

SUPPLEMENTARY DATA

Aging Intestinal Niche: Regulation of Stem Cells and Disease

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Supplement Table 1. Complementary scope and conceptual positioning of representative reviews on intestinal stem cells and gut aging

Author	Topic	Primary emphasis	Representative topics covered
Pentinmikko and Katajisto, 2020	The role of stem cell niche in intestinal aging	Stem cell-extrinsic mechanisms of intestinal aging	ISC regenerative decline, Paneth cell alterations, niche signaling, and lifestyle or pharmacological interventions
Sirvinskas et al., 2020	Intestinal stem cells heterogeneity and clonal dominance during aging: two faces of the same coin?	ISC heterogeneity and clonal dominance during aging	Cell-to-cell heterogeneity, neutral competition, crypt clonality, and tumorigenic risk
Hohman and Osborne, 2022	A gut-centric view of aging: Do intestinal epithelial cells contribute to age-associated microbiota changes, inflammaging, and immunosenescence?	Epithelial–microbiota–immune interactions during aging	Barrier dysfunction, microbial dysbiosis, inflammaging, immunosenescence, and systemic aging
Ma et al., 2022	Gut microbiota–stem cell niche crosstalk: A new territory for maintaining intestinal homeostasis	Microbiota–ISC niche crosstalk	Microbial sensing, microbiota-derived metabolites, Wnt and Notch signaling, epithelial regeneration, and intestinal disease
Choi and Augenlicht, 2024	Intestinal stem cells: guardians of homeostasis in health and aging amid environmental challenges	ISC homeostasis and aging under environmental challenges	ISC plasticity, niche regulation, epithelial barrier function, aging, and environmental stress
Abankwah et al., 2024	Gut aging: A wane from the normal to repercussion and gerotherapeutic strategies	Gut aging and gerotherapeutic strategies	ISCs, niche components, microbiota, intestinal dysfunction, age-associated diseases, and interventions, organized mainly as a broad survey of age-related abnormalities and interventions
Present review	Aging Intestinal Niche Regulation of Stem Cells and Disease	Convergence of intrinsic ISC aging and extrinsic niche remodeling	Intrinsic ISC aging; epithelial, mesenchymal, immune, and microbiota–metabolite remodeling; disease susceptibility; and therapeutic interventions. Provides an integrated feedback architecture; distinguishes small intestine from colon, physiological aging from injury and disease, and animal or organoid evidence from human observations; and evaluates interventions according to causal target and translational maturity