Abstract

Quality control (QC) is a collection of processes taking part in the biogenesis and architecture of proteins. The objective of this thesis is to describe these processes in detail. QC takes place on many different levels in various compartments of the cell. The focus is on the endoplasmic reticulum (ER) QC interconnected with cytosolic QC. There are multiple steps involved in ERQC: several types of protein translocation to the ER lumen, glycosylation, disulfide bond formation via protein disulfide isomerase, chaperones that assist to achieve a correct conformation, and ER-associated degradation pathway for retranslocation of misfolded proteins back to the cytoplasm, where they are degraded. Cytosolic QC is interconnected with the ERQC through various ways of translocation of proteins to the ER membrane or lumen. Proteins that are retranslocated from ER to the cytosol are ubiquitinated and subsequently degraded in the proteasome. Ubiquitination is a process of targeting a protein for degradation. Cytosolic chaperones and other cellular structures, such as aggresomes, juxtanuclear compartments, and insoluble protein deposits, take part in the ubiquitination. Calcium dysregulation that is linked to QC and correct protein folding in ER is also described. Some of the possible consequences of protein misfolding are pointed out. For instance, the misfolding of glutamate receptors leads to neurodegenerative diseases.

Key words: quality control, endoplasmic reticulum, ERAD, ERQC, glutamate receptor, protein, glycosylation, posttranslational modification, degradation, proteasome, ubiquitination