Further investigation is needed to understand the molecular players involved in obesity-induced insulin resistance. We have utilized a dietary switch mouse model to perform transcriptomics of the skeletal muscle, and compared these findings with RNA-seq of human obese-diabetic muscle. This multispecies approach identified key genes that tracked with the insulin resistant state in both mouse and human muscle, including Cysteine and glycine-rich protein 3 (Csrp3). Csrp3 expression is decreased in obese-insulin resistant muscle and plays an important role in insulin-stimulated glucose uptake.