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A novel role for prolactin in paternal behaviour

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Parental care is essential for offspring survival and involves novel and complex behaviours that impact offspring's growth, development, and health. For many species, including humans, both parents play a critical role in raising young. However, many men and women suffer from postpartum mood disorders, which can significantly hinder their ability to provide parental care, leading to adverse effects on offspring. Understanding the neurobiological basis of healthy parental care is therefore essential to develop targeted treatments for these conditions. Hormones play a crucial role in regulating parental behaviour via receptor-specific and cell-type specific actions in brain circuits. Although we know much about the neuroendocrine regulation of maternal behaviour, far less is known about paternal behaviour. We aimed to test whether prolactin, a hormone involved in lactation and maternal behaviours, was also essential for paternal behaviour. Like humans, male mice participate in raising offspring. Pharmacologically blocking prolactin-release using bromocriptine in father mice exposed to four pups significantly reduced pup retrieval behaviour (median number pups retrieved = 1, n = 8), one of the main parental behaviours displayed in mice, compared to controls (median number pups retrieved = 4, n = 6), (Mann–Whitney U = 7.5, P = 0.026). To determine what part of the brain mediated this effect, we performed an AAV-Cre mediated conditional deletion of the prolactin receptor in the medial preoptic area (MPOA) of the hypothalamus, an area known to regulate parental behaviour. MPOA prolactin receptor knockout males showed significantly less pup retrieval behaviour (median number pups retrieved = 0, n = 6), compared to controls (median number pups retrieved = 4, n = 6), (Mann–Whitney U = 0.5, P = 0.015). Taken together, these studies provide novel evidence for a causal role of prolactin acting in the brain to facilitate paternal behaviour. As our work develops and translational opportunities emerge, these results may lend to new insight on how to improve health and well-being in those with mood disorders associated with parenthood.

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Three-dimensional somatotopic mapping of human trigeminal ganglion neurons in situ

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Trigeminal neuralgia (TN) is severe facial pain, and its pathogenesis remains unclear. For patients who are not responsive to drug treatments or not suitable for microvascular decompression surgery (eg, elderly patients, unwilling for craniotomy), percutaneous trigeminal rhizotomy (PTR), which intentionally damages the trigeminal ganglion (TG), is commonly used. Efficacy and complications of the PTR depend on the targeting accuracy, which remains a big challenge for surgeons. One of the current PTR practices is to perform multiple needlings to localise the targeting spot that recreates the patient's TN symptoms. Patients must be trained preoperatively to localise facial stimuli and tolerate the discomfort during testing. A somatotopic mapping of the TG individual neurons and their precise innervation territories may overcome this painful testing procedure. This study aimed to establish a human 3D TG somatotopic mapping and correlate it to the surgical landmarks to guide precise localisation and reduce patient discomfort in PTR.

A total of 22 adult cadavers were studied using dissection, latex injection, epoxy sheet plastination, and confocal microscopy.

The qualitative results showed that (1) the TG has a complicated but clearly defined 3D somatotopy, (2) the trigeminal rootlets are enclosed by centrally-reflected arachnoid sleeves And (3) the TG is sandwiched between the dural and arachnoid walls of Meckel's cave. No individual variation was observed in the cadavers examined in this study.

This study concluded that a precise 3D somatotopic map of the TG would be essential to guide the accurate positioning of the needle tip in PTR. In the future study, it needs to be verified in the living subject, particularly correlated to the surgical/radiological landmarks and incorporated into the neurosurgical navigation and/or robotics systems. In addition, understanding the 3D relationship between TG somatotopic map and its surrounding structures may also help us explore the TN pathogenesis from a new perspective.

Gold standard postural, balance and gait measures are reliable and valid to assess healthy older adults remotely

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The use of telehealth has increased since the COVID-19 pandemic with more health professionals using telehealth for clinical consultations. However, the lack of reliable and valid tools to measure posture, balance, and gait remotely make the assessment of these outcomes difficult. Thus, we investigated whether postural, balance, and gait measures used in clinical practice are reliable and valid when assessed remotely through telehealth conferencing.

We investigated 15 healthy older adults who performed validated tests: timed Up and Go (TUG) simple, and with dual cognitive (TUG-C) and motor (TUG-M) tasks; Berg Balance Scale (BBS), Functional Gait Assessment (FGA), Dynamic Gait Index (DGI), and 360° turning. The tests were assessed on two separate dates: (i) face-to-face at the School of Physiotherapy, in Dunedin and (ii) remotely, via Zoom between 7 and 14 days after the initial assessment. Participants also undertook the physiological profile assessment (PPA) to assess their risk of falling. Reliability was measured using intraclass correlation (ICC) two-way mixed with absolute agreement to contrast the score of the assessments undertaken face-to-face and remotely. Concurrent validity was measured using Pearson correlation between the postural, balance and walking tests that were undertaken remotely and PPA.

All tests showed good reliability (TUG = 0.85; TUG-C = 0.84; TUG-M = 0.80; BBS = 0.78; FGA = 0.89; DGI = 0.90; 360° turning = 0.77). The tests were valid, with moderate to strong correlations between PPA and: TUG (P = 0.01/ r = 0.70), TUG-C (P = 0.02/ r = 0.64), TUG-M (P = 0.01/ r = 0.70), BBS (P = 0.04/ r = 0.56), FGA (P = 0.01/ r = 0.69); DGI (P = 0.01/ r = 0.70) and 360° turning (P = 0.01/ r = 0.66).

These findings are encouraging given the good reliability between face-to-face and remote measurements and the validity of these measures to assess fall risk even when performed remotely. The results suggest that health professionals could use these measures to assess the posture, balance, and gait of healthy older adults remotely. However, this needs to be confirmed in a larger trial.

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