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Figure 2 in Muratani M, Tansey WP. "How the ubiquitin-proteasome system controls transcription."

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### **Regulation of TCR by ubiquitylation of RNA polymerase II.**

Transcription-coupled repair (TCR) is the mechanism through which mutations in actively transcribed genes are preferentially repaired. **a** | Elongating RNA polymerase II (pol II), which has a unique pattern of phosphorylation on its carboxy-terminal domain (CTD), encounters a damaged DNA segment. The stalled polymerase (**b**) then recruits the ubiquitin (Ub)-ligase Rsp5 (**c**), which in turn ubiquitylates the largest subunit of pol II in a CTD-phosphorylation-dependent manner. **d** | Ubiquitylation is followed by the proteasomal destruction of at least one subunit of polymerase, recruitment of the repair machinery and restoration of DNA integrity.

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Source: Figure 5 in Muratani M, Tansey WP. "How the ubiquitin-proteasome system controls transcription." *Nat Rev Mol Cell Biol.* 2003 Mar;4(3):192-201.

**The ubiquitin (Ub)–proteasome system regulates transcription at numerous levels.** **a** | Interactions of an activator with the general transcriptional machinery (green) functions to **b** | recruit ubiquitin ligase(s) to the site of transcription and ubiquitylates many factors, including the activator, RNA polymerase II (pol II) and histones. **c** | These ubiquitylation events in turn recruit the 26S proteasome, which **d** | simultaneously destroys the activator and promotes elongation of transcription by pol II. Importantly, this proposed mechanism limits uncontrolled transcription in two ways — by destroying the activator at each cycle of promoter 'firing' and by ensuring that interactions between pol II and the proteasome are made in an activator- and promoter-dependent manner.