

iUUCD 2.0: an update with rich annotations for ubiquitin and ubiquitin-like conjugations.

Here, we described the updated database iUUCD 2.0 (<http://iuucd.biocuckoo.org/>) for ubiquitin-activating enzymes (E1s), ubiquitin-conjugating enzymes (E2s), ubiquitin-protein ligases (E3s), deubiquitinating enzymes (DUBs), ubiquitin/ubiquitin-like binding domains (UBDs) and ubiquitin-like domains (ULDs), which act as key regulators in modulating ubiquitin and ubiquitin-like (UB/UBL) conjugations. In total, iUUCD 2.0 contained 136 512 UB/UBL regulators, including 1230 E1s, 5636 E2s, 93 343 E3s, 9548 DUBs, 30 173 UBDs and 11 099 ULDs in 148 eukaryotic species. In particular, we provided rich annotations for regulators of eight model organisms, especially in humans, by compiling and integrating the knowledge from nearly 70 widely used public databases that cover cancer mutations, single nucleotide polymorphisms (SNPs), mRNA expression, DNA and RNA elements, protein-protein interactions, protein 3D structures, disease-associated information, drug-target relations, post-translational modifications, DNA methylation and protein expression/proteomics. Compared with our previously developed UUCD 1.0 (~0.41 GB), iUUCD 2.0 has a size of ~32.1 GB of data with a >75-fold increase in data volume. We anticipate that iUUCD 2.0 can be a more useful resource for further study of UB/UBL conjugations.