Supplementary Information

Profiling surface glycans on live cells and tissues using quantum dot-lectin nanoconjugates

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Table S1. List of lectins used in this study

Abbreviation	Origin	Glycan Specificity
SBA	*Glycine max*	N-acetylgalactosamine (N-GalNAc), galactose
ConA	*Canavalia ensiformis*	α-mannose
WGA	*Triticum unlgari*	N-acetylglucosamine (N-GlcNAc)
LTL	*Lotus tetragonolobus*	α-linked L-fucose, Sia-Lex, Lex
SNA	*Sambucus nigra*	Sia(α-2,6)Gal/ GalNAc
MAA	*Maackia amurensis*	Sia(α-2,3)Gal

Table S2. List of cell line.

Designations	Origin	Morphology	Organ	Disease
MCF-7	Human	Epithelial	Breast	Adenocarcinoma
HEK293	Human	Epithelial	Kidney	None
ACHN	Human	Epithelial	Kidney	Renal cell adenocarcinoma
A549	Human	Epithelial	Lung	Carcinoma
HeLa	Human	Epithelial	Cervix	Adenocarcinoma
HCT116	Human	Epithelial	Colon	Colorectal carcinoma
HepG2	Human	Epithelial	Liver	Hepatocellular carcinima
HDF	Human	Fibroblast-like	Epithermis	None

Table S3. Information of breast cancer tissue specimen

No.	Age	Sex	Organ	Diagnosis	pTNM	Stage
1	37	F	Breast	Infiltrating duct carcinoma	T2N0M0	ⅡA
2	48	F	Breast	Infiltrating duct carcinoma	T2N3aM0	ⅢC
3	36	F	Breast	Infiltrating duct carcinoma	T3N0M0	ⅡB
4	40	F	Breast	Infiltrating duct carcinoma	T2N0M0	ⅡA
5	51	F	Breast	Infiltrating duct carcinoma	T2N0M0	ⅡA
6	54	F	Breast	Infiltrating duct carcinoma	T2N0M0	ⅡA
7	43	F	Breast	Infiltrating duct carcinoma	T2N0M0	ⅡA
8	58	F	Breast	Infiltrating duct carcinoma	T2N3aM0	ⅢC
9	37	F	Breast	Infiltrating duct carcinoma	T2N3aM0	ⅢC

Table S4. The stage of breast cancer tissue

Stage	T	N	M
ⅡA	T0-T2	N0	M0
ⅡB	T2	N1	M0
	T3	N0	M0
ⅢC	Any T	N3	M0

T : Primary tumor stage

T0 : No evidence of primary tumor

T1 : Tumor ≤20 mm in greatest dimension

T2 : Tumor ≥20 mm but ≤50 mm in greatest dimension

T3 : Tumor >50 mm in greastest dimension

N : Regional lymph nodes stage

N0 : No regional lymph node metastasis identifie histologically.

N1 : Micrometastases; or metastases in 1-3 axillary lymph nodes; and/or in internal. mammary nodes wi th metastases detected by sentinel lymph node biopsy but not clinically detected.

N2 : Metastasis in 4-9 axillary nodes; or in clinically detected internal mammary lynph nodes in the abs ence of axillary lynph node metastasis.

N3 : Metastasis in 10 or more axillary lymph nodes, or in infraclavicular(level Ⅲ axillary) lymph nodes , or in clinically detected ipsilateral internal mammary lymph nodes in the presence of 1 or more po sitive level Ⅰ,Ⅱaxillary lymph nodes; or in more than 3 axillary lymph nodes and in internal mam mary lymph nodes with micrometastases or macrometastases detected by sentinel lymph node biopsy but not clinically detected/or in ipsilateral supraclavicular lymph nodes

N3a : Metastasis in 10 or more axillary lynph nodes (at least one tumor deposit greater t han 2.0 mm); or metastases to the infraclavicular (level Ⅲ axillary) node.

M : Distant metastasis stage

M0 : No clinical or radiographic evidence of distant metastases.

M1 : Distant detectable metastases as determined by classic clinical and radiographic means and/or hist ologically proven larger than 0.2 mm.

Table S5. Information of colon cancer tissue

No.	Age	Sex	Organ	Diagnosis	pTNM	Stage
1	44	M	Rectum	Adenocarcinoma, moderately differentiated	T3N2aM1a	ⅣA
2	47	F	Sigmoid colon	Adenocarcinoma, moderately differentiated	T3N1bM1b	ⅣB
3	64	M	Sigmoid colon	Adenocarcinoma, well differentiated	T3N1aM0	ⅢB
4	67	M	Colon	Mucinous adenocarcinoma	T2N2bM0	ⅢC
5	60	M	Rectum	Adenocarcinoma, moderately differentiated	T3N0M0	ⅡA
6	59	M	Colon	Adenocarcinoma, well differentiated	T3N0M0	ⅡA
7	58	F	Rectum	Adenocarcinoma, moderately differentiated	T3N2bM0	ⅢC
8	64	M	Rectum	Adenocarcinoma, moderately differentiated	T3N2aM0	ⅢB
9	68	M	Colon	Mucinous carcinoma	T4aN1bM0	ⅢB

Table S6. The stage of colon cancer tissue

Stage	T	N	M
ⅡA	T3	N0	M0
	T3-T4a	N1/N1c	
ⅢB	T2-T3	N2a	M0
	T1-T2	N2b	
	T4a	N2a	
ⅢC	T3-T4a	N2b	M0
	T4b	N1-N2	
ⅣA	Any T	Any N	M1a
ⅣB	Any T	Any N	M1b

T : Primary tumor stage
T0 : Primary tumor cannot be assessed
T1 : Tumor invades submucosa
T2 : Tumor invades muscularis propria
T3 : Tumor invades through the muscularis propria into pericolorectal tissues
T4a : Tumor penetrates to the surface of the visceralperitoneum
T4b : Tumor directly invades or is adherent to other organs or structures

N : Regional lymph nodes stage
N0 : No regional lymph node metastasis
N1 : Metastasis in 1-3 regional lymph nodes
N1a : Metastasis in one regional lymph node
N1b : Metastasis in 2-3 regional lymph nodes
N2 : Metastasis in four or more regional lymph nodes

N2a : Metastasis in 4-6 regional lymph nodes
N2b : Metastasis in seven or more regional lymph nodes

M : Distant metastasis stage
M0 : No distant metastasis
M1 : Distant metastasis
M1a : Metastasis confined to one organ or site (e.g., liver, lung, ovary, nonregional node)
M1b : Metastases in more than one organ/site or the peritoneum

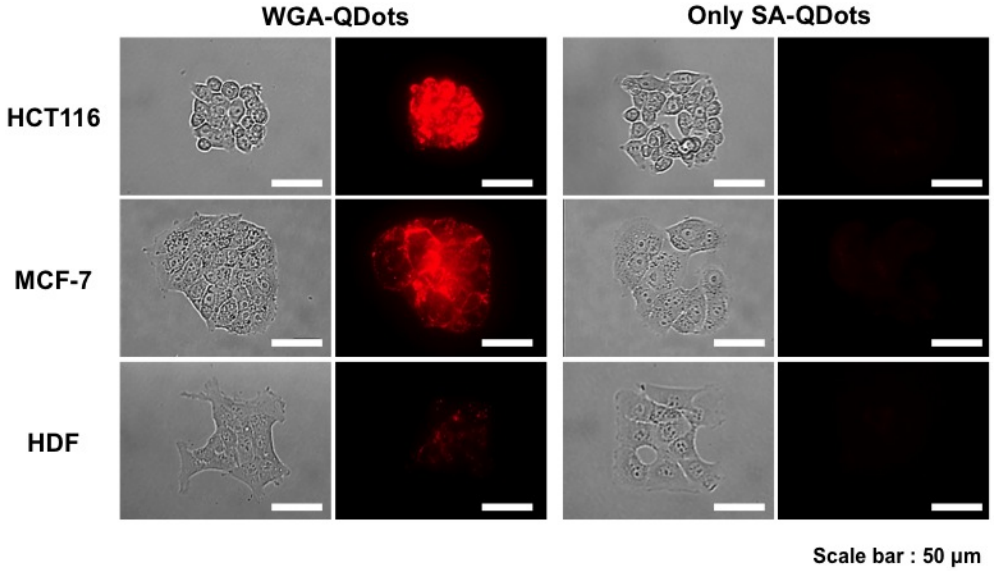


Figure S1. The investigation of non-specific binding with streptavidin-QDots (SA-Qdots) and comparison of fluorescence images between WGA-Qdots and only SA-Qdots..

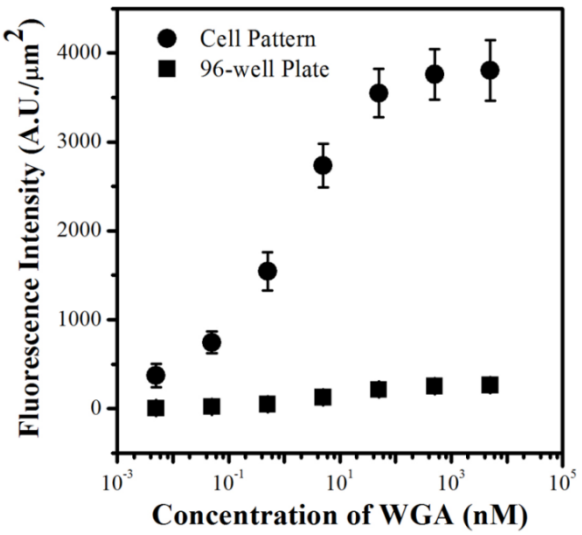
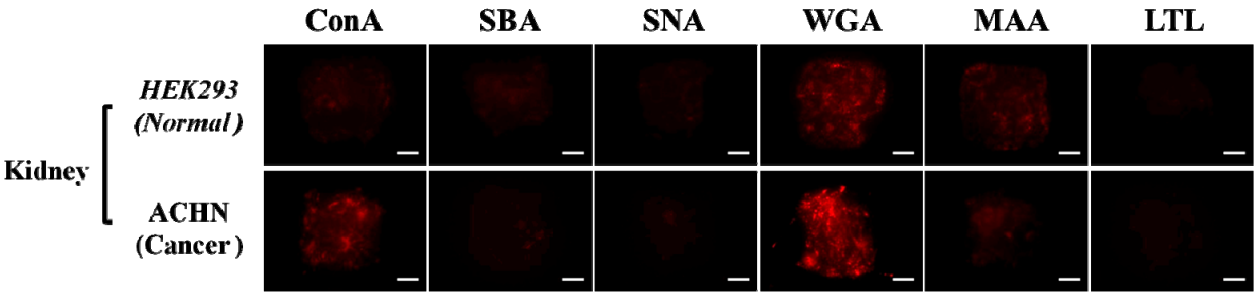


Figure S2. Comparison of cell pattern approach with conventional 96-well plate method. MCF-7 are incubated with various concentration of WGA.

(a)



(b)

Figure S3. Binding profile of kideny cancer cell (ACHN) and normal kidney cell (HEK293) to 6 le ctins. One representative cell pattern for each lectin and cell line is selected. (a) Representative fluores cence images of HEK293 and ACHN cell line. Scale bars indicate 40 μm. (b) Heat map with hierarchic al clustering for the 6 types of lectins examined.

Figure S3 shows distinctive binding patterns of both ACHN and HEK293. ConA (3 folds, $p < 0.01$) and WGA (2 folds, $p < 0.01$) show strong signal intensity against the cancer ACHN cell line, altho ugh SBA, SNA, and LTL also exhibit similar fluorescence intensity. This result suggests that mannose and GlcNAc are over-expressed on ACHN cells compared to HEK293.