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Mature adipocytes stimulate proliferation and inhibit differentiation of trout myogenic cells in vitro

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HAL Authorization

Mature adipocytes stimulate proliferation and inhibit differentiation of trout myogenic cells *in vitro*

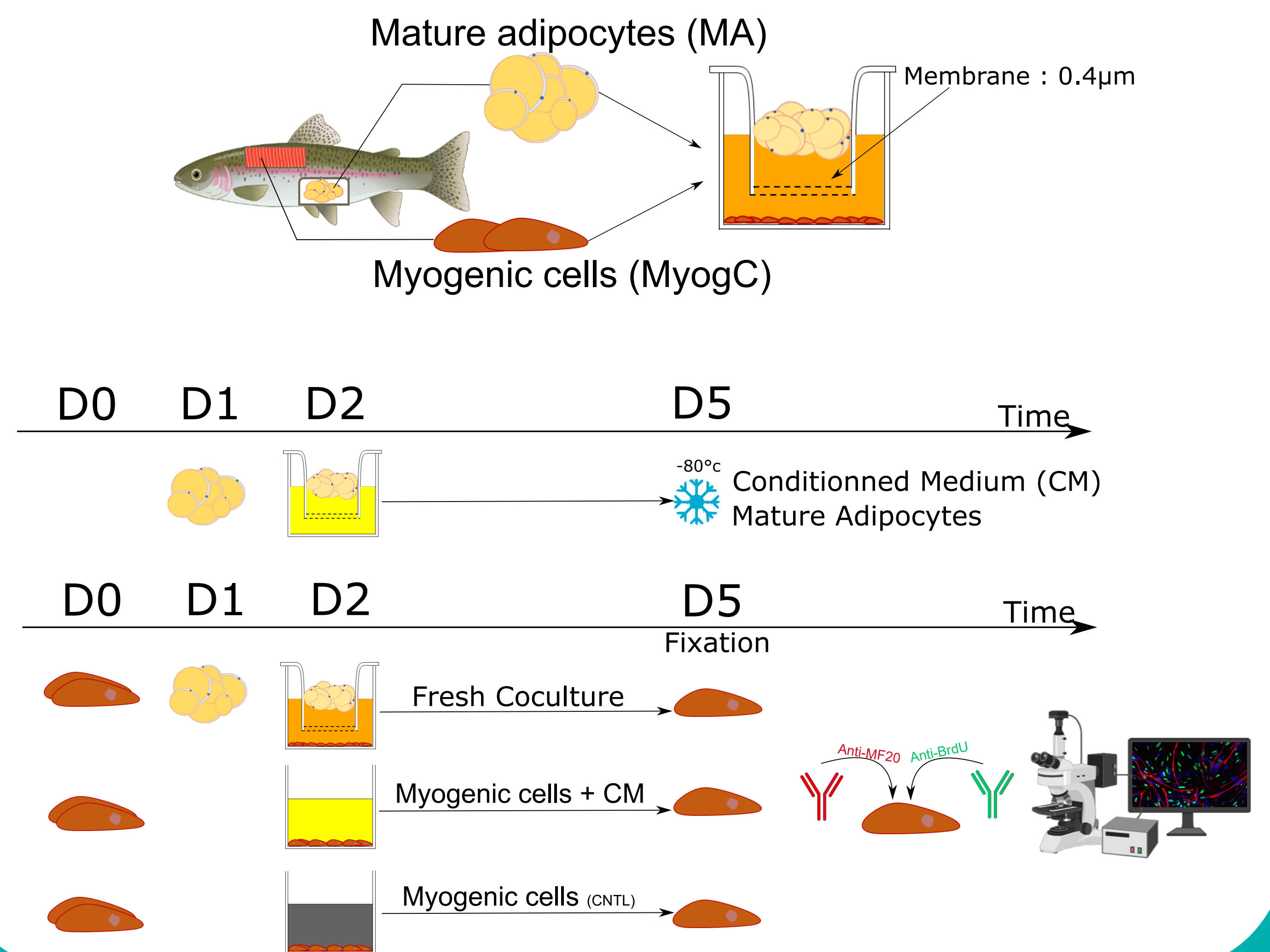
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Introduction

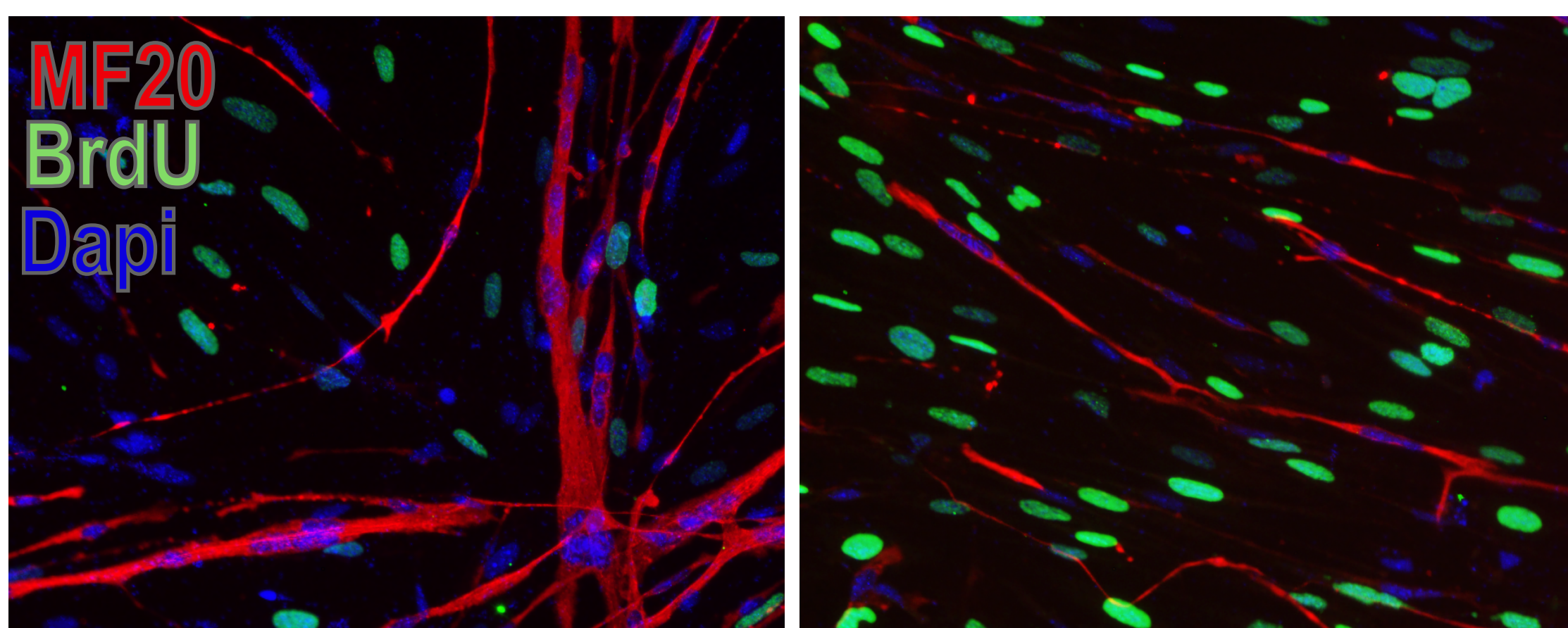
Adipose tissue, as well as muscle, are known to secrete multiple substances, called adipokines or myokines respectively. In mammals, their role in communication between these two tissues begins to become clearer. When it comes to fish, our understanding of the underlying mechanisms and interactions between adipose and muscle tissues is still very limited. *In vitro* studies have become indispensable for investigating these two tissues, with the use of myogenic cells from muscle and adipocytes from adipose tissue. Precursor muscle cells can be extracted to study their *in vitro* development. In the case of rainbow trout, it has been demonstrated that in culture, proliferation and differentiation start simultaneously on these myogenic cells (MyogC). Mature adipocytes (MA), while rarely employed in literature due to their buoyancy characteristic and poor survival in culture, provide a unique *in vitro* opportunity to better mimic *in vivo* cellular interactions in *in vitro* conditions. By employing indirect co-culture of these two types, this study aims to investigate the influence of these mature adipocytes on the *in vitro* development of myogenic cells.

Materials and methods

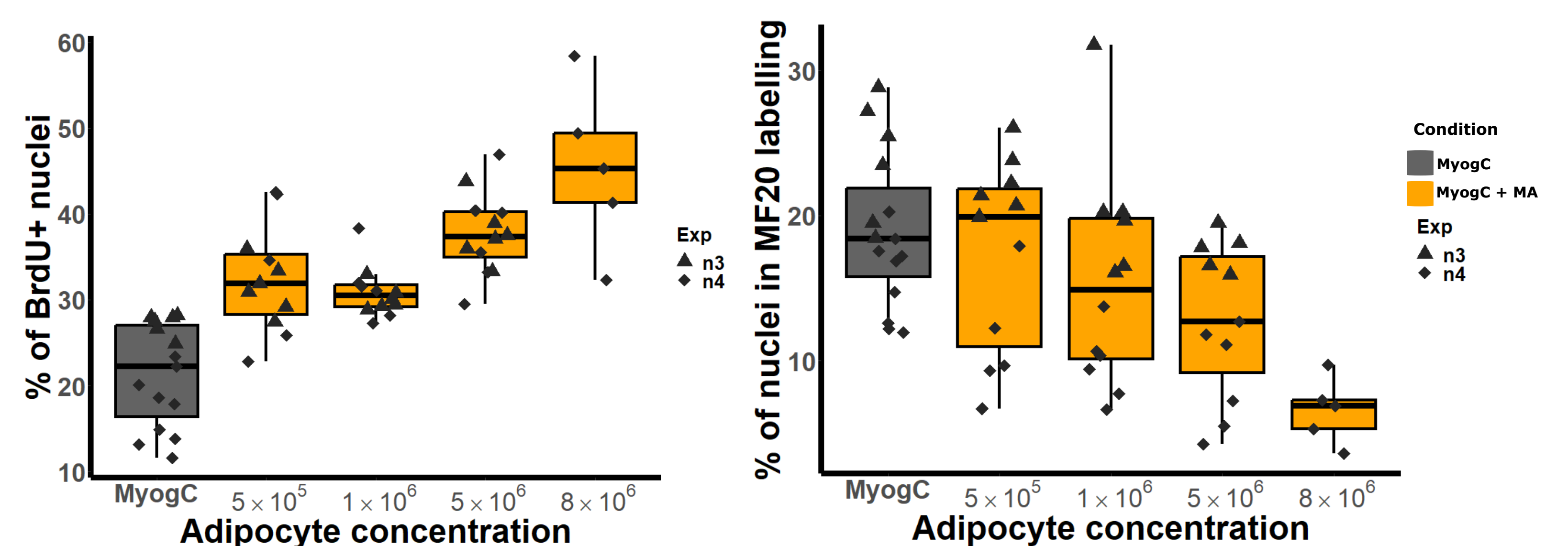


Results

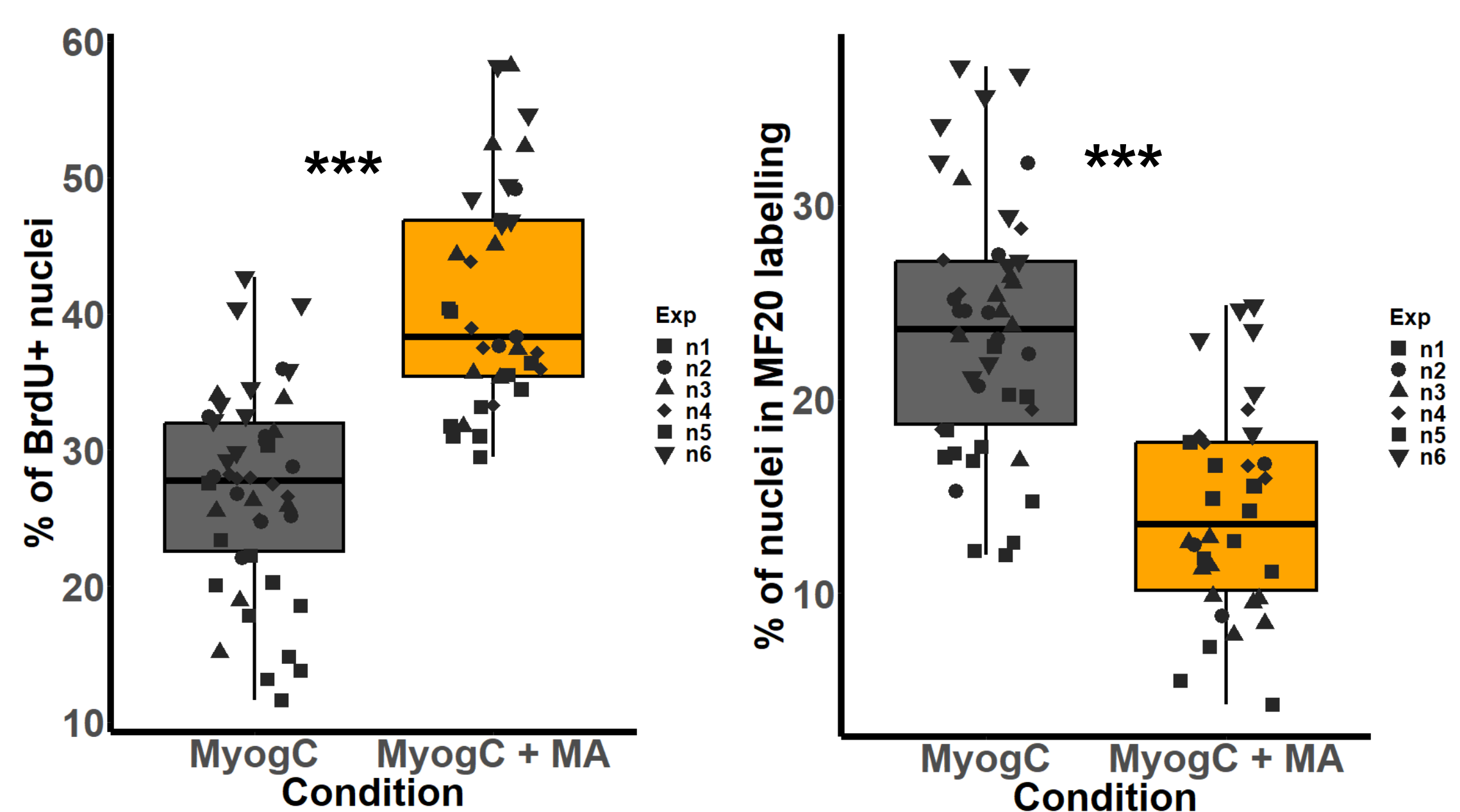
Mature adipocytes enhance proliferation and reduce differentiation of myogenic cells in indirect coculture



The observed effects on myogenic cells are dependent on quantity of mature adipocytes

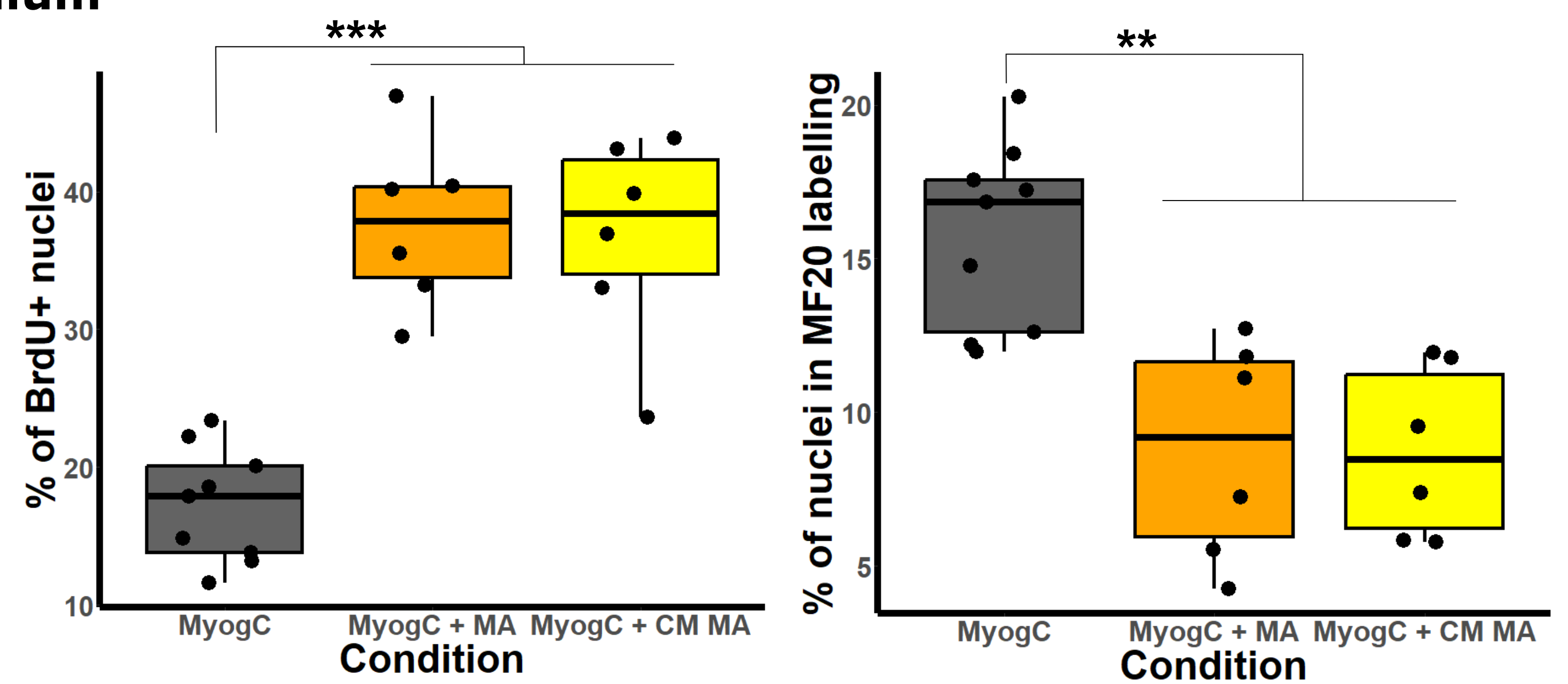


Our results indicate that with an increased concentration of mature adipocytes, both the positive impact on proliferation and the inhibitory effect on the differentiation of myogenic cells are amplified.



The proliferation of myogenic cells, measured by BrdU incorporation, is significantly enhanced after 3 days of co-culture with mature adipocytes compared to monoculture. Inversely, a decrease in differentiation, quantified by the number of nuclei within Myosin labeling, is observed.

The observed effects on myogenic cells are similar with conditioned medium



The conditioning of the medium by mature adipocytes alone is sufficient to replicate the effect observed through co-culture on proliferation and the differentiation of myogenic cells.

Conclusion

In summary, we highlight the communication from mature adipose tissue cells to muscle precursor cells in rainbow trout. This discovery reveals that mature adipocytes significantly influence myogenic cell proliferation and differentiation dynamics. Furthermore, the ability of conditioned medium from mature adipocytes to replicate co-culture effects demonstrates the role of paracrine signaling in regulating these processes.

Our next step aims to uncover the specific factor(s) responsible for these effects. We will seek to identify the nature of this factor, followed by compositional analyses of the medium conditioned by mature adipocytes.

References

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