS, 13/8 [mM] Mg <sup>2+</sup> , 5/8 [mM] TRIS, 1/8 [mM] EDTA)
Cy5-18HB treated spheroids	160 [μL]	١	20 [μL]	20 [µL]	\	10 [nM] Cy5-18HB (1/8× PBS, 13/8 [mM] Mg <sup>2+</sup> , 5/8 [mM] TRIS, 1/8 [mM] EDTA)

**Table S4.** Summary of all oligonucleotide staples used in the production of HR. To prepare HR, all oligonucleotides listed below, except for the red ones, will be needed. To prepare Cy5-HR, all oligonucleotides listed below, excepted for the green ones, will be needed.

DNA Sequence	DNA Sequence	DNA Sequence
TTCGAGCCAGTAATAAGGTAATTGAGCGCTAA	AAAAGGCTCCAAAAGGACCACCAGAACCACCACCAG	CGGAATCATAATTACTAGTTTTCAAATATATTTTAGTTAATT
TATCAGAGAGATAACCTTTAGGCAGAGGCATT	AAGTTTTGTCGTCTTTAATAAATCCTCATTAAAGCC	TCATCTTCTGACCTAAATTTAATGGTTGGGTTATATAACTAT
CCCGACTTGCGGGAGGTGCAGAACGCGCCTGT	ACCGCCACCCTCAGAGAAGGAGTGTACTGGTAATAA	TAGTGAATTTATCAAAATCATAGCTTGCTTCTGTAAATCGTC
GAATGCGGCGGGCCGTAGAGAATAACATAAAAAA	ATATGCGTTATACAAATTGTTAAATAAGAATAAAAACAC	GGAGAAACAATAACGGATTCGCCAAAATTATTTGCACGTAAA
AACAACATGTTCAGCTAACAGCCATATTATTTAT	CCGAGTAAAAGAGTCTGTTTAGACAGGAACGGTACGC	TCCTGATTGTTTGGATTATACTTAACATTATCATTTTGCGGA
CCCAATCCAAATAAGAGAGAATATAAAGTACCGA	AGGCCGATTAAAGGGATTGCGCCGCTACAGGGCGCGT	TCGACAACTCGTATTAAATCCTTTAAAATATCTTTAGGAGCA
TAACAACGCCAACATGTAAAACCGAGGAAACGCA	ACAACATACGAGCCGGAAGCGTCCGTGAGCCTCCTCA	GTGCCACGCTGAGAGCCAACTGATAGCCCTAAAACATCGCCA
CGCTCAACAGTAGGGCTTACGAGCATGTAGAAAC	TAGCTGATAAATTAATGCAATGCCTGAGTAATGTGTA	CCAGTCACACGACCAGTAATAAAACCGCCAGCCATTGCAACA
TAAAGGTGGCAACATATAGTTTGAAATACCGACC		GGAAAAACGCTCATGGAACTTTGATTAGTAATAACATCACTT
CGTCACCAATGAAACCATTGATTGCTTTGAATAC	AATATTTTGTTAAAATTCACGGAGAGGGTAGCTATTTT	ATAATTCGCGTCTGGCCTTCCTGATCAGGTCATTGCCACGTT
TTCATCGGCATTTTCGGTCTGAATAATGGAAGGG	TAGTACCGCCACCCTCAGACGAGAGGGGTTGATATAAGT	ACCAGACGACGATAAAAACCAAAGATTTAGGAATACCACATT
GAACCGCCTCCCTCAGAGTGCCCGAACGTTATTA	CTAATGAGTGAGCTAACTCACATAAGATGATGAAACAAA	CACAGACAGCCCTCATAGCCACCACCCTCATTTTCAGGGATA
AGCCGCCAGCATTGAATCAACAGTTGAAAGG	GAATCGGCCAACGCGCGGGGGGGGGGGGGGGGGGGGGGG	GCAAGCCCAATAGGAACCCATGTTCACCGTACTCAGGAGGTT
AGAATGGAAAGCGCAGTCAGCAGAAGATAAAACA	ATTGCCCTTCACCGCCTGGCCCTGAGCGGAATTATCATC	ATGTAAATGCTGATGCAAAGATTAAGACGCTGAGAAGAGTCAA
TGAGAGATCTACAAAGGCAGGACGACGTAGACGTGC		TCAATTACCTGAGCAAAAAACAGTAACAGTACCTTTTACATCG
ACTATGGTTGCTTTGACGTAGCCAGCTTTCATCA	TCAAGTTTTTTGGGGTCGAGGTGTTTTTGAATGGCTATT	ACAGAAATAAAGAAATTGAGATGATGGCAATTCATCAATATAA
CAGTTGAGGATCCCCGGGAATTTTATCCTGAATC	ACCACCACACCCGCCGCGCTTAACATCACGCAAATTAAC	ACAAAGAAACCACCAGAAAGAAGTATTAGACTTTACAAACAA
ATAGCCCGGAATAGGTGTTGAGAAAGGCCGGAGA	ATCAAAAATCAGGTCTTTACCCTAAGGTTTCTTTGCTCG	CTAACAACTAATAGATTAATGAACCTCAAATATCAAACCCTCA
GGTAAAGATTCAAAAGGGACCGTAACACTGAGTT	GAACCCTCATATATTTTAAATGCGCATTAAATTTTTGTT	ATCAATATCTGGTCAGTTGGCAAAATTAACACCGCCTGCAACA
ATAATAACGGAATACCCTTACCAGTATAAAGCCAA	GCAAAATCACCAGTAGCACCATTACAAGAACTGG	CAATAGCAAGCAAAATCTACCGAGCTCGAATTCGTAATCATGGC
CAATCAATAATCGGCTAAAAAGCCTGTTTAGTATC	CGACAGAATCAAGTTTGCCTTTAAATCCGCGACCTGCTC	CTGCGCGCCTGTGCACTCACACTGGTGTGTTCAGCAAATCGTT
GTTTTAACGGGGTCAGTGAAGGGACATTCTGGCCA	CATCTTTTCATAATCAAAAATCACAAATACGTAATGCCAC	CTGCGGCTGGTAATGGGTAGCTTACGGCTGGAGGTGTCCAGCA
AACATGAAAGTATTAAGAAATCGGCCTTGCTGGTA	TCAGAGCCACCACCCTCAGAGCCGGTCGCTGAGGCTTGC	CCGCAAGAATGCCAACGGATTCGTCTCGTCGCTGGCAGCCTCC
GAGAAGGATTAGGATTAGAGCGGGAGCTAAACAGG	ATTGGCCTTGATATTCACAAACATTGAAAATCTCCAAAA	GGGTAAAGTTAAACGATGATTAAATTTCTGCTCATTTGCCGCC
ACCCTAAAGGGAGCCCCCACGAAAGGGGGATGTGC	GTGTGATAAATAAGGCCAAAAGAACTGGCATGATTAAGAC	CTGGTGCCGGAAACCAGGATAGATGGGCGCATCGTAACCGTGC
CGTCTATCAGGGCGATGGACAGCGCCATGTTTACC	AAGCCGTTTTTATTTTCATCGTAATCCAATCGCAAGACAA	TCCGTGGGAACAAACGGCATAACCAATAGGAACGCCATCAAAA
CCCGAGATAGGGTTGAGTAGACATAAAAAAATCCC	TTTTAACCTCCGGCTTAAAGAAACGCAAAGACACCACGGA	CAGGGAAGCGCATTAGGGGTAATAGTAAAATGTTTAGACTGGA
TCCACGCTGGTTTGCCCCAAACGTGCCGGACTTGT	ATATGTGAGTGAATAAAGGGCGACATTCAACCGATTGAGG	CAACTAATGCAGATACATAGGACGTTGGGAAGAAAAATCTACG
AAATCAGCTCATTTTTATGACCCTGTAATACTTTT	ATTTTAAAAGTTTGAGCATAGCCCCCTTATTAGCGTTTGC	ATAAGGCTTGCCCTGACGAGAAAACGCATAGGCTGGCTGACCT
AAGAATTAGCAAAATTAAATAAACAGCTTGATACC	AATTGAGGAAGGTTATCCGCCACCCTCAGAACCGCCACCC	TCATCAAGAGTAATCTTGAAACGAGGCGCAGACGGTCAATCAT
TTCATTTGGGGCGCGAGCAGGGTAGCAACGGCTAC	GAGGTGAGGCGGTCAGCAGGAGGTTGAGGCAGGTCAGACG	AAGGGAACCGAACTGACCAACTTAACGGAGATTTGTATCATCG
GTTGATTCCCAATTCTGCACCAGCGATTATACCAA	ACAGAGATAGAACCCTTCTGAATTTACCGTTCCAGTAAGC	CCTGATAAATTGTGTCGAATAAAACGAAAGAGGGCAAAAGAATA
AAGCGGATTGCATCAAAAAACATTATTACAGGTAG	ACATTAAATGTGAGCGAGTGTAGCGGTCACGCTGCGCGTA	CAGCGAAAGACAGCATCGGAACGATGACAACAACCATCGCCCA
AGAACGCGAGAAAACTAGTCTTTCCTTATCATTCCA	GAAGATCGCACTCCAGATTTAGAGCTTGACGGGGAAAGCC	CGCATAACCGATATATTCAAGCCTTTAATTGTATCGGTTTATC
CATCAAGAAAACAAAAATATCCGCTCACAATTCCAC	TGCAAGGCGATTAAGTCCACTACGTGAACCATCACCCAAA	AGCTTGCTTTCGAGGTGAATTTCAAACAACTAAAGGAATTGCG
AACGTCAGATGAATATAAATTGCGTTGCGCTCACTG	AGTCCCGGAATTTGTGTTGTTCCAGTTTGGAACAAGAGTC	AATAATAATTTTTTCACGACCAGACGTTAGTAAATGAATTTTC
ATATTCCTGATTATCAAGCGGTTTGCGTATTGGGCG	GTAAAAAAAGCCGCACGCAGGCGAAAAATCCTGTTTGATGG	TGTATGGGATTTTGCTAAACAACAACAACAACGCCTGTAGCATACC
TAAAGCATCACCTTGCATTATAAATCAAAAGAATAG	GGGCGCGGTTGCGGTAACCTGTCGTGCCAGCTGCATTAAT	GAACAAAGTTACCAGAAGACACAAGAATTGAGTTAAGCCAGAT
AGTCTTTAATGCGCGAAACGTCAAAGGGCGAAAAAC	GGTGCCCCCTGCATCACATAAAGTGTAAAGCCTGGGGTGC	AATAAGAGCAAGAAACAATGAAAACGGGAGAATTAACTGAACA
CTCAATCGTCTGAAATACGTAAAGCACTAAATCGGA	TCAAATATCGCGTTTTAATTCGAAAGCACCGTCGGTGGTG	CCCTGAACAAAGTCAGAGAAACGATTTTTTGTTTAACGTCAAA
CGTTGTAGCAATACTTAGAAGAAAGCGAAAGGAGCG	TGCTCCTTTTGATAAGAGGTCATATGATTGCCGTTCCGGC	AATGAAAATAGCAGCCTTTACAGACGTCTTTCCAGAGCCTAAT
TCATAAACATCCCTTAATAAATATTCATTGAATCCC	TGCAACTAAAGTACGGTGTCTGGAGGAAAAAGAGACGCAG	TTGCCAGTTACAAAATAAATTTTGAAGCCTTAAATCAAGATTA
AAACAGCGGATCAAACATTTGCGGATGGCTTAGAGC	TAAATCGGTTGTACCAAAAACATAGATTGACCGTAATGGG	TGCCAGCACGCGTGCCTGTTCTTAACGATCCAGCGCAGTGTCA
AGCTITCAGAGGTGGAAAGTTTCATTCCATATAACA	TCGTCACCAGTACAAATCAACGCAAGGATAAAAATTTTTA	AACGGCATCAGATGCCGGGTTACAGAGCCGGGTCACTGTTGCC
TTCAGGCTGCGCAACTATAACCTGTTTAGCTATATT	ACCGAAGCCCTTTTTAGCAACACTATCATAACCCTCGTTT	TCAGCGGGGTCATTGCAGGCGCTACTGGTCTGGTCAGCAGCAA
ATAGGTCACGTTGGTGAAAATCATACAGGCAAGGCA	TTACCAACGCTAACGAATTTCACGGTCATACCGGGGGTTTC	GGCCAGAGCACATCCTCATAACGAGGCGGCCTTTAGTGATGAA
	GAGTGAGAATAGAAAGACAATAAAGCCTCAGAGCATAAAGC	AGCAGTTGGGCGGTTGTGTACATAGAGATAGACTTTCTCCGTG
CTCATTATACCAGTCAATAGAAAAACGTAGAAAAATACATAC	AGAGGCTTTGAGGACTAAACGAGTAGATTTAGTTTGACCAT	
CATTACCCAAATCAACAATTATTCATTAAAGGTGAA	GCGCGAAACAAAGTACACTGTAGCTCAACATGTTTTAAATA	ATCTGCCAGTTTGAGGGGACGACGAACAACCCGTCGGATTC
CATGTTACTTAGCCGGACCATTAGCAAGGCCGGAAA	ACGGTGTACAGACCAGATCAGGATTAGAGAGTACCTTTAAT	TGCCAGCACGCGTGCCTGTTCTTAACGATCCAGCGCAGTGTCA-Cy5
TACGAAGGCACCAACCACGTCAGACTGTAGCGCGTT	AATTGGGCTTGAGATGAGATTAAGAGGAAGCCCGAAAGACT	AACGGCATCAGATGCCGGGTTACAGAGCCGGGTCACTGTTGCC-Cy5
AGGGAGTTAAAGGCCGAGGAACCAGAGCCACCACCG	AAAGATTCATCAGTTGATTCAGAAAACGAGAATGACCATAA	TCAGCGGGGTCATTGCAGGCGCTACTGGTCTGGTCAGCAGCAA-Cy5
		GGLLAGAGCACATCCTCATAACGAGGCGGCCTTTAGTGATGAA-Cy5
<u> </u>		ACCGGAAACAATCGGCGAAACGTAGGGTAACGCCAGGGTTTTC-CV5
		CCTCTTCGCTATTACGCCAGCTGACAGCTTTCCGGCACCGCTT-Cy5
		ATCTGCCAGTTTGAGGGGACGACGTAACAACCCGTCGGATTC-Cv5

**Table S5.** Summary of all oligonucleotide staples used in the production of 18HB. To prepare 18HB, all oligonucleotides listed below, except for the red ones, will be needed. To prepare Cy5-18HB, all oligonucleotides listed below, excepted for the greens ones, will be needed.

DNA staple sequences of 18HB	DNA staple sequences of 18HB	DNA staple sequences of 18HB
TAGGICAAGGIGGCATCAATTCIGUTAGCTATATACGAACT		
GGTIGCTGAATGAATTACCTTTTTTTAATGGA	CTTTTGCGGATATGAGGCTTTGAGGACTAGCGTA	
TGTAGGAATTGCAAAAAGCTTTTTATAGA	GTAAGAGAGGAGAAGTTGCGGGGATCGTCATTTGC	
GCCTCAATAGGATTGCTTTGAATACCAAGTTATAGATT		
	GATTTAGTGTGAATACCATCGCCCACGCTTGCGAA	
CTTACAAACAACAGTACCTTTTACATCGGGAAAGTATT	GTAGAAATTAAGAAGTTGCGCCGACAATCGTTGAA	TAAGAGATGTGATAAATAAGGCAGAAATAAAGAAATTTTAAA
TTGATTAAATACGTCAGTAAATTTTAAA	AACGGAACAGTCAGTTAAACAGCTTGATAGGCTCC	GAGCATAAAAACAGGGAAAAGAAAACCACCCTTCTCTGAAAAG
CGGTTATTAATTGCGTAGATTTTCAGGTTTACCTTTGC	TACGTTAATAAATTTCATTTGGGG	CGCCAACTAATTACTAGAAAAAAGGGTTAGAACCTACCATATC
ATTGTAACATCGTAAAACGTTAAATTTC	CAGGAACGGTACGCCATTAAAGGGATTTTAGA	TATCACCCTGAACAAAGAAACAATCCGCCACCAAACAAAAAA
CACGCGGAATATAATGGAGCCTGTGCCA	ACGCAAATTAACCGTTGTA	AAAGCCAACGCTCAACAAATTCTTACCAGTAT
TCATGATTATTTGTTTGGATTATACTTCTGATATCATC	AGCTTGCTTTCGAGGTATTGTATCGGTTTATC	TGGCACAGACAATATTTTTGAAT
AAGCCTGGGGTGTC	GCAATACTTCTTTGATTAG	GGCTTCTGACCGACCAGTAATAAAGAAATGGGAAAAACTGCT
AAACACTACGTGAACCATCTATCAGGGCGATGGCC	GCCTGAGTAGAATTTCCCACCGAGTAAAAGAGTCTATCACTT	AATGTAGGAATATAGAAGGCTTATGGTAAATTCACCGTGGTG
TCAATTAAAGACGCTGAGTGTGAGTGAATAACCTTGCTTCTG	GCCACCCCACCGTACTCAGGATTAAAGGTGAATTAATTGACG	TTAACCGCACAGCGAACCTCCCGACCAAAGAAAATCACTAAG
AAATAACTGAATTCATGCGCAAGAGTCTGGAGCAATAATGCC	CTCAGAATATAGCCCGGAATACACCGAC	TAGCTGTCTTAAGATTAGTTGCTAATTTTGTTCACCAAGAAG
CCGATTTGAGAAAGGAAGGGAGCGCGTA	CACTTATACCTGTTACTTAGCCGGATGACCAGAAGCCCGATA	GTTCCATCCTAATCTTACCAACGCGCAACATACAGAATTTCT
TTAGTGCAGGCTATCAGGTCATTTTTGA	GCCACCACGTCGAGAGGGTTGAATTAGAGCCAGCACAAAAGG	AGATTTATCAGCCAGTTACAAAATCGCAGTATCATCGGGTAT
CTTCTAAAATCGATGAACGGTCAACCGT	GATAGCACAGTACCAGGCGGACAGTAGC	AATACGACAAAATAAGAAACGATTCGGAATAATCTTTTAAT
GGAGAAGAAACTAGCATGTCAAATCACC	CAAGCAAAAGGAACCGAACTGACCTTGAATCCAAAGCGACAG	CCGATATAAACAGCCTTTACAGAGGAACAAAGAACCGCTAAG
GGCCAGTGTACCCCGGTTGATGAGAAAG	CCATGTATAGGATTAGCGGGGGCAAGGCCGGAAACGCACAATC	TCAATGTAATTAGACGGGAGAATTTATCTTATCAGAGCAAGC
GTCACGAAAAGCCCCCAAAAACTAGGTAA	TTCGTCAGAGACTCCTCAAGATGAAACC	TACAGTAGGGGTAATTGAGCGCTAAAGCCCAGAGCCGCGACG
GGTAACGTTGTATAAGCAAATATGCAAT	TACTACGTAATACAGACCAGGCGC	AACAGTACTTGAAACAAG
CCAGCTGTAAAATTCGCATTACAACGCA	AACGCCTACATGAAAGTATTACGTAATCAGTAGCGATAAAAG	TTCAATTACCTGAGAGGAAG
GCGGGCCGTTAAATCAGCTCATTGCGGG	ACAGCCCTTCGGAACCTATTACAAGTTT	AAAATTATTTGCATATCATT
CTGTTGGACCAATAGGAACGCCATTATG	AGTTAAAGACATCTTGACAAGAAC	ATCAATATAATCCTGACAGATGATGGCAATCCTAATG
CGGAAACCTGTAGCCAGCTTTATAAAGC	ACGATCTCAGTTAATGCCCCCACTGTAGCGCGTTTTGTTAGC	CAGAGGTGATCGCCATTAAAAATACCGAACGAACC
TTCCGGCATTAAATGTGAGCGAAGAATT	TTTCCAGGAGTAACAGTGCCCCATTTTC	AGTATTAGGCGAAAAACCGTCACCCAAAGGAGCCC
AAGATCGACCCGTCGGATTCTATAAATC	TAGCATCGGACAAAGCTGCTCATTTTACCAGGCTCAACAATA	CAACAGTGCCAACGTGGACTCCAACGTCGAGGTGCCGAATTG
TGGGCGCATCGTGCCGGAAGCATAAAGTGTA	ATTTTCTTTTTAACGGGGTCATATTAGCGTTTGCCCCCAAAA	AGCAAATACAAGAGTCCACTACCTTATGAGTGTCC
AGCCGGCGAACGTGGCAGAGCTTGACGGGGAA	TAAACAACAGGAGTGTACTGGCATAATC	AAAGCATCACCTTGAGTGT
ATATTTTGTGCGAAAGACATAAATCATTTCCACC	CAAGGCCGCTACACCAGAACGAGTAATTACGAAGTTTCCATAAAG	TATCAAAAAGAATAGCCCGAGATTTACGGGATGTT
CTGGCCTTCCAGGCAAATAAAGACGGAGGACGCG	AGCGGAGCATACATGGCTTTTCAGAGCCACCACCGGTTACCA	CTGGTCAGCAAAATCCCTTATACTCTATTTTCTCA
ATTGACCGTCAGTTTGACAATTCCACACAATAAC	AACAACTATTTACCGTTCCAGCTCCCTC	AGTTGAATTGATGGTGGTTCCGGCCCTGAAACGAC
ACCACCAGCGTACTATGGTTGAAACAGGAGGCCGAGAATCCT	GAAATAACCGTCAACTTTAATCATGAATACCGAGTAGACAAG	GTTATCTCCCAGCAGGCGAAACTCGTCGTTTCCCA
GTAGCGGGAGCACGTATAACGTGCTTTCACGCGCTGGCAAGT	TAATAATAATGGAAAGCGCAGCAGAACCGCCACCCCCGAAGC	TTAGGAGCACTAAAGCGGTCCACGCTAGGGGCCTAAGTTG
GAGATCTAGAAGCAAAGCGGAACCCTGA	AATCTCCATAAATCCTCATTACACCACC	AGAGCCGTGGCCCTGAGAGAGGCATTTCGGGGATG
GGAGAGGAAAAAGATTAAGAGTAAATCA	AAAACCGATACTGGCTCATTATACCAACATTCAATAACCTACTAA	ATTTGAGAGCTGATTGCCCTTTCCGAACTATTACG
AATACAAGAGGTGGTTGCCCGCTTCTAATCTATAG	AAAAGGAGGCCTTGATATTCACAGAACCACCACCAATAATAA	AGACTTTTTCACCAGTGAGACTGGTGTAGATCGGT
TCTAGCTGAAAGACTTCAAATTTCAGAA	AATATCCAGAACAATATTA	AACTCGTGGCGCCAGGGTGGTCTTAAGCTGCGCAA
ATCAATATTTAATTCGAGCTTCCCCTCA	GGTTAATAACGTCCATCGAGAAGTGTTTTTAGGGAGCTCTTT	CCGAACGGGAGAGGCGGTTTGTACCTCGAGCGCCA
TCAATCATATGCCAAGCGATACCGACAGTGCGAAA	TATTCAGAACGTACAACCGAAATCCGCGACCGGTCTTTTTGC	AGTTTGAAATGAATCGGCCAATCCCCGGCTGGTGC
GCCGGAGAACCAGACCGGAAGGTCATAA	TGCCCCTCATCTCATCTCGCAGACGGTCAATTAAACAGATCG	TTGCGGAACCTGTCGTGCCAGTTCGTAAGCCAGCT
AGATTCACAACAGGTCAGGATAGCGTCC	GATCCGTAACCACCAACAAAGAGGACAGATGCGGAATCCAAA	CCACCAGAAGGATGCCCGCTTTCCAGGTTTCCTCCTCAGG
GCCTGAGTACCTTTAATTGCTAGTAAAA	GAAGTAGCATGTTTCCAGGCTGACCTTCATCGGGTAATCCTT	ATATTCCCATTAATTGCGTTGTCCGCTCAGGGGAC
CTCATATATAAGAGGTCATTTAGTTTTG	AAAAAAGTTTGGCTACATCATTACCCAAATCCAAAATAATTG	TGTTCCAGTTTGGAGAAAAATCT
CTCATATATAAGAGGTCATTTAGTTTTG AGGATAATGGCTTAGAGCTTAGCGAGAG	AAAAAAGTTTGGCTACATCATTACCCAAATCCAAAATAATTG AAGGTATGGGACCCTCATAAGGCTTGCCCTGCAACACTCAAC	TGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGCAAAATATCT
CTCATATATAAGAGGTCATTTAGTTTTG AGGATAATGGCTTAGAGCTTAGCGAGAG AGAAGCCAATATAATGCTGTAACGACGA	AAAAAAGTITIGGCTACATCATTACCCAAATCCAAAATAATTG AAGGTATGGGACCCTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGGGCTTGAGATGGCAGATACTTGA	TGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGCAAAATATCT CATAGCTTCGGGAAACAAAGAAA
CTCATATATAAGAGGGTCATITAGTITTG AGGATAATGGCTTAGAGCTTAGCGAGAG AGAAGCCCATATAATGCTGTAACGACGA CTTTTTTTAGAAGGGCATGAGTAAACAGGGTTTT	AAAAAAGTITGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCCTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGGGCTTGAGATGGCAGATACTTGA CAGTTTTTCAGACAACATACCTTATGCGATTGATTCATTAGA	TGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGCAAAATATCT CATAGCTTCGGGAAACAAAGAAA TGCTGCATTGTAAACGTTA
CTCATATATAAGAGGGTCATTTAGTTITG AGGATAATGGCTTAGAGGCTAGCGAGAG AGAAGCCAATATAATGCTGTAACGACGA CTTTITTTTAGAAGGGCATGAGTAAACAGGGTTTT ACCCTGTATGTTTTAGAATGATGATCATAA	AAAAAAGTTIGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCCTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGGGCTTGAGATGGCAGATACTTGA CAGTITTICAGACAACATACCTTATGCGATGATTCATTAGA ATTGCCTTTAGAATTTCGACGTTGGGAAGAAAAATC	TGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGCAAAATATCT CATAGCTTCGGGAAACAAAGAAA TGCTGCATTGTAAACGTTA TTCGCCAAATAATTCGCGT
CTCATATATAAGAGGGTCATTIAGTTITG AGGATAATGGCTTAGAGCTTAGCGAGAG AGAAGCCAATATAATGCTGTAACGACGA CTTITITTIAGAAGGGCATGAGTAAACAGGGTTTT ACCCTGTATGTTTTAGATGATGATCATAA CTAAATCGGTTGTAAGTACGGTGTCTGGAGGCATA	AAAAAAGTTIGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCCTCAATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGGGCTTGAGATGGCAGATACTTGA CAGTITITCAGACAACATACCTTATGCGATGATTCATTAGA ATTGCCTTTAGAATTTCGACGTTGGGAAGAAAATC AGGTTGAGGCAGGTCACGCCAGCATTGACAGG	TGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGCAAAATATCT CATAGCTTCGGGAAACAAAGAAA TGCTGCATTGTAAACGTTA TTCGCCAAATAATTCGCGT GACGACAAACAAACGGCGG
CTCATATATAAGAGGTCATTTAGTTTTG AGGATAATGGCTTAGAGCTAGCGAGAG AGAAGCCAATATAATGCTGTAACGACGA CITTITTTTAGAAGGGCATGAGTAAACAGGGTTTT ACCCTGTATGTTTTAAATAGATCATAA CTCAAGCGGTGTTGAGAGCGGTGTCTGGAGGCATA CTCAAGAGATTCCATATAACAGATAACGC	AAAAAAGTTIGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCCTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGCCTTGGGCTTGAGATGGCAGATACTTGA CAGTTITCAGACAACATACCTTATGCGATGATCATTAGA ATTGCCTTTAGAAATACCTGACGAGGAAAAAATC AGGTTGAGGCAGGTCACGCCAGCATTGACAGG CCGCCAGCCATTGCAACAG	TGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGCAAAATATCT CATAGCTTCGGGAAACAAAGAAA TGCTGCATTGTAAACGTTA TTCGCCAAATAATTCGCGT GACGACAAACAAACGGCCGG CGCTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGCGGG
CTCATATATAAGAGGTCATTTAGTTTTG AGGATAATGGCTTAGAGCTAGCGAGAG AGAAGCCAATATAATGCTGTAACGACGA CITTITTTAGAAGGGCATGAGTAAACAGGGTTTT ACCCTGTATGTTTTAAATATGATCATAA CTAAATCGGTTGTAAGTACGGTGTCTGGAGGCATA CTCAGAGAGTTCCATATAACAGATAACGG AGCAAAACCAATTCTGCGGAACACTTCA	AAAAAAGTTTGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCCTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGGGCTTGAGATGGCAGATACTTGA CAGTTTTCAGACAACATACCTTATGCGATTGATTCATTAGA ATTGCCTTTAGAAATTCCGACGTTGGGAAGAAAAATC AGGTTGAGGCAGGTCACGCCAGCCATTGACAGG CCGCCAGCCATTGCAACAG GAAATACCTACACAGGGAACTCAAACTATCGGCCTGCTCATG	TGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGCAAAATATCT CATAGCTTCGGGAAACAAAGAAA TGCTGCATTGTAAACGTTA TTCGCCAAATAATTCGCGT GACGACAAACAAACGGCCGG CGCTAGGAATGTAAAGGACTAAATCGGAACGAAAGGAGCGGG AAAACCAGCAGAAGATAAAA
CTCATATATAAGAGGTCATTTAGTTITG AGGATAATGGCTTAGAGCTAGCGAGAG AGAAGCCCAATATAATGCTGTAACGACGA CTTTTTTTAGAAGGGCATGAGTAAACAGGGTTTT ACCCTGTATGTTTTAAATATGATCATAA CTAAATCGGTTGTAAGTACGGTGTCTGGAGGCATA CTCAGAGATTCCATATAACAGATAACGG AGCAAAACCAATTCTGCGAACACATTCA GCAAGTAACACACTCCATCATGGT	AAAAAAGTTIGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCCTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGGGCTTGAGATGGCAGATACTTGA CAGTITTICAGACAACATACCTTATGCGATGATTCATTAGA ATTGCCTTTAGAATTTCGACGTGGGAAGAAAAATC AGGTTGAGGCAGGTACCGCACGCATTGACAGG CCGCCAGCCATTGCAACG GAAATACCTACACAGGGAACCCGAACTAAACTA	TGTTCCAGTTTGGAGAAAAATCT           CGAATATGGTTTGCAAAATATCT           CATAGCTTCGGGAAACAAAGAAA           TGCTGCATTGTAAACGTTA           TTCGCCAAATAATCGGCGT           GACGAAACAAACAGGCGG           CGCTAGGAATGTAAAGGACTAAATCGGCAG           CGCTAGGAATGTAAAGGACTAAATCGGGAACGAAAGGAGGGGG           AAAACCAGCAGAAGATAAAA           TGTTCCAGTTTGGAGAAAAAATCT-Cy5
CTCATATATAAGAGGTCATTIAGTTITG AGGATAATGGCTTAGAGCTAAGCGAGAG AGAAGCCCAATATAATGCTGTAACGAGGA CTTTTITTTAGAAGGGCATGGAGTAAACAGGGTTTT ACCCTGTATGTTTTAAATATGATCATAA CTGAAGTGTGTAGTAGTACGGTGTTGGAGGCATA CTCAGAGATTCCATATAACAGATAACGC AGCAAAACCAATTCTGCGAACACATTCA GCAAGTAACACATCCATCAGTGG ATACAGGTTTAGTTTGACCATCAGTTGA	AAAAAAGTITGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCCTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGGGCTTGAGATGCAGATACTTGA CAGTITTICAGACAACATCACCTTATGCGATGATTCATTAGA ATTGCCTTTAGAATTTCGACGTGGGAAGAAAAATC AGGTTGAGGCAGGTCACCGCCAGCATTGACAGG CCGCCAGCCATTGCAACAACA GAAATACCTACACAGGGAACCCAAACTATCGGCCTGCTCATG TTGAGCCATTGAGGAAGGAACCGGTATTTTTAT ACCATTAATGGTTTACCAGCGCTTGCGGGTATTAA	IGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGCAAAATATCT CATAGCTTCGGGAAACAAAGAAA TGCTGCATTGTAAACGTTA TTCGCCAAATAATTCGCGT GACGACAAACAAACGGCGG CGCTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGCGGG AAAACCAGCAGAAGATAAAA TGTTCCAGTTIGGAGAAAAATCT-Cy5 CGAATATGGTTTGCAAAAATCT-Cy5
CTCATATATAAGAGGTCATITAGTITTG AGGATAATGGCTTAGAGCTAGCGAGAG AGAACCCAATATAATGCTGTAACGACGA CITTITTITAGAAGGGCATGAGTAAACAGGGTTTT ACCCTGTATGTTTAAATACGGTGTCTGGAGGCATA CTCAAGAGTTCCATGTAAGTACAGGTAACGG CTCAGAGATTCCATATAACAGATAACGG AGCAAAACCAATTCTGCGAACACTTCA GCAAGTAACACACTCCATCATGGT ATACAGGTTAGTTGACCATCAGGTG TAGCAGGTTAGTTGACCATCAGGTATTACAG	AAAAAAGTITGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCCTTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGGATTGAGGCTTGGCTT	TGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGCAAAATATCT CATAGCTTCGGAAACAAAGAAA TGCTGCATTGTAAACGTTA TTCGCCAAATAATTCGCGT GACGACAAATAATTCGCGT GACGACAAACAAACGGCGG CGCTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGCGGGG AAAACCAGCAGAAGATAAAA TGTTCCAGTTTGGAGAAAAAATCT-Cy5 CGAATATGGTTTGCAAAATATCT-Cy5 CATAGCTTCGGGAAACAAAGAAA-Cy5
CTCATATATAAGAGGTCATITAGTITTG AGGATAATGGCTTAAGGCTATAGCGAGAG AGAAGCCAATATAATGCTGTAACGACGA CITTITTTAGAAGGGCATGAGTAAACAGGGTTT ACCCTGTATGTTTTAAATATGATCATAA CTAAATCGGTTGTAAGTACGGTGTCTGGAGGCATA CTCAGAGATTCCATATAACAGATAACGGC AGCAAAACCAATTCGGCAACACATTCA GCAAGTAACACATTCCATCATGGT ATACAGGTTAGCATTAGCTGCACAGTTGA TAGTAGTAGCATTAGCTATGGCAATGGTATTACAG CGCGAGCTGAAACGTTGGTGTAGA	AAAAAAGTITGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCCTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGGGCTTGAGATGGCAGATACTTGA CAGTITTTCAGACAACATACGTATGCGATTGATTCATTAGA ATTGCCTTTAGAATTTCGACAGTGGGAAGAAAAATC AGGTTGAGGCAGGTCACGCCAGCCAGCGAGAAAAATC GAAATACCTACACAGGGAACTCAAACTATCGGCCTGCTCATG TTGAGCCATTGAGGGGAGGG	IGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGCAAAATATCT CATAGCTTCGGGAAACAAAGAAA TGCTGCATTGTAAACGTTA TTCGCCAAATAATTCGCGT GACGACAAACAACCGGCG CGCTAGGAAGTATAAACATAATCGGAACGAAAGGAGCGGGG AAAACCAGCAGAAGAAAAATCT-Cy5 CGAATATGGTTGGCAAAATATCT-Cy5 TGCTGCGATTGGAAACAAAGAA-Cy5 TGCTGCATTGTAAACGTTA-Cy5
CICATATATAAGAGGICAITTAGITITG AGGATAATGGCTTAGAGCTAAGCGAGAG AGAAGCCAATATAATGCIGTAACGAGGA CITITITTAGAAGGGCATGAGTAAACAGGGITIT ACCCIGTATGITITAAATATGATCATAA CICAAGAGATTGCATATAACAGATAACGGC CICAGAGAATCCATTGAGAACACGGC AGCAAAACCAATTCGGCGAACACATTCA GCAAGTAACACATCCATCATGGT ATACAGGTTAGTITGACCATCAGTTGA TAGTAGTAGCATTAGATTICGCAAATGGTATTACAG CGCGAGCTGAAACGTIGGTGTAGA TGGCGCGGCAACAGGCCACCCGCCGCGCTTAA	AAAAAAGTITGGCTAATAACCAATACAAATCCAAAATAATTG AAGGTATGGGACCCTCAATAAGGCTTGCCAACACTCAAC CGTTGAGAATGAGGGCTGGGCT	TGTTCCAGTTTGGAGAAAAATCT           CGAATATGGTTTGGAAAATATCT           CATAGCTTCGGGAAACAAAGAAA           TGCTGCATTGTAAACGTTA           TTCGCCAATATATCGGCGT           GACGACAAACAAAGAAA           GACGACAAACAAGAGACGACGAACGAAAGGAGGGGG           AAAACCAGCAGAAGATAAAA           TGTTCCAGTTTGGAGAAAAATCT-Cy5           CGAATATGCTTGGAAACAAAAAAAACTC-Cy5           TGCTGCATTGTAAAGCAACAAAGAACAACAAGAACGACGACGACGACGACG
CTCATATATAAGAGGTCATTIAGTTITG AGGATAATGGCTTAGAGCTATAGCGAGAG AGAAGCCAATATAATGCTGTAACGAGGA CTTTTTTTAGAAGGGCATGAGTAAACAGGGTTTT ACCCTGTATGTTTTAAATATGATCATAA CTAAATCGGTTGTAAGTACGGTGCTGGAGGCATA CTCAGAGATTCCATATAACAGATAACGC AGCAAAACCAATTCGTGCAACACATTCA GCAAGTAACACATCCATCATGGT ATACAGGTTAGTTIGACCATCAGGT ATACAGGTTAGTTIGACCATCAGTGA TAGTAGTAGCATTAATTICGCAAATGGTATTACAG CGCGAGCTGAAACGTTGGTGTAGA TGCGCCGCTACAGGGCCAACACCGCCGCTTAA GACTCACGCTAGAAAGCCCTAAAGTCAAGTTTTITGGGGTCA	AAAAAAGTITGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCCTCATAAGGCTTGCCCTGCAACACTCAAC CGTIGAGAATGAGGCTGGGCTTGAGGTGGACGAGAATACTTGA CAGTITTICAGACAACATACCTTATGCGATGATTCATTAGA ATTGCCTTTAGAATTTCGACGTTGGGAAGAAAAATC AGGTGAGGCAGGTCACCGCCAGCATTGACAGG CCGCCAGCCATTGCAACA GAAATACCTACACGGGGAACCGAACTACAACCTATCGGCCTGCTCATG TGAGCCATTGAGGGAGGGAACCGGAATTTTTTAT ACCATTAATGGTTTACCAGCGCTTGCGGGTATTAA ATCGATTACGGGAATCGACGCTTGCGGGTATTAA ATCGATTACAGGAAACTACAGGGTCAACGAACAAA GCCTTTACATACATAAGGTGTAACGAGGAAACAA GGTCATAAAGACTCCTTATTAAAACAACGCGCAGAAC AAAATCAAAAGCCCATATTAAAACAACGCGCAGAAC	IGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGCAAAATATCT CATAGCTTCGGGAAACAAAGAAA TGCTGCATTGTAAACGTTA TTCGCCAAATAATCGCGT GACGACAAACAAACGGCGG CGCTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGCGGG CGCTAGGAAGATAAAA TGTTCCAGCTTGGAGAAAAATCT-Cy5 CGAATATGGTTGCAAAATATC-Cy5 CGAATATGGTTGCAAAATATC-Cy5 TGCTGCAATGATACGTA-Cy5 TGCCGCAATAATCGCGT-Cy5 GACGACAAACAAACGGCGC-Cy5
CTCATATATAAGAGGTCATITAGTITTG AGGATAATGGCTTAGAGCTATAGCGAGAG AGAACCCAATATAATGCTGTAACGACGA CITTITTITAGAAGGGCATGAGTAAACAGGGTTTT ACCCTGTATGTTTAAATATGATCATAA CTCAGAGATTCCATATAACAGATAACGGC CTAAATGGGTTGTAGGTACGGGTGTCTGGAGGCATA CTCAGAGATTCCATATAACAGATAACGGC AGCAAACCAATCTGCGAACACATCA GCAAGTAACACACTCCATCATGGT ATACAGGTTAGTTGGCAACACTGGT TAGCAGGTTAGTTGGCAACGGTATACAG CCGCGGACAGGGCCACCCGCCGCGCTTAA GCACCCCGCTAAAGGGCCCCTAAAGTTTTTGGGGTCA ATCCAGGCTATGCCTGCGACATAGCTAGTTCGCGCA	AAAAAAGTITGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCCTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGGGCTTGAGATGGCAGATACTTGA CAGTITTICAGACAATGACCTTGAGGGAAGAAAAATC AGGTTGAGGCAGGTCACCGCAGCATTGATCAGG CCGCCAGCCATTGCAACAG GAAATAACCTACACAGGGGAACCCAAACTATCGGCCTGCTCATG TTGAGCCATTGGAGGGAGCGCAGCGTATTTAT ACCATTAATGGTTTACCAGGGCATCGGGAATTAA ATCGATACCAGGGAATCAGCCTACGGGTATTAA ATCGATACAGGGAAGGGA	TGTTCCAGTTTGGAGAAAAATCT           CGAATATGGTTTGGAAAAATATCT           CATAGCTTCGGGAAACAAAGAAA           TGCTGCATTGTAAACGTTA           TTCGCCAAATAATCGCGT           GACGACAAACAAACGGCGG           CGTTAGGAATGTAAACGTTA           TTCGCCAAATAATCGCGT           GACGACAAACAAACGGCGG           CGTTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGCGGGG           AAAACCAGCAGAAGATAAAA           TGTTCCAGTTTGGAAAAAAATCT-Cy5           CGAATAGGTTGCAAAAAAAACAAAGAAA-Cy5           TGCGCAATGTAAACGGTCAG-Y5           TGCGCAAAAAATCTCCy5           GACGACAAACAAACGGTCG-Cy5           CGCTAGGAATGTAAAGGACCACGA-Y5           CGCTAGGAATGTAAAGGACCAACGA-Y5
CTCATATATAAGAGGTCATITAGTTITG AGGATAATGGCTTAGGGTCATTAGTTITG AGAAGCCAATATAATGCTGTAACGAGGA CITTITTTAGAAGGGCATGAGTAAACAGGGTTTT ACCCTGTATGTTTAAATATGATCATAA CTAAATGGTTGTAAGTACGGTGTCTGGAGGCATA CTCAGAGATTCCATATAACAGATAACGGC AGCAAAACCAATTCTGCGAACACATTCA GCAAGTAACCAATTCGTGGAACACATTCA GCAAGTAACCACTCCATCATGGT ATACAGGTTAGTTGACCATCAGGTGA TAGTAGTAGCATTAGCTGGCAGAATGGTATTACAG CGCGAGCTGAAACGTTGGTGTAGA TGCGCGCGCTACAGGGCCACCCGCCGCGCTTAA GACTCACGCTAAGAGCCCTAAAGTCAAGTTTTGCGGGTCA ATGCTAGCTATTACTCGCACTTAACAAGTCCCCCCA	AAAAAAGTITGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCCTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGGGCTGGACGAGAGCAGATACTTGA CAGTITITCAGACAACATACCTTATGCGATGATTCATTAGA ATTGCCTTTGAAATTTCGACGGTGGGAAGAAAAATC AGGTTGAGGCAGGCACGCCAGCCAGCGGATTGATCAGCGG GAAATACCTACACAGGGGACCCGAACTATCGGCCTGCTCATG TTGAGCCATTGCAACAG GAAATACCTACACAGGGGAGCCCGGGTATTAA ATCGATACAGGGAAGGGA	TGTTCCAGTTTGGAGAAAAATCT           CGAATATGGTTTGGAAAATATCT           CATAGCTTCGGGAAACAAAGAAA           TGCTGCATTGTAAACGTTA           TTCGCCAATATATTCGCGT           GACGACAAACAAACGGCGG           CGCTAGGAAACATTAATCGGAACCAAAGGAACGAGAGGGGG           AAAACCAGCAGAAGATAAAA           TGTTGCATTGGAAACATAATC-Cy5           CGATAGGATATATTGGCAAAATATC-Cy5           TGCTGCGAATATAATCGGAACAAAGAAA-Cy5           TGCTGCCAAATAATCGCGT-Cy5           GACGACAAAACGGCGCG-Cy5           GACGACAAAACAGCGCGCG-Cy5           GAACACAGCAGAAGAATAATCGCASAACGAACGAAGGAGCGGGG-Cy5
CICATATATAAGAGGICATITAGITITG AGGATATAGAGGICTIAGGAGGICAGICAGGAG AGAAGCCAATATAATGCIGTGACGAGGA CITTITITTAGAAGGGCATGAGTAAACAGGGITTT ACCCIGTATGITTAAATATGATCATAA CICAAATGGTTGTAAGTACGGIGTGTGGAGGCATA CICAAGAGATICCATCATAGACAGATACGC AGCAAAACCAATICCATCATGGT CICAGAGAGATCCATTCAGGGACACATICA GCAAGTAACCACTCCATCATGGT ATACAGGTTAGTTGACCATCAGGTGA TAGTAGTAGCATTAGTTGGCAGCGCGCTAA GACICACGCTACAGGGCCACCCGCCGCGCTAA GACICACGCTACAGGGCCACCGCGCGCTAA GACICACGCTAGAAGCCCTAAGTCAGGGCCA ATCGTAGCATTAGCTGCGGCATTAACCAGTTTGGCGGCCA ATCGTAGCATTAGCGGCGCCCCCGGCGCTAA GCACTCACGGCTATAGCGCGCCTTAACCAATGCCCGCCG CGTGGATATCATCGTACCAGGTGTGTGCCGCCGCGCGCGAGTGAAAT CICAAAGGGTAATCAGACGTTGACCATCGTAAGCAAATCCC	AAAAAAGTTIGGCTAATAACCAATACAAATCAATAATTG AAGGTATGGGAACCTTAATAAGGCTTGCCAAACACTCAAC CGTTGAGAATGAGGGCTGGGCT	TGTTCCAGTTTGGAGAAAAATCT           CGAATATGGTTTGGAAAATATCT           CATAGCTTCGGGAAACAAAGAAA           TGCTGCATTGTAAACGTTA           TTCGCCAAATATCGCGT           GACGACAAACAAAGGAGCGGGG           GACGACAAACAAGGAGCGGGG           GACGACAAACAAGAAAA           TGTTCCATTGTAAACGTTA           TGCGCAATGAAACAGTAAACGCGGGG           GACAGCAGAAGATAAAA           TGTTCCAGTTTGGAAGAAAAAAAAA           TGTTCCAGTTTGGAAAAATATCT-Cy5           CGAAAGTTGGAAACAAAAAAAAAAAACy5           TGCTGCATTGTAAACGTA-Cy5           TTCGCCAAATAATTCGCGT-Cy5           GACGACAAACAAACAAACAAACAAACAAAGAAACGAACG
CTCATATATAAGAGGTCATITAGTITTG AGGATATATGAGGTCATAGGTAGGAGA AGAGCCAATATAATGCTGTAACGAGGA CTITITTTAGAAGGGCATGAGTAAACAGGGTTT ACCCTGTATGTTTAAATATGATCATAA CTAAATGGTTGTAAGTACGGTGCTGGAGGCATA CTCAGAGATTCCATATAACGATAACGGC AGCAAAACCAATCCGATACACGGC AGCAAAACCAATCCGATCACAGGTG ATACAGGTTAGTTTGACCATCAGTGA TAGTAGTAGCATTAGTTTGACCATCAGTGA TAGTAGTGACGTGAAACGTGGAGTAGA CGCGAGCTGAAACGTGGTGTAGA TGCGCCGCTACAGGGCCACCCGCCGGCGTAA GCCCCGCTGAAAGGCCAACCGGCGCTAA GCCCAGCTGAAAGCCCTAAAGTCAAGTTTTTGGGGTCA ATCGTAGCTATTGCCTGCGGCTAAAGTCCGCCGCCA CCGGGGTGAAAGCCCTAACGTCGCCCGCCCA CCTGAGTATTAATCGTACCAGGGTGTACCATCGTGAAGCAAATCC TTCAAAGGGTAATCAGACGTTGAACTCGGCTGAACTCC TTCAAAGGGTAATCAGACGTTGAACTCGGCTGAACTCGC	AAAAAAGTTIGGCTAATAATTACCAAAATCAATTG AAGGTATGGGAACCITCAATAAGGCTTGCCAAACATCAAATCA CGTIGAGAATTGAGGCTTGGGCTTGAGATGGCAGAATACTGA CAGTITTICAGACAACATACCTTATGCGATIGATTCATTAGA ATTGCCTTTAGAATTTCGACGTTGGGAAGAAAAATC AGGTTGAGGCAGGTCACGCCAGCATTGACAGG CCGCCAGCCATTGCAACG GAAATACCTACACAGGGAACCCAAACTATCGGCCTGCTCATG TTGAGCCATTGGGAACG CACGCAGCATTGCAACG CCGTCAACAGGGAATAGGTATTTTGCCAACGGGTATTAA ATCGATACACGGAATAAGTTTTTGCCACGGGTATTAA ATCGATACACGGAATAAGTTTTTGCCACGGGTATTAA GCCTTTACATACATAACATA	TGTTCCAGTTTGGAGAAAAATCT           CGAATATGGTTTGGAAAATATCT           CATAGCTTCGGGAAACAAAGAAA           TGCTGCATTGTAAACGTTA           TTCGCCAATATATCGCGT           GACGACAAACAAAGAAA           GACGACAAACAAGGCGG           CGTAGGAATGTAAAGGTTA           TGCTGCATTGTAAACGTTA           TGCGCAATAATCGGCGG           CGTAGGAATGTAAAGGACTAAATCGGGAACGAAAGGAGGGGGG           AAAACCAGCAGAAGATAAAA           TGTTCCAGTTTGGAGAAAAATCT-CyS           CGATAGCTTGGGGAAACAATCAAAAAAAACAAGGAAC-CyS           TGCGCAATATGTTGTAAACGTA-CyS           TTCGCCAAATATGTCCGG-CyS           GGCTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGCGGGG-CyS           CGTAGGAAGTGTAAAGCACTAAATCGS
CICATATATAAGAGGTCATITAGTITTG AGGATAATGGCTTAAGAGCTATAGCGAGAG AGAGCCCATATAATGCTGTAACGAGGA CITTITTTAGAAGGGCATGAGTAAACAGGGTTTT ACCCTGTATGTTTAAATAGCGGTGTCTGGAGGCATA CICAAATGGTGTAAGTACGGGGGGCGCGGCGCGGCGCGGC	AAAAAAGTITGGCTAATAATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCTTCAATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGGGCTTGAGAGTGGCAGAATACTTGA CAGTITTICAGACAACATACCTTATGCGATGATTCATTAGA ATTGCCTTTAGAATTTCGACGTTGGGAAGAAAAATC AGGTTGAGGCAGGTCACCGCCAGCATTGACAGG CCGCCAGCCATTGCAACAG GAAATACCTACACGAGGGAACCGAACTATGGGCCTGCTCATG TTGAGCCATTGAGGGAGGGAACCGGTATTTTTAT ACCATTAATGGTTTACCAGCGCTTGCGGGTATTAA ATCGATACACGGAATAAGCTTTTTATCACAACAA GCCTTTACATACATAAGGTGTAACGAGGGAACCGAAAAAA GCCTTTACATACATAAGGTGTAACGAGGAGAAAAAA GCCTTTACATACATAAGGGTGTAACGAGGAGAAAAA GGTCATAAAGACTCCTTATTAAAACAAGCGCAGAAC AAAATCAAAACGCCAATAATAATTTTGTTATTCTGT AGAGCCGGTAAGCAGATAGCCAACATGAACTGAATTAACAA ATTGATTACATTGGCAAGAT GCAATTAATGGCAATAGCAATGACAACAACAACAA	TGTTCCAGTTTGGAGAAAAATCT           CGAATATGGTTTGGAAAATATCT           CATAGCTTCGGGAAACAAAGAAA           TGCTGCATTGTAAACGTTA           TTCGCCAAATAATCGCGT           GACGACAAACAAAGAAA           GACGACAAACAAAGGAGGGG           CGCTAGGAATGTAAAGGTTA           TTCGCCAAATGTAAAGGTAGGGGG           AAAACCAGGAGAAGATAAAA           TGTTCCAGTTTGGAAAAAATCT-CyS           CGAATAGCTTGGGAAACAAAGAAA-CyS           TGCGCAATGAAACAAAGAAA-CyS           TGCGCAATGAATATCGGCGC-CyS           GACGACAAACAAAGGAGCCGGG-CyS           CGCTAGGAAGATCAAAGCACTAAATCGGAACGAAAGGAGCGGGG-CyS           AAAACCAGCAGAAGATAAAA-CyS
CICATATATAAAGAGGICAITTAGITITIG AGGATAATGGCTTAGAGCITAGCGAGAG AGAAGCCAATATAATGCITGTAACGAGGA CITITITITTAGAAGGGCATGAGTAAACAGGGITIT ACCCIGTAGTGTAAGTACGGICTIGGAGGCATA CICAGAGAGTICCATATAACAGATAACAGGC AGCAAAACCAATTCIGCGAACACATICA GCAAGTAACCAATTCIGCGAACACATICA GCAAGTAACCAATTCIGCGAACACATICA GCAAGTAACCAATTCIGCGAACACATICA GCAAGTAACCAATTCIGCGAACACATICA GCAGGAGGTGAAACGTIGGTGTAGGA TAGTAGGATTAGCATTACAGGTGAGA TAGTAGGATTAGCATTACAGGTGAGA TGCGCGCGCACAGGGCCCCCCGCGCGTAA GCACCACGCGAAACGCTIGGTGTGACAGTITITIGGGGTCA ATCCAGGCTAATGCCACTTAACGACGGCGCA ACCGTAGCATTACATCGCACTTAACGACGGCCA CGTGATATTAATCGACAGGGTGTACCACTIGAGCAAATCC CTGAAAGGGTAATCAGACGTTGTACCACTIGC CGGTGTTATTAATTCAACGCGTGTAACTCGCGCGACTIGC CIGTTTATTAATTCAAAGGCGATTGACATCGGCGGCCTGCCCGGGGCG CGGTTATTAATTCAAAGGCCATTGCACCACTCGCTGACGGCG CGGTTATTAATTAAAGGCGATTGACCACTCGTGAGCGCCTGCCCCCCCC	AAAAAAGTITGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCCTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGGGCTTGAGAGGCGCAGATACTGAA CAGTITTICAGACATGAGCCTGGGCATGATTCATTAGA ATTGCCTTTGAAATTCGACATGGGCAGGAAAAATC AGGTTGAGGCAGGCACGCCAGCATTGATGACGGG GAAATACCTACACAGGGGAACCAACTGACGGCCCGCCATGGATGAACCACGGGAACCAACAG GAAATACCTACACAGGGGAACCCAACTATCGGCCTGCTCATG TTGAGCCATGAGGGAGGGAACCGGTATTTATA ACCATTAATGGTTTACCAGGCGCTGCGGGTATTAA ATCGATTACGGAACTCAAACTATCGACCAGGAAC GGTCATACAGGGAAGCGCAGCGGAATTTATCGT AGAGCCAGCAATAAGTTTTTTGTATTCTGT AGAGCCGGAAATAGCCAATAGCCAGGAAC AAAATCAAAACGCCAATAGCACTGAATTAACCAG ATTATTACATTGGCAAGCAATAGCCAGGAATCGGCAGAAC ATTATTACATTGGGAAGCAATAGCCAGGAATCGGCGGTATTAA ATTATTACATTGGGAAGCAATAGCCAGGAATCGCGGCAGTAA CTCAGAGGAAATAGCAATAGCCAGGAATCGCCGCAGAAC AAATCAAACGGCAATAGCCAGCAATGACCGGATAACTGGGAGAATGGCGGATAAGCAGCGGATAGCGGCGGAATGGCGGCAATGGCGGCAATGGCGGCAATGGCGGCAATAGCCGGTATTAATTT GGGACATGGCGTTTTCATCGCGCCCCAAATCGCGCGCAATGATGGAAC AAATGAATGGGATTACCCGCGCCCAAATCGCGCGCGAATGGCTAGGAAGAC	TGTTCCAGTTTGGAGAAAAATCT           CGAATATGGTTTGGAAAAATATCT           CATAGCTTCGGGAAACAAAGAAA           TGCTGCATTGTAAACGTTA           TTGCGCCAATATATTCGCGT           GACGACAACAACGGCGG           CCATAGGTATGTAAACGTA           TGCTGCATTGTAAACGCACATAATCGGAACGAAAGGAGCGGGG           AAAACCAGCAGAAGATAAAA           TGTTCCAGTTTGGAAGAAAATCT-Cy5           CGATATGGTATGGAAACAATCT-Cy5           TGCTGCGAAACAAAGAAA-Cy5           TGCTGCCAAATAATTGCGGT-Cy5           GACGACAAACAGCGGCG-Cy5           GACGACAAACAGAACATAATATCGGAACGAAAGGAGCGGGG-Cy5           AAAACCAGCAGAAGATAAAA-Cy5
CICATATATAAGAGGICATITAGITITG AGGATATAGAGGICATAGGICAGGAGA AGAGCCAATATAAGCITGIGAGGAGA CITTITTAGAAGGGCATGAGTAAACAGGGITTT ACCCIGTATGITTAAATATGATCATAA CICAATAGGITGITAGTACGGICGGGAGGCATA CICAGAGACTICCATATAACAGTACAGC AGCAAAACCAATICGGCAACACATICA GCAAGTACCAATICGGCAACACATICA GCAAGTACACACTCCATCATGGT ATACAGGITTGATGITGACCATCAGGTGA TAGTAGTAGCATTACTICGCAAATGGTATTACAG CGCGAGCIGAAACGTIGGIGTAGA TAGGAGTAGCATTACGCACAGGIGA CGCGGGCATACAGGCCCACAGGIGAA TACGAGCTATAGCATTAACAGTGCGCCA GACICACGCTACAGGGCCACCCGCCGCGCTTAA GACICACGCTACAGGGCCACTGCGCCTTAACAATGICCAGGICA ATGGTAGTATTACGACAGGCGTTAACAATGICCGCCA CGTIGATATTAACGACGTGAAGGICTGACCCCCGGGGGCAAATCC TIGATTTAATTAAAGAGCGTATAGACGTGACGGGCCACCCCCCGCGGCGAAACCC TIGATTTTAATTTAAAGAGCGATTGACCACTGGAGGGCC TAACCAAAAACAACAAACACACGCCGCCGCGGGCTGGCCGACTGGC TAACCAAAAACAACAAACACACGCGTGAACGTGGTGCTGGCC TAACCAAAAACAACAAACACACGCGTGTACCGAGCTGGACTGC	AAAAAAGTTIGGCTAATAACCAATACAAATCCAAAATAATTG AAGGTATGGGAACCITCAATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATGAGGCTIGGGCTIGAGATGCCAGAATACTGA CGTTGAGAAATGAGACATGCCAGCAGATACTGA ATTGCCTTTAGAAATTICGACGTTGGGAAGAAAAATC AGGTTTGAGGCAGGTCACGCCAGCATTGCGGGC GCGCCAGCCATTGCACGCGCACCTGACCAGG CCGCCAGCCATTGCACAGG GAAATACCTACACAGGGAACCCAAACTATCGGCCTGCTCATG TTGAGCCATTGCGAGGGAACCCGAACTAACCAGGCCCGCTCCTGG TTGAGCCATTGCGAGGGGAACCCGGTATTTAT ACCATTAATGGTTTACCAGCGCTGCCGGGTATTAA ATCGATACAGGGAATAGGTGTAACGGGCAGAAC GCCTTTACATACATAAGATGGTGTAACGGGCAGAAC AAAACCAAACGCCATTATCAGCGCAGAAC AAAACCAAACGCCATAATCAGCGCAGAAC CCGCGGAAAGCCCATAGCAACTCAACT	TGTTCCAGTTTGGAGAAAAATCT           CGAATATGGTTTGGAAAAAAATCT           CATAGCTTCGGGAAACAAAGAAA           TGCTGCATTGTAAACGTTA           TTCGCCAAATAATCGGCGG           CGCTAGGAAACAAAGAAA           GACGACAAACAACGGCGG           CGCTAGGAAGTAAAAGAAAA           TGTTCCAGTTTGGAAAGCACTAAATCGGAACGAAAGGAGCGGGG           AAAACCAGCAGAAGATAAA           TGTTCCAGTTTGGAAAAATAAAAAATCT-Cy5           CGATAGGCTTGGAGAAAAAAACAAA-Cy5           TGCTGCATTGTAAACGTTA-Cy5           TTCGCCAAATAATTCGGGCG-Cy5           CGCTAGGAAAGTAAAAGAAAA-Cy5           TGCGCAATATAATTCGGAACCAAAAGGAACGAAAGGAAGG
CICATATATAAGAGGTCATITAGTITIG AGGATATAGAGGTCATAGGGAGAG AGAGCCAATATAATGCTGTAACGAGGA CITTITITAGAAGGGCATGAGTAAACAGGGTTT ACCCTGTATGTTTAAATATGATCATAA CICAAATGGTTGTAAGTACGGTGCTGGAGGCATA CICAGAGAGTICCATATAACAGTACAGC AGCAAAACCAATTCCGCGAACACATTCA GCAAGTACCAATTCAGCGAACACATTCA GCAAGTAACACACTCCATCATGGT ATACGAGTTAGTITGGCAACAGTTGA TAGTAGTAGCATTAGTTIGGCAAATGGTATTACAG CGCGAGCTGAAACGTTGGTGTAGA TGCGCGCGCTACAGGGCCACCCGCCGCGCTAA GCCCAGCTGAAAGCCTTAACCAAGTTTTTGGGGTCA ATCCAGCGTAGAAGCCCTAAAGTCAAGTTTTTGGGGTCA ATCCTAGCTATTAGTTGCGCAACTGCCCCGCCGCCCCGCCCCGCCCCGCCCCGCCCCGCCCCGCCCC	AAAAAAGTITGGCTAATAACTATTACCCAAAATCAAATAATTG AAGGTATGGGAACCITCAATAAGGCTTGCCAACACTCAAC CGTIGAGAATGAGGGCTGGGCTIGAGAGGGCAGGAACACTGAA CAGTITTICGAGACATGACCITGAGGAGGGAGGAAAAAATC AGGTITGAGGCAGGTCACGCCAGCATTGACAGG CCGCCAGCCATTGCAACTGCGATGGCACAGG CCGCCAGCCATGGCAACG GAAATACCTACACAGGGGAAGGGAA	TGTTCCAGTTTGGAGAAAAATCT           CGAATATGGTTTGGAAAATATCT           CATAGCTTCGGGAAACAAAGAAA           TGCTGCATTGTAAACGTTA           TTCGCCAATATATCGGCG           GACGACAAACAAAGAAA           GACGACAAACAAGAAA           TGCTGCATTGTAAACGTTA           TTCGCCAAATAATCGGCGG           CGCTAGGAATGTAAAACGTCAAATCGGAACGAAAGGAGCGGG           AAAACCAGCAGAAGATAAA           TGTTCCAGTTTGGAGAAAAATCT-Cy5           CGATAGCTTGGGAAACAAAAAAAAC-Cy5           TGCTGCATTGTAAACGTACAY5           TTCGCCAAATAATCGGCGC-Cy5           GACGACAAGAAGAAAA-Cy5           CGTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGGCGGG-Cy5           CGCTAGGAAGATGTAAAGCACTAAATCGGAACGAAAGGAAGG
CICATATATAAAGAGGTCATITAGTITTG AGGATAATGGCTTAAGAGCTATAGGCGAGAG AGAGCCCATATAATGCTGTAACGAGAG CITTITTTAGAAGGGCATGAGTAAACAGGGTTTT ACCCGTGTATGTTTAAATACGGTGTCTGGAGGCATA CICAAGAGGTTGTAGATACGGTGTCTGGAGGCATA CICAGAGGATTCCATATAACGGTGACGCG AGCAAAGCAATCTGGCAACAATCA GCAAGGTAACACACTCCATCATGGT ATACAGGTTAGTTGGCAACAATGGTATTACAG CGCGGTAACACGTTGGTGTAGA TAGCAGGTTAGTTGGCACATGGTATACAG CGCGGCTGAAACGTTGGTGTAGA TGGCGCGCTAAAGGCCCCCAAGGTGATTACAG CGCGCGCTAAGGGCCCCCAGGCGTTAA GACTCACGCTAGAAAGCCCTAAAGTGGTATTACAG CGCGGCGCTAAGGGCCCCCAGGCGCCTAA GACCCACGCTAGAAAGCCCTAAAGTGGTATTACAG CGCGGGTAAGGGCCTGGCGGCGCTAA CGCGCGCGCTAAGGGCCCCCAGGGCCTAA CGCGGCGCTAAGGGCCCCCAGGGCCTAA CGCGCGCGCTAAGGGCCCCCAGGGCCTGGAGTGCA ATCGAGGTATTAATCGGCAACAGGGCCTGGCACTGC CGCGAGCGAACGCGCTGGCGCCCGGCGCCACCCCGCGCGCCACCCCGCGCGCCC CGTGATATTAATGCGCGCGCGCGCCGCGC	AAAAAAGTITGGCTAATAATTACCAAAATCCAAAATAATTG AAGGTATGGGAACCITCATAAGGCTTGCCCTGCAAACATCAAC CGTIGAGAATTGAGGCTTGAGGCTGGAGTGGAGGAGAATACTGA CAGTITTICAGACAACATACCTTATGCGATIGATTCATTAGA ATTGCCTTTAGAATTICGACGTTGGGAAGAAAAATC AGGTTGAGGCAGGTACCCCAGCATTGACAGG CCGCCAGCCATTGCAACCGATGGCAGGGACCAATGGACACGGGCACCCAATGACGATGGCAGGTCACGCCAGCATTGAAGGG GAAATACCTACACGAGGGAACCCAAACTATCGGCCTGGCTGG	TGTTCCAGTTTGGAGAAAAATCT           CGAATATGGTTTGGAAAATATCT           CATAGCTTCGGGAAACAAAGAAA           TGCTGCATTGTAAACGTTA           TTCGCCAAATAATCGGCGG           GACGACAAACAAAGAAA           TGTTCCAGTTGTAAAGGTA           TGTCCAGTTGTAAAGGACTAAATCGGAACGAAAGGAGCGGG           AAAACCAACGAGAAGATAAAA           TGTTCCAGTTTGGAAAAAAAAAAAA           TGTTCCAGTTTGGAAAAAAAATCT-CyS           CGCTAGGGAAGATAAAAA           TGTCCAGTTGGGAAACAAAGAAA-CyS           TGCGCAATGATAATCGGCGC-CyS           CGCTAGGAAACAAAGAAACAYS           TGCCCAATGATTGAACGCT-CyS           GACGACAAACAAACGAGCACTAAATCGGAACGAAAGGAGCGGGC-CYS           AAAACCACAGCAGAAGATAAAA-CYS
CICATATATAAGAGGTCATITAGITITG AGGATATATGAGGGTCAITTAGITITG AGAGCCCAATATAAGCITAGCGAGAG CITTITTITAGAAGGGCATGAGCAAGGGGT CITTITITTAGAAGGGCATGAGTAAACAGGGTTT ACCCIGTATGTTTAAATATGATCATAA CIAAATCGGTTGTAGTAGCAGCGAGCATA CICAGAGATTCCATATAACAGTAACAGC AGCAAAACCAATTCIGCGAACACATTCA GCAAGTAACCACTCCATCATGGT ATACAGGTTAGTTGGCACACAGTG ATACAGGTTAGTTGGCACACAGTG ATACAGGTTAGTTGGCAGCAGCGC AGCGAACCAATTCIGCGAACACATTCA GCAAGTAACACACTCCATCATGGT ATACAGGTTAGTTGGCCATCAGTTGA TAGTAGTAGCATTACTTGGCAATGGTATTACAG CGCGAGCTGAAACGTTGGTGTGAGA TGCGCGCGCTACAGGGCCCCAACGCGCTTAA GACTCACGCTAACAGGCCCTAAAGTCAGTTTTGGGGGCA ATCCTAGGCTATGCCTGCCCAGGGTCTGCACGCCA CGTGATATTAATCGCACCCAAGTTGTGCGCCA CGTGAATTAATTGCCGCCCACTTGCACAGTGGTGGCAAATCC CTCAAAGGGTAATCAGACGTTGCACCCCGGGTGGACGCC CGTTTTATTAATTGCTGCGCCGCTACAGTGGCGGCGCCCCCGCGCTGA TTCTTAAGCAACAATCAAGCCGTACACTGGTGGGCGCGCCTCGGTAGCGC CGTTTTATTAATTCATCGCGCCACTCGCGCGCGCCCCCGGCGCAAATCC CTGTAAGCAACAACAAATCAAGCCGCTACGGCGGCGCCCCCGCGCGCG	AAAAAAGTITGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCTTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGAGCTTGAGAGGCGCAGATACTGA CGTTGAGAATTGAGGCTGGGCTTGAGAGGCGCAGATACTGA CAGTITTICAGACAACATCACCTTATGCGATGATTCATTAGA ATTGCCTTTGAAATTCCGACGGTGGGGAAGAAAAATC AGGTTGAGGCAGGTCACCGCCAGCATTGACAGG CCGCCAGCCATTGCAACAG GAAATACCTACACAGGGGAACCGAACTATCGGCCTGCTCATG TTGAGCCATGAGGGAGGGAACCGGTATTTTTTAT ACCATTAATGGTTIACCAGGGCTTGCGGGTATTAA ATCGATTAATGGTTIACCAGGGCTTGCGGGTATTAA ATCGATTACAGGGAAGGGA	IGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGGAAAAAATATCT CATAGCTTCGGGAAACAAAGAAA TGCTGCATTGTAAACGTTA TTCGCCAAATAATTCGGGT GACGACAAACAAACGGCGG CGCTAGGAAATGTATAAGCACTAAATCGGAACGAAAGGAGCGGGG CAAAACCAGCAGAAGATAAAA TGTTCCAGTTIGGAGAAAAATCT-CyS CGAATATGGTTGGGAAACAAATATCT-CyS CGAATATGGTTGGGAAACAAATAATC-CyS TGCTGCGATTGTAAAGCATAAAGAAA-CyS TTCGCCAAATAATTCGCGT-CyS GACGACAAACAAACGGCGGG-CyS CGCTAGGAATCTAAAGCACTAAATCGGAACGAAAGGAGCGGGG-CyS AAAACCAGCAGAAGATAAAA-CyS
CICATATATAAGAGGTCATITAGTITIG AGGATATATGAGAGCTAAGGCTATAGTITIG AGAAGCCAATATAATGCTGTAACGAGGA CITTITITAGAAGGGCATGAAGTAAACAGGGTTT ACCCTGTATGTTTAAATATGATCATAA CICAAGAGATTCCATATAATACGATAAA CICAAGAGATTCCATATAATACGGTAGAGCATA CICAAGAGATTCCATATAACAGTAACGC AGCAAAACCAATTCGGCAACACTTCA GCAAGTAACCAATTCGCAACAGTGA AGCAAAACCAATTCGCACAATGGTATTACAG CAGGAGTGAAAACGATGGTGTGAGA TAGTAGTAGCATTAATTGGCAAATGGTATTACAG CGCGAGCTGAAAGCGTGAGGTGAG	AAAAAAGTTIGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGAACCTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATGAGGGCTGGGCT	IGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGGAAAAAAATCT CATAGCTTCGGGAAACAAAATATCT TGCTGCATTGTAAACGTTA TTCGCCAAATAATTCGCGT GACGACAAACAAACGGCGG CGCTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGCGGG CGCTAGGAATGTAAAGCACTAAATCGCAACGAAAGGAGCGGGG AAAACCAGCAGAAAATATCT-Cy5 CGAAATATGGTTTGCAAAATATCT-Cy5 CATAGCTTCGGGAAACAAAAAAAACY5 TTCGCCAATATATTCGCGT-Cy5 GACGACAAACAAACGGCGC-Cy5 CGCTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGCGGGC-Cy5 AAAACCAGCAGAAGATAAAA-Cy5
CICATATATAAGAGGTCATITAGTITIG AGGATATAGAGGTCATAGGGTCAITTAGTITIG AGAAGCCAATATAATGCITGTAACGAGAG CITTITITAGAAGGGCATGAAGTAACAGGGTTT ACCCTGTATGTTTAAATATGATGATAA CITAAATGGTTGTAAGTACGGTGGTGGGAGGCATA CICAGAGAGTICCATATATACGGTGACGGAGGCATA CICAGAGAGTTCCATATAACAGATAACGC AGCAAAACCAATTCTGCGAAACACTTCA GCAAGTAACCACTCCATCATGGT ATACAGGTTAGTTGGCAACACATTCA GCAAGTAACACACTCCATCATGGT ATACAGGTTAGTTGGCAGCAGGTGA TAGTAGTAGCATTAATTCGCAAATGGTATTACAG CGCGAGCTGAAAGCGTTGGTGTAGA TGCGCCCGCTACAGGGCCACCCGCCGCGCTAA GCACAGCTGAAAGCCTAAAGCCTAACGAGTTTTTGGGGTCA ATCCTAGGCTATGGCTGGCGCACCCGCCGCCCCGCC	AAAAAAGTTIGGCTACATCATTACCCAAAATCCAAAATAATTG AAGGTATGGGACCTTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATTGAGGCTTGGGCTTGAGATGGCAGAGTACTTGA CAGTTTITCGAGCAACATGCCTTGGGGAAGGAAAAATC AGGTTTGAGGCAGGTCACGCCAGCATTGACAGG CCGCCAGCATTGCGAACG GAAATACCTACACAGGGAAGCCAACTCAAACTATCGGCCTGCTCATG TTGAGCCATTGGGAACG GAAATACCTACACAGGGAAGCCAAACTAACCAGGC CCGCCAGCATTGGGAAGGGAA	IGTTCCAGTTTGGAGAAAAATCT           CGAATATGGTTTGGAAAATATCT           CATAGCTTCGGGAAACAAAGAAA           TGCTGCATTGTAAACGTTA           TTCGCCAAATAATCGGCG           CGGTAGGAAACAAGAAA           GACGACAAACAAACGGCGG           CGGTAGGAATGTAAACGTAAATCGGCAG           TGTTCCAGTTGGAAAGATAAAA           TGTTCCAGTTGGAAAGATAAAA           TGTTCCAGTTGGAGAAAAATCT-Cy5           CGAAGCTGGGAAACAAAAAAAACA-Cy5           TGCTGCATTGTAAAGCTTA-Cy5           TTCGCCAAATAATCGGGCG-Cy5           GACGACAAACAAGAAA-Cy5           TTCGCCAAATGTAAAGGACACTAAATCGGAACGAAAGGAGGCGGG-Cy5           CGGTAGGAAGATGTAAAGCACTAAATCGGAACGAAAGGAGGGGGG-Cy5           CGGTAGGAAGATGTAAAGCACTAAATCGGAACGAAAGGAGGCGGG-Cy5           CGGTAGGAAGATGAAAAA-Cy5           CGGTAGGAAGATGAAAA-Cy5
CICATATATAAAGAGGTCATITAGTITTG AGGATAATGGCTTAAGGCTATAGGTAGGAGG AGAGCCCAATATAATGCTGTAACGAGGG CITTITTTAGAAGGGCATGAGTAAACAGGGTTTT ACCCTGTATGTTTAAATATGATCATAA CICAGAGGATTCCATATAGCGTGTGTGGGAGGCATA CICAGAGATTCCATATAACGGTGCTGGAGGCATA CICAGAGATTCCATATAACAGATAACGG GCAAGTAACACATCTGCGAACAATCA GCAAGTAACACACTCCATCATGGT ATACAGGTTAGTTGGCAACAGGTG TATCAGGTTAGTTGGCAACAGTGG TATCAGGTTAGTTGGCAACAGGTGATACAG CGCGCGTAAAGGTGCCGCAGCGCGCGCAGA GCCCGCTGAAAGGTGGTGTGGA GCCGCGCGAAGGGCCCCCAGCGCGCGCAGA TGGGCCGCTAAGGGCCCCAGCGCCGCGCGCA CGTGAGCTATTGCCTGCGGCAGTTGAAGGATTTTGGGGGCA ACCGTAGCCTAAGGGCCCCAACAGTGGTTTGGGGGC ACCGACGCTAGAAGGCCCCAACGGCTTAA GACTCACGCTAGAAAGGCCCTAAGTCAGGTTTTGGGGGCA ACCGTAGCTATTGCCTGCGCGGGGCTTAA CCGAAGGGAATCAGGCGCCGACGCGCGGCGCAAC CGTGATATTAATCGTGCGCGGGGTTGAACATGCCGGGGGC CCGGTAGCTATTAATCGGCTACACATGGCGGGGGGCCGAACAACCC CTGTTATTTAATTTA	AAAAAAGTTIGGCTAATAATCCCAAAATCCAAAATAATTG AAGGTATGGGAACCITCAATAAGGCTTGCCCTGCAACACTCAAC CGTIGAGAATGAGGACTGGACTIGAGGAGGGCAGAATACTGA CAGTITTICAGACAATCCAACTTIGCGATIGATTCATTAGA ATTGCCTTTAGAATTICGACGTIGGGAAGAAAAATC AGGTTGAGGCAGGTCACCCCAGCATTGACAGG CCGCCAGCCATTGCAACG GAAATACCTACACAGGGGAACCCAAACTATCGGCCTGCTCATG TTGAGCCATTGGAGCAGGGAACCCAAACTATCGGCCTGCTCATG TTGAGCCATTGGAGGAGGGAACCCAAACTATCGGCCTGCTCATG TTGAGCCATTGGAGGAGGGACCCGGTATTTAT ACCATTAATGGTTTACCAGCGCTTGCGGGTATTAA ATCGATTAATGGTTTACAAGGGTGACGCAGAAC GCCTTTACATACAGGGAACCCAAACTATCGGCCTGCTGCAGGAAC CAAAATCCAAAAGACTCTTATAAACAACGGCGAGAAC AAAATCAAAACGCAATAAGTTTTTGTTATTCTGT AGAGCCGGTAAGCAGATAGCCAGAATAACCAGTAA CTCAGAGGAAATAGCAATAGCAACTGAATTAACAA ATTACTTACATTGGCAGAT GAAATTAATGCGTTTTACAACGAGCAGCAATAGCGATAACCAGTAA CTCAGAGGAAATAGCAATAGCAACTGAATTAACAA ATTACTTACATTGGCAGAT GAAATTAAATCAGATCAATTACGAGCAGTAACCAGGTAA AATGCAAAATCCGATTAACCAACGGCGAGAAC AAATGAAAACGCATTAACTATCCGCGCCAAATCGCGCTATGAGTGAG	IGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGGAAAAAATATCT CATAGCTTCGGGAAACAAAATATCT TCGCCAATTGTAAACGTTA TTCGCCAATATGTGAAACGTTA TTCGCCAATAATTCGCGT GACGACAACAACAAGGCGG CGCTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGCGGG AAAACCAGCAGAAGATAAAA TGTTCCAGTTTGGAGAAAAATCT-Cy5 CGATAGCTTGGGAAACAATATCT-Cy5 GACGACTAGGGAAACAAAGAAA-Cy5 TTCGCCAATTATCGCGT-Cy5 GACGACAAACAAACGAGCGG-Cy5 CGCTAGGAATGTAAACGTT-Cy5 CGCTAGGAATGTAAACGT-Cy5 CGCTAGGAATGTAAACGAT-Cy5 CGCTAGGAATGTAAACGAT-Cy5 CGCTAGGAATGTAAACGAT-Cy5 CGCTAGGAATGTAAACGAT-Cy5 CGCTAGGAATGTAAACGAT-Cy5 CGCTAGGAATGTAAACGAT-Cy5 CGCTAGGAATGTAAACGAT-Cy5 CGCTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGCGGG-Cy5 AAAACCAGCAGAAGATAAAA-Cy5
CICATATATAAGAGGICAITTAGITITIG AGGATAATGGCITAGAGCITAIGCGAGAG AGAAGCCAATATAATGCITGTAACGAGAG CITITITITAGAAGGGCATGAGTAAACAGGGITIT ACCCIGTATGTITAAATATGATCATAA CICAGAGGATICCATATAATACGGITGCIGGAGGCATA CICAGAGAGTICCATATAACAGTACGGC AGCAAAACCAATICGCGAACACATICA GCAAGTACCAATICGCGGAACACATICA GCAAGTACCAATICGGCAACACATICA GCAAGTACCAATICGGCAACACATICA GCAAGTACCAATICGGCAACACATICA GCAAGTACCAATICGGCAACACATICA GCAGTACGCATTAGTICGCAACAGTIGA TAGTAGGATTAGCATTACGGCAAGGCGTATA CGCGAGCIGAAACGTIGGIGTAGAA TGCGCGCCTACAGGGCCCCCACCGCGCTTAA GCACTCACGGCTAGAGAGCCCCTAACAGTIGTIGGGGCA ATCCTAGGCTATIGCCTCCGCGCTTACAAGTCCAGCTIGCAGGGCACCCCCCCCGCGCTA CGGGAGCTGAAAAGCCCTAAGTCCAGTIGGTGGGAAAT CICAAAGGCTATIGCCTGCACCTTAACAATGCCCGCCA CGTGATATTAATICGCACAGGGTGTGACCATICGGCGGCGCAAACCCC CGGGAGCTGAAAACGCCGCACTIGACAGTGGGCGGCAAAACCCCCCGGGCGCGCCCCCCCCGCGGAAACCATIGCCTGGGCGCACCCCCCCGGAGTGGACGCCCCCCGGCGCAACCCCCCGGAGGCGCTGAAAACGTCGCGCGCCCCGGACGCGCCCCCCCGGACGCGCCCCCCGGACGGCCCCCACCCCCGAACGACCCCCC	AAAAAAGTTIGGCTAATAATTACCAAAATCAATACATTG AAGGTATGGGACCTCAATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATGAGGAGCTGGGCTTGAGATGCCCAACACTCAAC CGTTGAGAAATGGAGACTGGAGCTGGGCTTGAGAGGAGAACATGGA ATTGCCTTTAGAACATCGCACTGGGGATGGATTGATTCAATAGA ATTGCCTTTAGAACAACGCGCGACCATGACTGACGGG CCGCCAGCCATGCAACGGACCCAAACTATCGGCCTGCTCATG TTGAGCCATGCAACGA CCGCCAGCCATGCACACGGACCCAAACTATCGGCCTGCTCATG TTGAGCCATGCAACGAGGGAACCGGATATTTTAT ACCATTAATGGTTTACCAGCGCTGCCGGTATTTAA ATCGATACCGGAATAGTTTTTGTGCAAACTACCAA GCCTTTACATGCAGCGGAGGGAACCGGGAACCGGAAAAA GGCCATTAACGGCAGTGTAACATCAG GGCCTTACCATCACGGCAGCTGTAACCAATCAACCAG AAAATCCAAACAGGCAATAAGCGAGAGAAAAA GGCCTTACATACATAAAGGTGTAACGAGGAGAAAAA GGCCTTACATACATAAAGGTGTAACGAGGAGAAAAA GGCCTTACATACATAAAGGTGTAACGAGGAGAAAAA GGCCTAGAGGCAATAAGCAATAGCGAATAACCAGTAA CTCAGAGGGAAATAGCAATAGCAACTGAATTAACAA ATTATTTACATTGCCGAGAACAGCAATAGCGCATAGCTTAGA AAATGCGATACGGATTAGCTAACCAGTAA CTCAGAGGCAATAGCAATAGCAACAAGCATAGCCGATAGCTTAGA AAATGCGATACGCAATAGCAACAAGACATAGCGATAGCTTAGA AAATGCGATACCGCATAATGACTAGCAGCAATAGCGATAGCTTAGA AAATGCGATACCAATTAGCAACGAGCATAGCCGAATCGCCCCCAAATCGCGCCCAAATCGCAATCGCAATCGCAATCGCAATCGCAATCGCAATCGCAATCGCAATCGCAATCGCAATCGCAATCGCAATCGCAATCGCAATCGCAATCGCAATCGCAATCGCAATCCGCAATC	IGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGGAAAAAATATCT CATAGCTTCGGGAAACAAAGAAA TGCTGCATTGTAAACGTTA TTCGCCAAATAATTCGCGT GACGACAAACAAACGGCGG CGCTAGGAAATAATTGACACTAAATCGGAACGAAAGGAGCGGGG AAAACCAGCAGAAGATAAAA TGTTCCAGTTIGGAGAAAAATCT-CyS CGAATATGGTTGGGAAACAAATATCT-CyS CGAATATGGTTGGGAAACAAATATC-CyS TGCTGCGATTGTAAAGCATCACYS TGCGCCAAATAATTCGCGT-CyS GACGACAAACAAACGGCGGC-CyS CGCTAGGAATATAATCGCGT-CyS CGCTAGGAATGTAAAGCGCGGC-CyS CGCTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGCGGGC-CyS AAAACCAGCAGAAGAAGAAA-CyS
CICATATATAAGAGGTCATITAGTITTG AGGATATATGGGTCATITAGTITTG AGAGCCAATATAAGCGTCATGCAGAGG CITTITTTAGAAGGGCATGAGCAAGAGG CITTITTTAGAAGGGCATGAGTAAACAGGGTTT ACCCCTGTATGTTTAAATATGATCATAA CIAAATCGGTTGTAAGTACGGTGTCTGGAGGCATA CICAGAGAGTTCCATATAACAGTACAGGC AGCAAAACCAATTCGGCAACACATTCA GCAAGTAACCACTCCATCATGGT ATACAGGTTAGTTGACATCAGGTGA TAGTAGTAGCATTAATTCGCAAATGGTATACAG CGCGGGCTGAAACGTTGGTGTGAGA TAGTAGTAGCATTAGCGTGGAGGA CGCGGGCTACAGGGCCACCCGCCGCGCTTAA GACTCACGCTAGAGGCCCCCCGCGCGCTTAA GACTCACGCTACAGGGCCACCCGCCGCGCTTAA GACTCACGGCTACAGGGCCACCCGCCGCGCTTAA GACTCACGGCTAGAGGCCCCCAGGGGCTTGAAGGGGCAC CGTTGATATTAATCGTACCAGGGTGTGACCATCTGTAAGCAATCC TIGATATTAATCGTACCGACTTGACATGTCCGCCA CGTTGATATTAATCGACGTGTGACATCGCTGAGGGCGC TAACCAAAAACAACACCGCGCTGAAAAGTCCCTGGTGGGC TAACCAAAAACAACAACACCGCTGAAAAGTCCTCGTGACATGC TCAAAGCGTAATCAGGGGTATCGGGTGTGAAATTGTACCGCC TACCAAAAACAACAACCGCGTGTAACAAGTCGCGGTGGAAAT CTCAAAGCAATCAAATCA	AAAAAAGTTIGGCTAATAACCAATACAAATCCAAAATAATTG AAGGTATGGGACCTTCATAAGGCTTGCCCTGCAACACTCAAC CGTTGAGAATGAGGACTGGGCTGGG	IGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGGAAAAAATATCT CATAGCTTCGGGAAACAAAGAAA TGCTGCATTGTAAAGGTTA TTCGCCAAATAATTCGCGT GACGACAAACAAACGGCGG CGCTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGCGGGG AAAACCAGCAGAAGATAAA TGTTCCAGTTTGGAAGAAAAATCT-Cy5 CGAATATGGTTTGCAAAATATCT-Cy5 CATAGCTTCGGGAAACAAAAAAACY5 TTCGCCAATATATTCGGGAACGAAAAGAAA-Cy5 TTCGCCAATATATTCGGCGCG-Cy5 CGCTAGGAAACAAACGGCGG-Cy5 AAAACCAGCAGAAGATAAAA-Cy5 TCGCCAATTATATACGAACATAAATCGGAACGAAAGGAGCGGG-Cy5 AAAACCAGCAGAAGATAAAA-Cy5
CICATATATAAAGAGGTCATITAGTITTG AGGATAATGGCTTAAGGCTATAGCGAGAG AGAAGCCAATATAATGCTGTAACGAGAG CITITTITTAGAAGGGCATGAAGTAAACAGGGTTT ACCCTGTATGTTTAAATATGATCATAA CITAAATGGTTGTAAGTACGGTGTCTGGAGGCATA CITCAGAGAATCCATATAACAGTAACAGC AGCAAAACCAATTCTGCGAAACACTTCA GCAAGTAACCAATTCCATCATGGT ATACAGGTTAGCATTAATTCGCAAATGGTATTACAG CGCGAGCTGAAACGTTGGTGTGAG TAGTAGTAGCATTACTTCGCAAATGGTATTACAG CGCGAGCTGAAAGCCTGAGGTGAGA CGCGGGCGCTACAGGGCCACCCCCGCGCGCTAA GACTCACGCTACAGGGCCACCCGCCGCGCTTAA CGCGGGTATAGCATTACAGTTGACAGTTGTGGGGTCA ATGGTAGTTATGCCGCACTTAACGATGGCCGCACA CGTTGATATTAATCGTACCAGGGGTCTGACCGCGGGCGAAAT CTCAAAGGGTAATCGACGGCTTGACCGCGGCGCGG	AAAAAAGTTIGGCTAATAACCAATACAAATCCAAAATAATTG AAGGTATGGGAACCTCAATAAGGCTTGCCAAACATCAAATAATTG CGTTGAGAATTGAGGCTTGGGCTTGAGATGCCTGAACACTCAAC CGTTGAGAAATGAGACATGCCATGGCATGG	IGTTCCAGTTTGGAGAAAAATCT CGAATATGGTTTGGAAAATATCT CATAGCTTCGGGAAACAAAATATCT TCGCCAATGTATGTAAACGTTA TTCGCCAAATAATCGGCG GACGACAAACAAACGGCGG CGCTAGGAATGTAAAGCACTAAATCGGAACGAAAGGAGGGGG AAAACCAGCAGAAGATAAA TGTTCCAGTTTGGAAAAATATCT-Cy5 CCATAGCTTCGGAAACAAAATATCT-Cy5 CCATAGCTTGGAAACAAAAAAAC-Cy5 TTCGCCAATTGTATAGCGT-Cy5 CGCAACAACAACGGCGG-Cy5 CGCGACAAACAACGGCGG-Cy5 CGCGACAAACAACGGCGGC-Cy5 CGCGACAAACAACGGCGC-Cy5 CGCGACAAACAACGGCGGC-Cy5 CGCGACAAACAACGACAAATCGGAACGAAAGGAGGGGGG-Cy5 AAAACCAGCAGAAGATAAAA-Cy5

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