

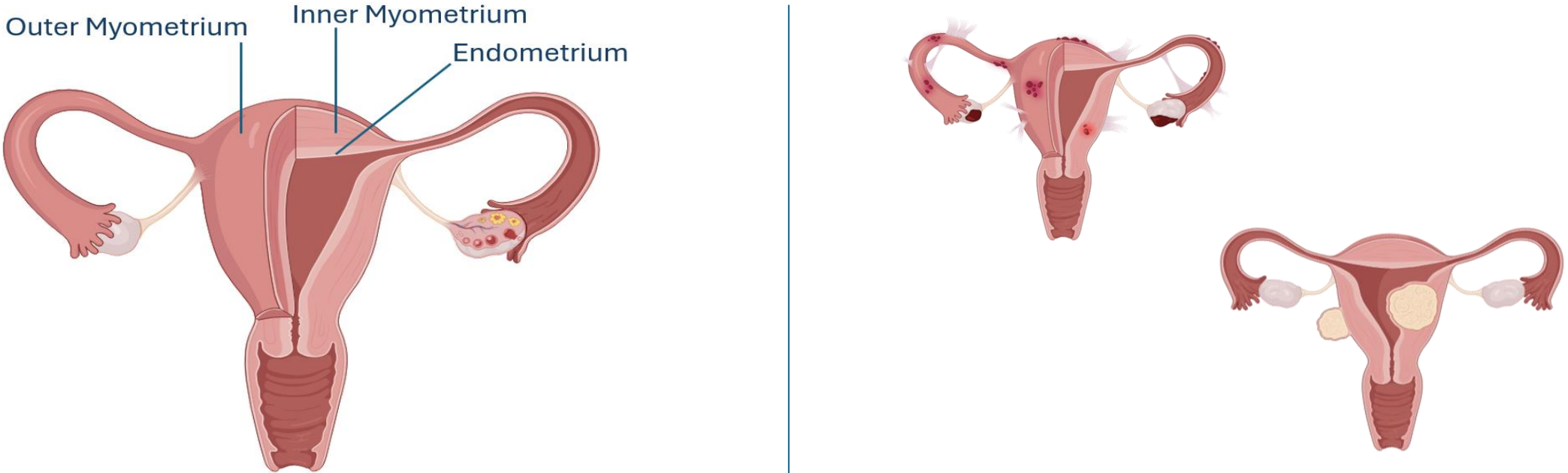
Comparing hormone receptor expression in the inner and outer layers of the human myometrium during labour and across the menstrual cycle

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Background & Hypothesis

The **myometrium**, the uterine muscular wall, plays an essential role in menstruation and parturition by generating and coordinating contractions. It has **two distinct layers**: the inner junctional zone and the outer longitudinal layer, hypothesised to have different embryonic origins.



Schematic showing (A) the inner and outer myometrial layers in a healthy uterus, (B) a uterus affected by adenomyosis, (C) a uterus affected by fibroids.

Hormone-responsive myometrial pathologies like **leiomyoma** and **adenomyosis**, often cause debilitating symptoms e.g. chronic pelvic pain and heavy menstrual bleeding, **impact quality of life** and affect one in three women of reproductive age.

The hormone receptor profiles of the myometrial layers have **not yet been fully characterised**. The cellular composition and structure of the non-pregnant myometrium is **poorly understood**, with limited research on myometrial layers. Therefore, it is hypothesised that...

The two myometrial layers have distinct hormone receptor profiles, influencing uterine function and pathologies.

Methods

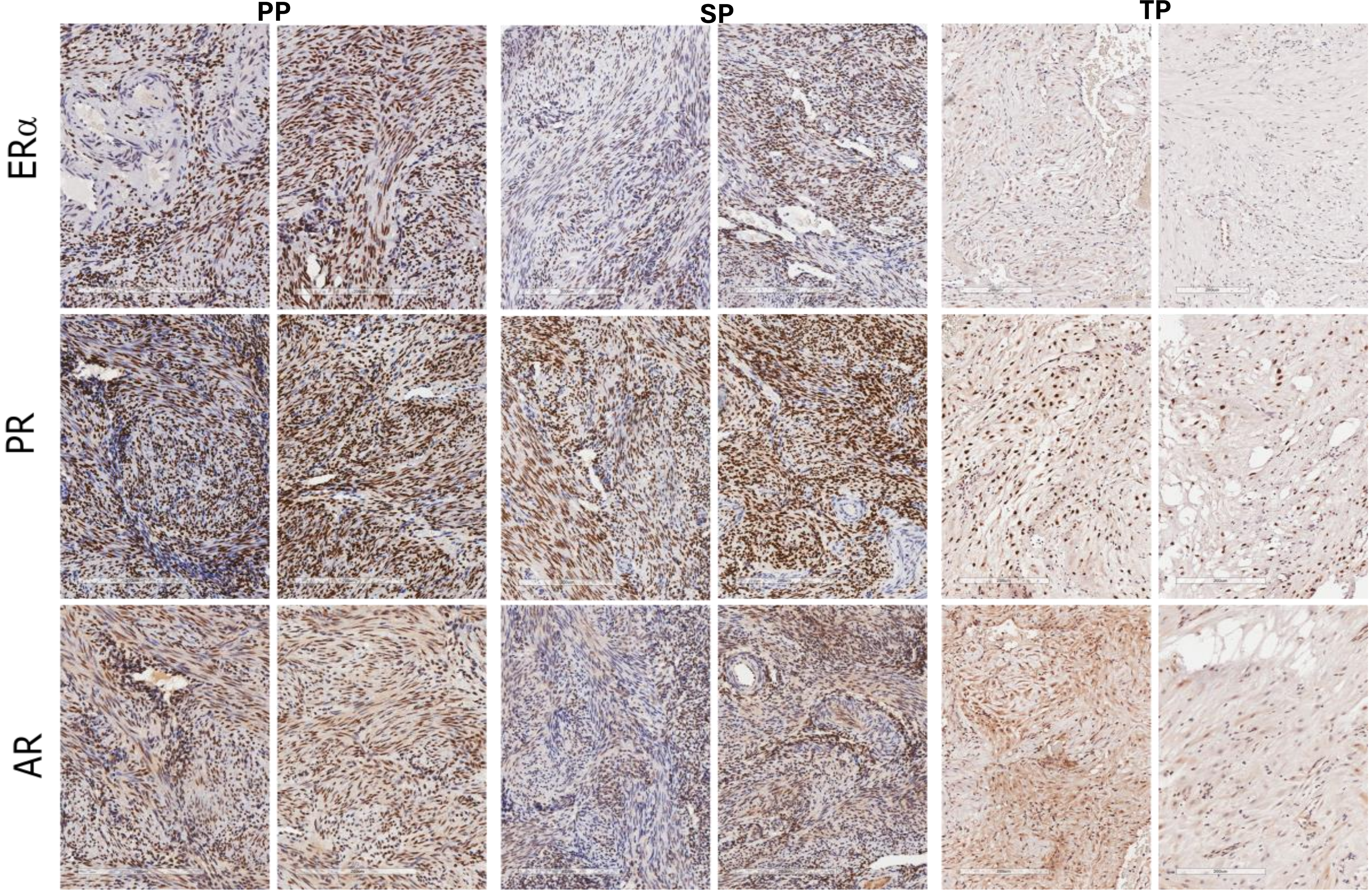
Immunohistochemistry was used to detect the presence of oestrogen receptor (**ER α**), progesterone receptor (**PR**) and androgen receptor (**AR**) in full thickness myometrial samples obtained during the proliferative phase (**PP**, n=10), secretory phase (**SP**, n=10), and in term, non-labouring pregnancy (**TP**, n=10).

Staining was quantified using **StarDist** software in **ImageJ** and graphed in **R studio**. A **Mann-Whitney U** test was used to compare expression between the inner and outer myometrial layers.

Significance was considered for **p < 0.05**.

Receptor Distribution

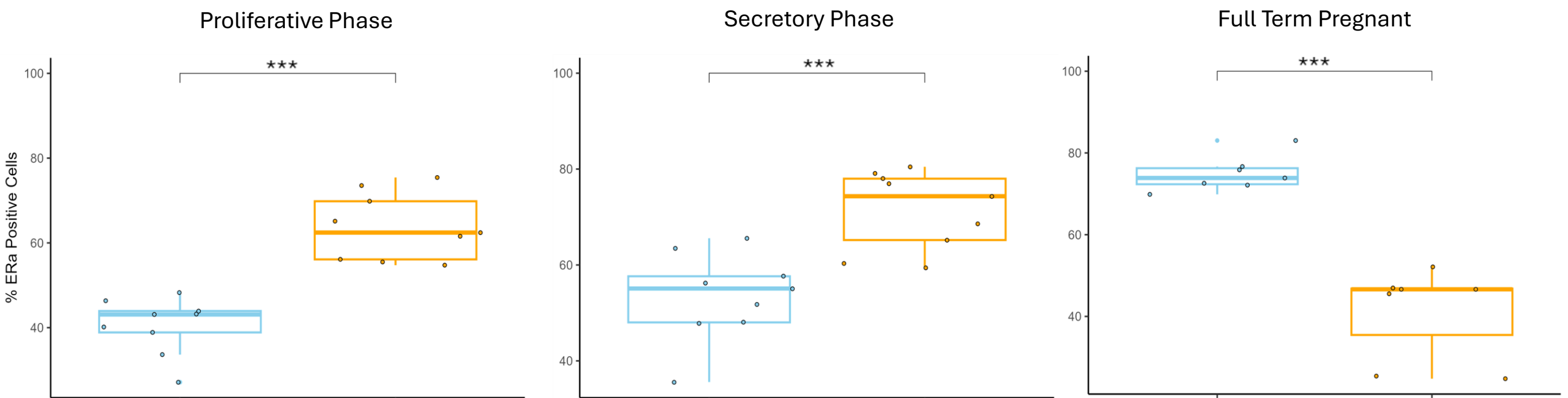
ER α , **PR** and **AR** are localised in the **nucleus** of myometrial cells, in both inner and outer myometrial layers during the **PP**, **SP** and at **TP**.



Blue haematoxylin staining of nuclei and brown DAB staining of anti-ER α , anti-PR and anti-AR antibodies, respectively, in full-thickness myometrial samples from across the menstrual cycle and at full-term, non-labouring pregnancy. Scale bars = 200 μ m.

ER α Expression Quantification

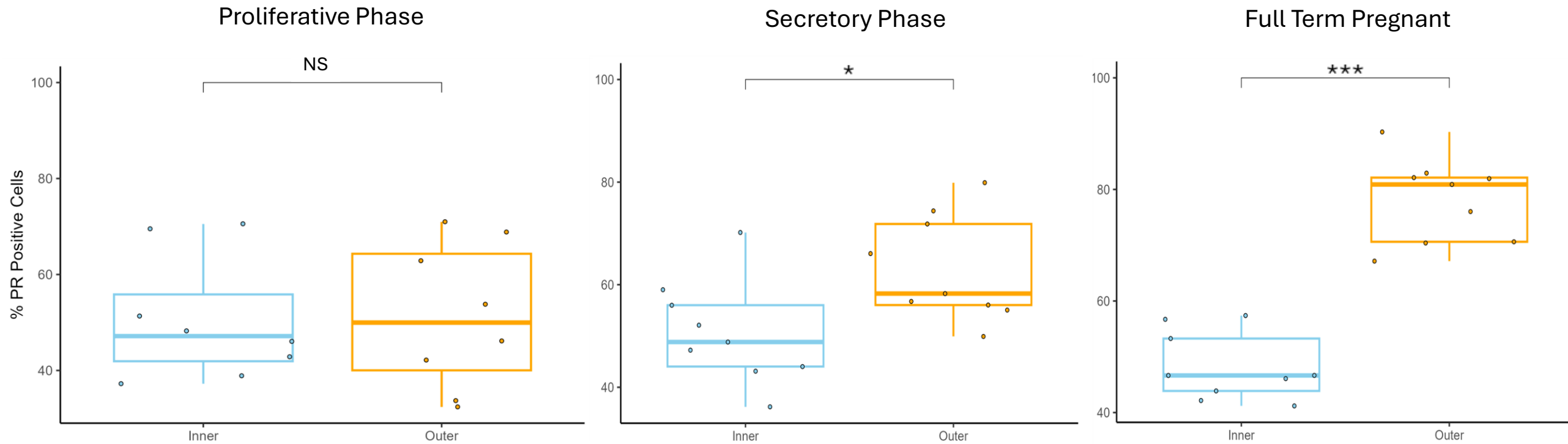
ER α is expressed in both inner and outer myometrial layers during the **PP**, **SP**, and **TP**, with **higher expression** in the **outer** layer in **non-pregnant** samples and in the **inner** layer in **pregnant** samples.



Graphs generated in R showing the percentage of ER α -positive cells in the inner and outer myometrial layers: (A) proliferative phase, (B) secretory phase, and (C) non-labouring full-term pregnancy. Significant differences are indicated (p < 0.05).

PR Expression Quantification

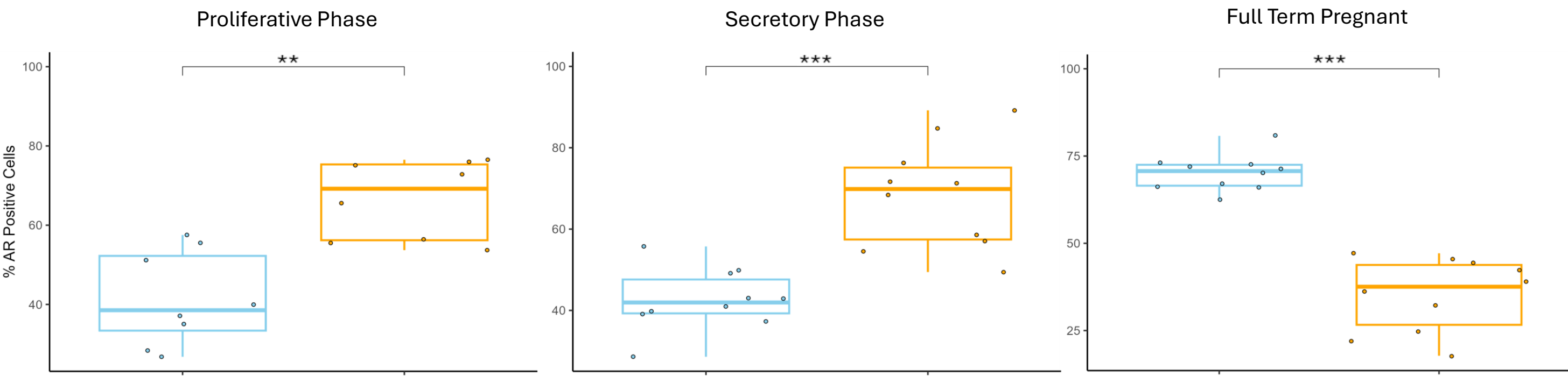
PR is expressed in both inner and outer myometrial layers during the **PP**, **SP**, and **TP**, with **higher expression** in the **outer** layer in **SP** and **pregnant** samples.



Graphs generated in R showing the percentage of PR-positive cells in the inner and outer myometrial layers: (A) proliferative phase, (B) secretory phase, and (C) non-labouring full-term pregnancy. Significant differences are indicated (p < 0.05).

AR Expression Quantification

AR is expressed in both inner and outer myometrial layers during the **PP**, **SP**, and **TP**, with **higher expression** in the **outer** layer in **PP** and **SP** samples and in the **inner** layer in **TP** samples.



Graphs generated in R showing the percentage of AR-positive cells in the inner and outer myometrial layers: (A) proliferative phase, (B) secretory phase, and (C) non-labouring full-term pregnancy. Significant differences are indicated (p < 0.05).

Summary of Findings

This study has demonstrated that **inner** and **outer** myometrial layers have **distinct hormone receptor profiles**. Differences in expression were observed between **PP**, **SP**, and non-labouring **TP**.

Elevated hormone receptor levels in the **outer** myometrium suggests **heightened hormone-responsiveness**, which may influence contractility and contribute to the development of pathologies such as **subserosal leiomyoma** and adenomyosis.

Further characterisation of myometrial layers in physiological and pathological states is required.