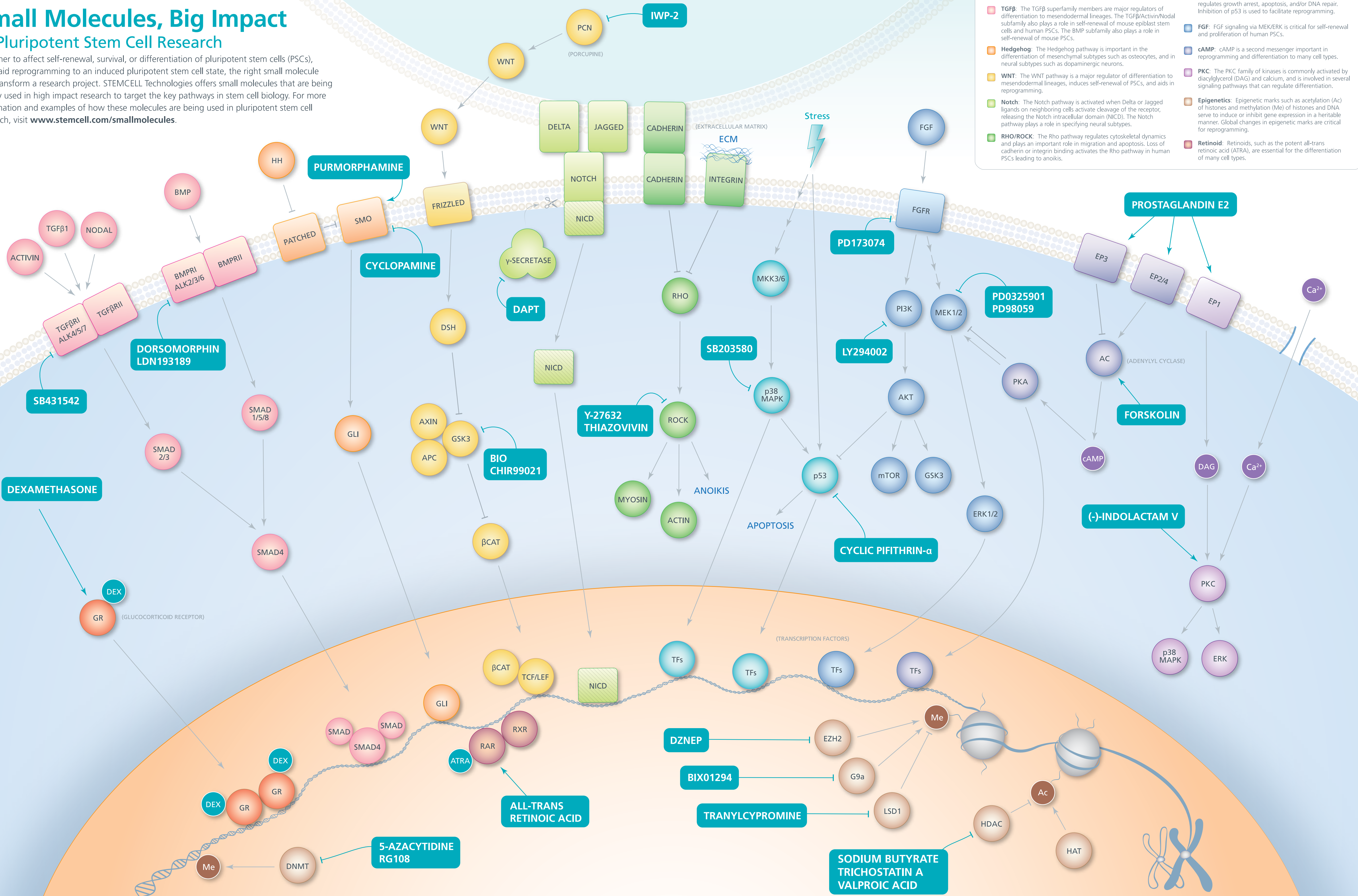


Small Molecules, Big Impact

In Pluripotent Stem Cell Research

Whether to affect self-renewal, survival, or differentiation of pluripotent stem cells (PSCs), or to aid reprogramming to an induced pluripotent stem cell state, the right small molecule can transform a research project. STEMCELL Technologies offers small molecules that are being widely used in high impact research to target the key pathways in stem cell biology. For more information and examples of how these molecules are being used in pluripotent stem cell research, visit www.stemcell.com/smallmolecules.

SMALL MOLECULES are available from STEMCELL Technologies.



- Glucocorticoid:** Glucocorticoids, such as dexamethasone (Dex), are steroid hormones that have been used in specific differentiation protocols.
- TGFβ:** The TGFβ superfamily members are major regulators of differentiation to mesodermal lineages. The TGFβ/Activin/Nodal subfamily also plays a role in self-renewal of mouse epiblast stem cells and human PSCs. The BMP subfamily also plays a role in self-renewal of mouse PSCs.
- Hedgehog:** The Hedgehog pathway is important in the differentiation of mesenchymal subtypes such as osteocytes, and in neural subtypes such as dopaminergic neurons.
- Wnt:** The Wnt pathway is a major regulator of differentiation to mesodermal lineages, induces self-renewal of PSCs, and aids in reprogramming.
- Notch:** The Notch pathway is activated when Delta or Jagged ligands on neighboring cells activate cleavage of the receptor, releasing the Notch intracellular domain (NICD). The Notch pathway plays a role in specifying neural subtypes.
- RHO/ROCK:** The Rho pathway regulates cytoskeletal dynamics and plays an important role in migration and apoptosis. Loss of cadherin or integrin binding activates the Rho pathway in human PSCs leading to anoikis.
- p38 / p53:** p38 MAPK is activated in response to cellular stresses, and influences apoptosis and cellular differentiation. p53 is activated in response to cellular stresses and regulates growth arrest, apoptosis, and/or DNA repair. Inhibition of p53 is used to facilitate reprogramming.
- FGF:** FGF signaling via MEK/ERK is critical for self-renewal and proliferation of human PSCs.
- cAMP:** cAMP is a second messenger important in reprogramming and differentiation to many cell types.
- PKC:** The PKC family of kinases is commonly activated by diacylglycerol (DAG) and calcium, and is involved in several signaling pathways that can regulate differentiation.
- Epigenetics:** Epigenetic marks such as acetylation (Ac) of histones and methylation (Me) of histones and DNA serve to induce or inhibit gene expression in a heritable manner. Global changes in epigenetic marks are critical for reprogramming.
- Retinoid:** Retinoids, such as the potent all-trans retinoic acid (ATRA), are essential for the differentiation of many cell types.