

Important: use of AI tools

- You are allowed to use AI tools for your support, for example:

- ➔ Use them as a support in a literature search
- ➔ Use them for a inspiration, then write your own text

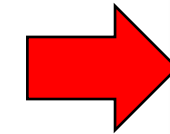
- Please note that:

- ➔ If used, obliged to shortly mention at section B:

1. Which tool did you use?
2. In what section of the text did you use the tool?
3. How did the AI usage help with your final text?

- You're obliged to mention the usage (fraud; exam committee)

- Work on most of the text yourselves: own understanding, consistency, integration, quality, learning to think!



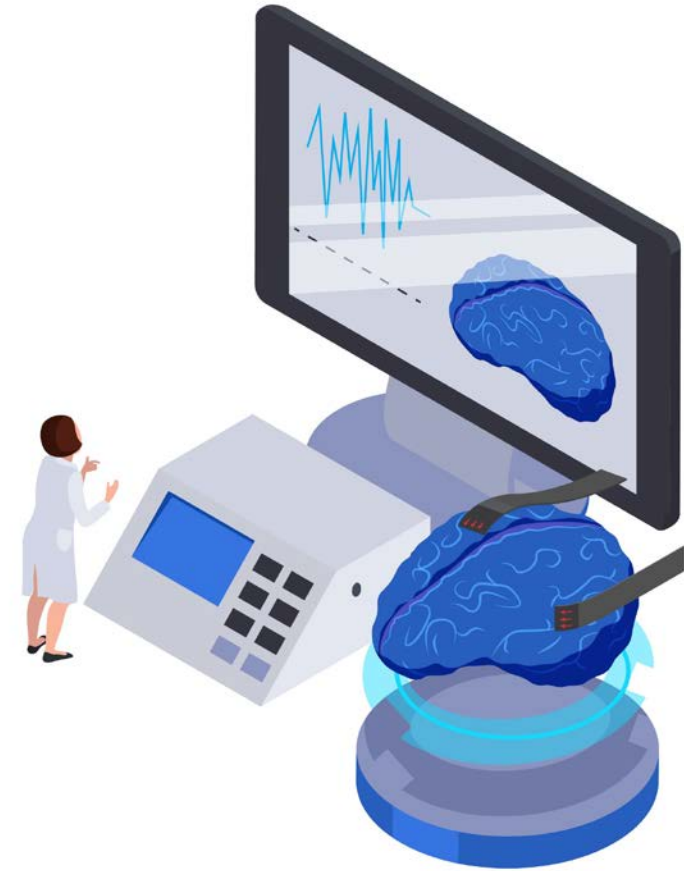
Writing is thinking. To write well is to think clearly. That's why it's so hard.

David McCullough



How can you use AI tools while writing?

- Large Language Model (LLM)
- Enter prompts -> answer
- Input model can have biases
- I will use ChatGPT as a tool example
- How to use this as a critical, modern academic?





BE

Can you wite me a short introduction on somitogenesis?



Certainly! Somitogenesis is a fascinating and intricate biological process that plays a crucial role in the development of vertebrate organisms, including humans. It is the process by which segmented structures known as somites are formed along the embryonic axis. These somites give rise to various essential components of the body, such as the vertebrae, muscles, and dermis.



Somitogenesis occurs through a highly regulated series of events involving the segmentation of the presomitic mesoderm, a specialized layer of cells in the developing embryo. This process is tightly controlled by a network of genes and signaling pathways, making it a captivating subject of study in the field of developmental biology.

Understanding somitogenesis is not only essential for unraveling the mysteries of embryonic development but also has significant implications for various medical fields, including orthopedics and genetics. It serves as a foundational process that shapes the segmented structure of the vertebrate body, highlighting the remarkable precision and complexity of biological development.

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pathways like the Notch and Wnt pathways. This process occurs in a rhythmic and precise manner, reflecting the organism's unique body plan. Understanding somitogenesis is pivotal for comprehending embryonic development and congenital disorders related to segmental patterning, making it a key focus of developmental biology research.

BE

Can you add relevant signaling molecules which are important for the process?



Somitogenesis is a fundamental biological process crucial for the development of vertebrate embryos. It involves the sequential formation of somites, segmented structures that give rise to various body components, such as muscles, vertebrae, and dermis. Somitogenesis begins with the segmentation of the presomitic mesoderm, driven by intricate molecular signaling pathways like the Notch and Wnt pathways. Notch signaling plays a key role in synchronizing the segmentation clock, while Wnt signaling influences the anterior-posterior axis of somite development. This process occurs in a rhythmic and precise manner, reflecting the organism's unique body plan. Understanding somitogenesis and its associated signaling molecules is pivotal for comprehending embryonic development and congenital disorders related to segmental patterning, making it a key focus of developmental biology research.



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BE

Can you add some jokes?



Somitogenesis is like a well-choreographed dance in the embryo's development. Picture it as a biological ballet, with cells pirouetting into somites! 🦋 And just like any dance, there are always a few "missteps" in the genetic waltz that can lead to some funny outcomes. Ever heard about the vertebrate embryo that tried to moonwalk its way through somitogenesis? It turns out, even in biology, you can't defy gravity! 😊 So, while the molecular signals may be serious business, somitogenesis occasionally throws in a genetic "twist" that keeps scientists on their toes! 🤸🤸



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Can you give grammar and spelling improvement suggestions for my text? "Somites form along the embryonic axis by sequential segmentation from the presomitic mesoderm (PSM) and differentiate into the segmented vertebral column as well as other unsegmented tissues. Somites are thought to form via the intersection of two activities known as the clock and the wavefront. Previous work has suggested that fibroblast growth factor (FGF) activity may be the wavefront signal, which maintains the PSM in an undifferentiated state."



Certainly! Your text is already well-written, but here are some minor grammar and spelling improvement suggestions:



1. "Somites form along the embryonic axis through sequential segmentation from the presomitic mesoderm (PSM) and differentiate into the segmented vertebral column, as well as other unsegmented tissues."
2. "Somites are believed to form through the interaction of two processes known as the 'clock' and the 'wavefront.'"
3. "Previous studies have suggested that fibroblast growth factor (FGF) activity may serve as the wavefront signal, maintaining the PSM in an undifferentiated state."

These changes address minor grammar and punctuation issues while maintaining the clarity and flow of your text.

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can you give me 4 references on FGF8 and its role in somitogenesis?



I can provide you with four references related to FGF8 and its role in somitogenesis as of my last knowledge update in September 2021. Please note that there may be more recent research on this topic, and you should consider searching for the latest articles using academic databases for the most up-to-date information:



1. **Dubrulle, J., & Pourquié, O. (2004). FGF signaling controls somite boundary position and regulates segmentation clock control of spatiotemporal Hox gene activation. *Cell*, 116(4), 487-498.**

This paper discusses the role of FGF signaling in somite boundary formation and its influence on the segmentation clock and Hox gene activation during somitogenesis.

2. **Aulehla, A., Wiegraebe, W., Baubet, V., Wahl, M. B., Deng, C., Taketo, M., ... & Pourquié, O. (2008). A β -catenin gradient links the clock and wavefront systems in mouse embryo segmentation. *Nature Cell Biology*, 10(2), 186-193.**

This reference explores the connection between FGF signaling, β -catenin gradients, and the coordination of the clock and wavefront systems in mouse embryo segmentation.

3. **Maroto, M., Bone, R. A., Dale, J. K., & Dale, J. K. (2012). Somitogenesis. *Developmental Dynamics*, 241(6), 1013-1032.**

While this is a review article, it provides an overview of various factors involved in

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Noem een aantal Nederlandse ontwikkelingsbiologen



Natuurlijk, hier zijn enkele Nederlandse ontwikkelingsbiologen die bekend zijn vanwege hun bijdragen aan het vakgebied van de ontwikkelingsbiologie:



1. Hans Clevers: Hans Clevers is een vooraanstaande Nederlandse ontwikkelingsbioloog die bekend staat om zijn werk op het gebied van stamcellen en regeneratieve geneeskunde. Hij heeft belangrijke bijdragen geleverd aan het begrijpen van de werking van stamcellen in verschillende weefsels.
2. Christine Mummery: Christine Mummery is een Nederlandse ontwikkelingsbioloog en stamcelonderzoeker. Ze heeft baanbrekend werk verricht op het gebied van geïnduceerde pluripotente stamcellen (iPSC's) en hun toepassingen in regeneratieve geneeskunde en ziektemodellering.
3. Sarah de Vries: Sarah de Vries is een Nederlandse ontwikkelingsbioloog gespecialiseerd in Wnt-signalering bij gastrulatie.
4. René Ketting: René Ketting is een Nederlandse moleculair bioloog die bekendheid heeft verworven door zijn onderzoek naar RNA-interferentie (RNAi) en de rol ervan in genregulatie en ontwikkeling.
5. Sander van den Heuvel: Sander van den Heuvel is een Nederlandse ontwikkelingsbioloog die zich richt op de ontwikkeling van embryonale patronen en celmigratie tijdens de ontwikkeling van organismen.

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Describe the Xenopus Spemann organizer activities, including sources.



The Xenopus Spemann organizer is a key structure in developmental biology, named after the German embryologist Hans Spemann, who discovered its crucial role in early vertebrate development. The organizer is primarily responsible for inducing and patterning various tissues during embryonic development. Here are some of the key activities and sources associated with the Xenopus Spemann organizer:



1. **Induction of the Notochord:** The organizer releases signaling molecules, such as Chordin and Noggin, which inhibit the action of Bone Morphogenetic Proteins (BMPs). This inhibition prevents the ectoderm from becoming epidermis and induces the formation of the notochord, a critical structure in the developing vertebrate embryo. The notochord serves as the axial support and a source of signaling cues for surrounding tissues.
2. **Dorsal-Ventral Patterning:** The organizer plays a vital role in establishing the dorsal-ventral axis of the embryo. It secretes antagonists like Chordin, Noggin, and Follistatin, which inhibit BMP signaling on the ventral side of the embryo. This inhibition results in the differentiation of dorsal structures, including the neural tube and somites.
3. **Anterior-Posterior Patterning:** In addition to dorsal-ventral patterning, the organizer also influences anterior-posterior patterning. Through the action of molecules like Retinoic Acid and Wnt inhibitors, it helps specify different regions of the developing embryo, including head and tail.

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Can you come up with new hypotheses why cells which are born simultaneously in the tail bud of the vertebrate embryo, do not end up in the same somite?



The phenomenon of cells born simultaneously in the tail bud of the vertebrate embryo not ending up in the same somite is a fascinating aspect of somitogenesis, and there could be several hypotheses to explain it. Here are some new hypotheses to consider:



1. **Microenvironmental Differences:** Cells in the tail bud might be exposed to subtle microenvironmental variations that affect their fate. These differences could include variations in signaling molecule gradients, extracellular matrix composition, or neighboring cell types. Cells responding differently to these cues could result in their segregation into different somites.
2. **Stochastic Gene Expression:** Even though cells are born simultaneously, stochastic gene expression at the single-cell level could lead to variations in the expression of key somitogenesis-related genes. This variability might cause some cells to follow a slightly different developmental path, ultimately leading them to different somites.
3. **Non-Cell Autonomous Signaling:** Cells in the tail bud may communicate with each other through signaling molecules. However, the reception or interpretation of these signals could be influenced by the specific history or state of a cell, leading to divergent developmental outcomes.
4. **Competition for Resources:** Cells in the tail bud might compete for limited resources

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In summary: AI tool support in writing

- You may use it for support, for example
 - ➡ Collecting information, analyzing it and critically assessing it are skills that you can learn, and must learn
 - ➡ An attitude of integrity is the basis for good scientists
 - ➡ Text support and inspiration often is reliable and interesting
- However:
 - ➡ Submitting AI-generated texts (or pieces) as your own work is **fraud**
 - ➡ AI tools are **risky** for providing reliable information, drawing conclusions and providing sources

