Cell cultures from marine invertebrates: past failures and future promises

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Despite decades of extensive research efforts, and notwithstanding all attempts, immortalized cell lines from marine invertebrates are not yet available, in part, because of the wide variety of cell types in marine invertebrates from different phyla, limited knowledge on the nutritional needs, growth factors and other unique conditions that support proliferation of marine invertebrate cells *in vitro*. While the biological reasons of these failures are still elusive, it is customary to document that marine invertebrate cells stop dividing *in vitro* within 24-72h after their isolation, starting cellular quiescence. The limited achievement in marine invertebrate cell cultures is also associated with the fact that scientific journals usually avoid publishing failed experiments, so much of the unsuccessful attempts are not presented to the scientific community. Summarising past failures in the development of cell cultures from marine invertebrates, novel biological methodologies, recently developed, bring new approaches and new hopes for successful development of cell cultures from these organisms. For example, evaluating the list of cell lines developed from insects and mammals elucidates that a significant portion of these new cell lines represents transformed cells, immortal cells acquired from naturally developed tumors, hybridomas, induced mutagenesis or plasmid transfected cells, use of adult stem cells, employment of induced pluripotent stem (iPS) cells, and additional new approaches. Also, the fast application of genomic and proteomic methodologies in marine biology, may enable researchers to survey globally the alterations at messenger RNA and protein levels for advancing the knowledge on *in vitro* cellular quiescence vs. cell proliferation. The present talk will summary current trends and scientific approaches in the research discipline of invertebrate cell cultures and will focus on novel promising avenues in the research. It is claimed that recapturing cellular immortality that has failed when using the traditional approaches for cell cultures can be successfully achieved by employing modern molecular and cellular tools, developed for mammalian systems.