BRIEF SUMMARY

[0004a] In a first aspect, the present disclosure provides a method of identifying a compound that modulates β-catenin depots in a cell, the method comprising:

(a) contacting a composition comprising the cell with the compound;

(b) assaying the composition comprising the cell, or a derivative of the composition, for the β-catenin depots; and

(c) identifying the compound that modulates β-catenin depots in the cell by comparison of the assayed β-catenin depots in the cell to a reference.

[0004b] In a second aspect, the present disclosure provides a method of identifying β-catenin depots in a cell, the method comprising:

(a) contacting a composition comprising the cell with a detectable reagent that specifically recognizes an inactive form of a β-catenin polypeptide comprising a phosphorylation at T41 and/or S45; and

(b) detecting the detectable reagent,

wherein the detection of the detectable reagent within the cell identifies the β-catenin depots in the cell.

[0004c] In a third aspect, the present disclosure provides a method of identifying a compound useful for treating a β-catenin-associated disease, wherein the method comprises identifying a compound according to the method of the disclosure, optionally wherein the β-catenin-associated disease is selected from the group consisting of a cancer, autosomal dominant polycystic kidney disease (ADPKD), hereditary familial adenomatous polyposis (FAP), Alzheimer's, or a metabolic disease.

[0004d] In a fourth aspect, the present disclosure provides a method of identifying β-catenin depots in a cell, the method comprising:

(a) contacting a composition comprising the cell with a first detectable reagent that specifically recognizes a β-catenin polypeptide;

(b) contacting the composition comprising the cell with a second detectable reagent that specifically recognizes a phospho-H2A.X (P-2A.X) or mediator of DNA damage checkpoint protein 1 (MDC1); and

(c) detecting the first detectable reagent and the second detectable reagent;

wherein the detection of a colocalization of the first detectable reagent and the second detectable reagent within the cell identifies the β-catenin depots in the cell.

[0005] In certain examples, provided is a method of identifying a compound that modulates β-catenin depots in a cell, the method comprising: (a) contacting a composition comprising the cell with the compound; (b) assaying the composition comprising the cell, or a derivative of the composition, for the β-catenin depots; and (c) identifying the compound that modulates β-catenin depots in the cell by comparison of the assayed β-catenin depots in the cell to a reference.

[0006] In some embodiments, comparison of the assayed β-catenin depots in the cell to the reference is based on one or more of the following attributes of the β-catenin depots: (i) presence of the β-catenin depots; (ii) number of the β-catenin depots; (iii) size of the β-catenin depots; (iv) surface area of the β-catenin depots; (v) cellular location of the β-catenin depots; (vi) distribution of the β-catenin depots; (vii) ratio of the amount of the β-catenin depots and a reference condensate; or (viii) composition of the β-catenin depots. In some embodiments, modulation of the β-catenin depots is based on increasing the β-catenin depots in the cell as compared to the reference. In some embodiments, modulation of the β-catenin depots is based on an increase in the number of the β-catenin depots in the cell as compared to the reference. In some embodiments, modulation of the β-catenin depots in the cell is based on an increase in the number of the β-catenin depots in the nucleus of the cell as compared to the reference. In some embodiments, modulation of the β-catenin depots in the cell is based on an increase in the presence of the β-catenin depots in the cell as compared to the reference. In some embodiments, modulation of the β-catenin depots in the cell is based on an increase in the presence of the β-catenin depots in the nucleus of the cell as compared to the reference.

[0007] In some embodiments, the assaying for the β-catenin depots comprises detecting an inactive form of a β-catenin polypeptide. In some embodiments, the detecting the inactive form of the β-catenin polypeptide comprises contacting the composition comprising the cell, or the derivative of the composition, with a detectable reagent that specifically recognizes the inactive form of the β-catenin polypeptide. In some embodiments, the detectable reagent is an antibody specifically recognizing the inactive form of the β-catenin polypeptide. In some embodiments, the assaying comprises detecting the detectable reagent that specifically recognizes the inactive form of the β-catenin polypeptide. In some embodiments, the detecting comprises imaging at least a portion of the cell. In some embodiments, the detectable reagent that specifically recognizes the inactive form of the β-catenin polypeptide is a fluorescently labeled antibody

[0012] In some embodiments, the cell is a model for autosomal dominant polycystic kidney disease (ADPKD), hereditary familial adenomatous polyposis (FAP), Alzheimer's, or a metabolic disease, such as obesity and/ or insulin resistance.

[0013] In some embodiments, the inactive form of the β-catenin polypeptide is a wildtype β-catenin polypeptide. In some embodiments, the inactive form of the β-catenin polypeptide is a mutant β-catenin polypeptide.

[0014] In some embodiments, the assaying further comprises contacting the composition comprising the cell, or the derivative of the composition, with a second detectable reagent that specifically recognizes an active form of a β-catenin polypeptide comprising a phosphorylation at S552 and/or S675, and wherein the amino acid position is relative to amino acid sequence of SEQ ID NO:1.

[0015] In some embodiments, the method further comprises contacting the composition comprising the cell, or the derivative of the composition, with a fixative agent before the assaying of step (b).

[0016] In some embodiments, the method further comprises determining one or more cellular features of the cell.

[0017] In some embodiments, the reference is based on: (i) a composition comprising the cell not contacted with the compound; (ii) a composition comprising the cell admixed with a control vehicle and not contacted with the compound; (iii) a desired β-catenin profile; (iv) a reference condensate or a reference polypeptide within the cell; and/ or (v) a reference composition comprising a cell.

[0018] In some embodiments, the method further comprises subjecting the composition comprising the cell to a condition that promotes formation of the β-catenin depots prior to the contacting the composition comprising the cell with the compound.

[0019] In some embodiments, the method further comprises assessing the identified compound using a second cell-based assay and/or an *in vitro* assay. In some embodiments, the method further comprises assessing the identified compound using a second cell-based assay.

[0020] In certain other examples, provided herein is a method of identifying β-catenin depots in a cell, the method comprising: (a) contacting a composition comprising the cell with a detectable reagent that specifically recognizes an inactive form of a β-catenin polypeptide comprising a phosphorylation at T41 and/ or S45; and (b) detecting the detectable reagent, wherein the detection of the detectable reagent within the cell (*e.g.*, within a condensate)

identifies the β-catenin depots in the cell. In some embodiments, the detectable reagent is an antibody specifically recognizing the inactive form of the β-catenin polypeptide comprising a phosphorylation at T41 and/ or S45. In some embodiments, the detectable reagent is an antibody specifically recognizing the inactive form of the β-catenin polypeptide comprising phosphorylations at T41 and S45. In some embodiments, the detecting comprises imaging at least a portion of the cell. In some embodiments, the detectable reagent is a fluorescently labeled antibody specifically recognizing the inactive form of the β-catenin polypeptide comprising a phosphorylation at T41 and/ or S45. In some embodiments, the detectable reagent is detected using a fluorescently labeled secondary antibody that specifically recognizes the detectable reagent. In some embodiments, the method further comprises contacting the composition comprising the cell with a fixative agent before contacting with the detectable reagent. In some embodiments, the method further comprises measuring a signal of the detectable reagent. In some embodiments, the method further comprises comparing the signal with a reference. In some embodiments, the reference is based on: (i) a composition comprising the cell not contacted with the detectable reagent; (ii) a composition comprising the cell admixed with a control vehicle and not contacted with the detectable reagent; (iii) a reference signal; (iv) a reference condensate or a reference polypeptide within the cell; and/ or (v) a reference composition comprising a cell.

[0021] In certain other examples, provided herein is a method of identifying a compound useful for treating a β-catenin-associated disease, wherein the method comprises identifying a compound according to a method described herein. In some embodiments, the β-catenin-associated disease is selected from the group consisting of a cancer, autosomal dominant polycystic kidney disease (ADPKD), hereditary familial adenomatous polyposis (FAP), Alzheimer's, or a metabolic disease.

[0022] In certain other examples, provided herein is a compound identified by a method described herein.

[0023] In certain other examples, provided herein is a method of identifying β-catenin depots in a cell, the method comprising: (a) contacting a composition comprising the cell with a first detectable reagent that specifically recognizes a β-catenin polypeptide; (b) contacting the composition comprising the cell with a second detectable reagent that specifically recognizes a phospho-H2A.X (P-2A.X) or mediator of DNA damage checkpoint protein 1 (MDC1); and (c) detecting the first detectable reagent and the second detectable reagent; wherein the