

## **Supporting Information**

### **Small Molecule as Fluorescent Probes for Monitoring**

#### **Intracellular Enzymatic Transformations**

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**Table S1**

| Name of the enzyme     | localization  | Role  | Disease relevance   | References |
|------------------------|---|---|---|------------|
| Alkaline phosphatase   | Alkaline phosphatase is present in all tissues throughout the entire body. It is particularly concentrated in human liver, bile duct, kidney, bone, intestinal mucosa and placenta. | Alkaline phosphatase is play a pivotal role in intestinal homeostasis and gives protection as well as in mediation of inflammation via repression of the downstream Toll-like receptor. | Higher Alkaline phosphatase levels in the blood are linked to critical diseases such as bone disorders, hepatitis, liver damage, bile cancers, heart failure.<br><br>Lower ALP levels in blood indicate malnutrition, which could be caused by celiac disease or a deficiency in certain vitamins and minerals.   | 1-11       |
| $\beta$ -galactosidase | $\beta$ -galactosidase is located in lysosomes.   | $\beta$ -galactosidase catalyzes the hydrolysis of lactose to glucose through an intermediate galactose.  | $\beta$ -galactosidase is overexpressed in primary ovarian cancers, an important biomarker for visualizing peritoneal metastases from ovarian cancers as well delineating affected cells from normal cells. The deficiency in $\beta$ -galactosidase disrupts the common metabolic process of complex carbohydrates, which results as lysosomal storage diseases ( $\beta$ -galactosialidosis or Morquio B syndrome). | 12-28      |
| Nitro reductase        | Nitroreductase family of enzymes are widespread amongst bacteria and  | Nitroreductases enzyme involved in the reduction of nitrogen-containing compounds, including those  | Nitro reductase is important for the development of novel antibiotics as the main target for the treatment of infections caused by bacteria.  | 29-42      |

|                               |   |   |  |       |
|-------------------------------|---|---|--|-------|
|                               | are absent in mammalian cells.  | containing the nitro functional group.  | Additionally its enzymatic activity in gut microbiota is linked to carcinogen production and etiology of colorectal cancer. Due to its absence in mammalian cells it is also used as activating enzymes in gene-directed enzyme prodrug therapy approaches for cancer chemotherapy, where the nitro reductase gene is used to selective cancer cells, providing unique targeted therapy of tumors over normal tissues. |       |
| Tyrosinase                    | Tyrosinase is a copper-containing enzyme, present in both plant and animal tissues.   | Tyrosinase enzyme catalyses the production of melanin and other polyphenolic compounds.   | A lower level of tyrosinase is linked to a higher risk of melanoma. Additionally the abnormal level of tyrosinase induces dopamine neurotoxicity and neurodegeneration; which are associated with Parkinson's disease  | 43-51 |
| Leucine aminopeptidase        | They are localized in the cytoplasm and/or on membranes of cells.   | Leucine aminopeptidase N-terminal residues from proteins and peptides. It is an important marker for studying peptide digestion and leucine release, which helps in absorption of amino acid in the small intestine. Additionally it plays role in processing of bioactive peptides (oxytocin, vasopressin, enkephalins), and vesicle trafficking to the plasma membrane. | Leucine aminopeptidase is associated with various physiological and biological disorders ranging from tumor cell invasion, proliferation, drug resistance, and angiogenesis to liver injury.   | 52-61 |
| $\gamma$ -glutamyltransferase | $\gamma$ -glutamyltransferase is present the cell membrane of various tissues, including the kidneys, bile duct, pancreas, gallbladder, spleen, heart, brain, and seminal vesicles. | $\gamma$ -glutamyltransferase is a transferase enzyme, catalyses the transfer of gamma-glutamyl functional groups from molecules such as glutathione to an amino acid or a peptide or water (forming glutamate). It plays the main role in  | Elevated serum $\gamma$ -glutamyltransferase level causes liver, biliary system, and pancreas diseases. Additionally accumulation of $\gamma$ -glutamyltransferase stimulates invasion, tumor progression, and drug resistance, by the modulation of intracellular redox metabolism  | 62-71 |

|                                  |  |   |   |       |
|----------------------------------|--|---|---|-------|
|                                  |  | $\gamma$ -glutamyl cycle, a pathway for the synthesis and degradation of glutathione as well as drug and xenobiotic detoxification.   |   |       |
| Aminoacylase 1                   | Aminoacylase 1 found in tissues and organs of kidneys and the brain. | Aminoacylase 1 hydrolyzes N-acetyl amino acids into the free amino acid and acetic acid.  | The deficiency of aminoacylase 1 causes spongy degeneration of the brain known as leukodystrophy and accumulation of N-acetyl amino acids in the urine. | 72-76 |
| Cystathionine $\gamma$ -synthase | Cystathionine $\gamma$ -synthase is present in plant tissues.        | Cystathionine $\gamma$ -synthase belongs to the family of transferases enzyme, involved in methionine biosynthesis. Methionine, a crucial metabolite in plant cells, is essential for the initiation of protein translation. It is also used as a precursor for polyamine, ethylene, and biotin biosynthesis. |   | 77-80 |
| Hydroxynitrile lyases            | Hydroxynitrile lyases present in cyanogenic plants and bacteria.     | Hydroxynitrile lyases catalyzes the cleavage of cyanohydrins to hydrocyanic acid along with the formation of the corresponding aldehyde or ketone.  |   | 81-86 |

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