ABSTRACTS

The regeneration system of planarians

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Neoblasts, which are classically defined as prospective totipotent stem cells containing germ plasm-like granules, supporting planarian regeneration, now have been identified by expression of the DjvlgA and DjPTK3 genes, coding for a vasa-type ATP-dependent RNA helicase and a receptor-type tyrosin kinase, respectively. DjvlgA- and DjPTK3-positive cells are distributed in the mesenchymal space from head to tail, participating in formation of blastema and organ rudiments during regeneration.

In X-ray-irradiated planarians, which had lost regenerative capacity, the number of DjvlgA-expressing cells decreased drastically. When fragments containing neoblasts are transplanted into X-ray irradiated hosts, they can restore regenerative ability. We have shown propagation and migration of stem cells by chimeric analysis.

Interestingly, we found that neoblasts begin to transcribe tissue-specific genes in a position-dependent manner, while they are still in the mesenchymal space. This occurs prior to their migration to the organ rudiments or blastema, and at a time when they are not yet morphologically distinguishable as neoblasts. We speculate that the mRNAs transcribed in the stem cells may be trapped in a complex with RNA helicase(s), forming a "chromatoid body", and are not translated into protein until they migrate to the rudiment. After formation of the rudiments, these committed cells may receive a signal for organogenesis and then start to translate these mRNAs as well as to express pattern formation genes for organogenesis.

Results can be found in

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