Brain Abnormalities Associated With Bipolar Disorder

- 31% more signal sending cells in the **Thalamus** (involved in regulatory functioning of the brain)
- 28% more cells in the **Ventral Brain System** (responsible for sending out the signaling cells)
- Reduced amounts of the amino acid **N-acetylaspartate** (NAA) in the hippocampus (indicating damage or dysfunction in emotion regulation and memory) Reduced NAA is also seen in Parkinsons, Alzheimer's and Multiple Sclerosis
- Reduction in size of the **Frontal Cortex** (responsible for concentration, planning, judgement, emotional expression, creativity and inhibition)
- Reduction in size of the **Hippocampus** (responsible for processing and distributing information)
- Reduction in volume and excessive activity of the **Amygdala** (responsible for interpreting facial expressions and adapting responses to emotionally relevant stimuli)
- Reduction in size of the **Caudate Nucleus** (responsible for regulating and organizing information) Reduced size of the Caudate Nucleus is also present in ADHD
- Nearly 40% reduction in the gray matter of the left **Pre-Frontal Cortex**
- **Cell shrinkage** and **reduced cellular connections** in the brain
- Abnormalities in the chemical pathways of **serotonin**, **noradrenaline**, **norepinephrine**, and **dopamine**
- **Intracellular** signaling abnormalities
- Elevated **Cortisol** levels (hormone produced from the adrenal cortex and released during stressed or agitated states)
- Widespread dysregulation of mitochondrial energy metabolism (converts energy into forms that are usable by the cell) and downstream deficits of adenosine triphosphate-dependent processes

Information taken from:
The American Medical Association, Dept of Psychiatry, Vol 60 (12) 2003
The American Journal of Psychiatry, October 2000
The Bipolar Child by Demitri Papolos MD
Interview with Husseini, Manji M.D., Chief of the Laboratory of Molecular Pathophysiology at the National Institute of Mental Health (NIMH).
Gen Psychiatry. 2004 Mar;61(3):300-8. Dept of Psychiatry, Harvard Medical School, Boston, Mass