nuttall women's health

Franklin Factor

Catalyzing Innovation in Women's Health

Issued by: Nuttall Women's Health

Funding Scope and Duration

Franklin Factor offers flexible support for projects ranging in duration from **one to three years**, with total funding requests **ranging from $500,000 up to $5,000,000 US dollars per project**. **NWH expects to fund several projects in the Franklin Factor RFP**. Proposed budgets and timelines should be commensurate with the scope, ambition and stage of development of the project. Applicants are encouraged to carefully align their proposed work with the overall goals of the RFP and to demonstrate how the requested resources will enable meaningful scientific or technological advancement. We encourage applications from both non-profit and for-profit entities committed to transforming female health through innovation and technology.

Goal

Franklin Factor seeks to catalyze transformative technologies, innovations and medical devices that provide the necessary tools to more fully and rigorously capture molecular, physiological, environmental and microbial changes that occur in women across their lifespan. The goal is that these tools will accelerate research and clinical care through providing more rigorous and/or continuous data output leading to earlier diagnosis, personalized treatment, improved symptom management and prevention strategies tailored to the unique biological and life-course experiences of women. Inspired by the pioneering spirit of **Rosalind Franklin**—whose groundbreaking scientific discoveries laid the foundation for modern molecular biology and **Benjamin Franklin**—a visionary inventor—this initiative embodies the pursuit of bold, interdisciplinary solutions to accelerate progress in women's health.

Desired Clinical Impact

Franklin Factor seeks to catalyze a new era of technological innovation in women's health by advancing devices, tools and platforms that enable deeper, more precise understanding of female physiology and pathology. Specifically, the project aims to: (1) uncover and characterize the physiological and molecular mechanisms that underlie sex-specific health trajectories and disease manifestations; (2) harness and adapt emerging technologies—*such as biosensors, wearables, AI-driven analytics and diagnostics*—to more effectively treat conditions that disproportionately or uniquely affect women; and (3) accelerate the development and deployment of both at-home and clinical diagnostic platforms to expand access, promote earlier intervention and improve health outcomes for women across the lifespan. Through this multifaceted approach, the Franklin Factor Project aspires to close longstanding gaps in biomedical innovation and ensure that women benefit equitably from technological progress in healthcare.

The Problem

Despite remarkable advances in medicine, women's health remains underrepresented in technology-driven innovation. While there has been significant growth in the fields of wearables, biosensors and at-home testing technologies and despite some promising new findings, these innovations have largely failed to incorporate **sex-specific applications** or address the complex physiological realities unique to women.

Over the past half-century, only a handful of technologies have fundamentally transformed women's health—the birth control pill (1960s), in vitro fertilization (IVF) **(**1978), and the HPV vaccine **(**1990s–2000s) stand as landmark advances. These innovations reshaped reproductive autonomy, fertility and cancer prevention, respectively. Yet despite their profound impact, such breakthroughs have been rare. Franklin Factor is designed to change that—to **catalyze the next generation of transformative innovations** in women's

health. Just as these past technologies defined pivotal shifts in care, we aim to support tools and platforms that will drive progress in diagnosis, treatment, and prevention across the full arc of the female lifespan.

Wearable devices and biosensors have the potential to be powerful tools for tracking hormonal fluctuations not just for fertility but also for the impact on hormonally derived conditions such as migraines, premenstrual dysphoric syndrome, postpartum depression and other conditions (e.g. sleep disruptions, metabolic shifts and cognitive dysfunction) associated with menopause. While recent reports demonstrate potential feasibility of sweat-based sensors that allow for continuous monitoring of estradiol levels (without blood draws), the totality of the hormonal milieu present across the female lifespan cannot yet be quantified without laboratory-based testing.

Likewise, enhanced wearables have shown promise in integrating physiological data (e.g., temperature, heart rate, and respiratory rate) to provide individualized predictions for ovulation and menstrual cycle phases. The focus on fertility limits the potential impact of these wearables to improve health for women across their lifespan. Using existing technology monitors (e.g., glucose, heart rate, hormones) to assess how specific interventions (e.g., exercise, diet, therapeutics) modify physiological profiles during specific conditions (e.g., premenstrual dysphoric syndrome, perimenopause, menstrual migraines) could significantly enhance our understanding of female health and disease.

Beyond reproductive tracking, the field is also expanding into previously underserved areas applicable to women's health. New devices track symptoms such as hot flashes, mood changes and sleep disruptions, offering actionable insights for women navigating hormonal transitions. Validation of these devices in well-phenotyped cohorts is still required. Additionally, their ability to help tailor more precision-based interventions to optimize health for women has not been adequately studied.

Innovations in assessing and treating pain are also emerging. Notably, there have been innovative ways to assess and measure pain-along with responses to various therapeutic modalities. These innovations have used pupil dilatation and skin patches (to measure specific metabolites and/or other pain-related biomarkers) as non-invasive methods to measure pain. Likewise, therapeutic wearables are being designed to alleviate pain. Yet, full exploration of these innovations and technology into specific areas in women's health (e.g. endometriosis, postpartum pelvic pain, endometriosis) are lacking.

At home testing provides distinct advantages for optimizing health. Aside from the advantages of limiting travel and increasing accessibility, it allows for more frequent testing which in turn provides deep data on which to understand physiological processes and important exposures. Additionally, at home testing creates a new opportunity for diagnostics. Demonstrating the potential of this approach, in May 2025, the U.S. Food and Drug Administration approved the first at-home HPV testing kit for cervical cancer screening. This device allows individuals to self-collect vaginal samples at home, which are then mailed to a laboratory for analysis of high-risk HPV strains responsible for nearly all cervical cancer cases. Thus, increasing accessibility for screening and with the goal of further decreasing the burden from cervical cancer. Further demonstrating the potential of at-home testing solutions is the use of microsampling devices for blood collection for biomarkers, environmental toxins and hormone levels providing more continuous assessments and more insight into drivers of health and disease. While promising, the application of at-home microsamplers to advancing women's health has been limited.

A surge in innovative biomarker technologies has revolutionized diagnostics across multiple fields. As an example, in oncology, cfDNA-based liquid biopsies have transformed cancer detection and monitoring, allowing for the identification of tumor-specific mutations, assessment of minimal residual disease and tracking of treatment response without the need for invasive tissue biopsies. In organ transplantation, cfDNA has been used as a biomarker for early detection of graft rejection, significantly improving graft survival and patient outcomes. Additionally, in infectious diseases, cfDNA has enabled rapid pathogen detection and host response monitoring, providing timely and precise diagnostic insights.

Likewise, innovative approaches and the leveraging of systems biology have allowed the discovery of protein biomarkers that have created new opportunities to identify those at risk for Alzheimer's disease. Yet, their transformative impact in other fields, innovative technologies and platforms that allow for rigorous biomarker discovery remain significantly underexplored in women's health—*an area marked by delayed diagnoses, vague symptom profiles and a lack of precision tools*. Conditions such as endometriosis, polycystic ovary syndrome (PCOS), premenstrual dysphoric disorder (PMDD) and gynecologic cancers often go undiagnosed for years due to the absence of reliable, non-invasive biomarkers. While there are emerging studies demonstrating potential promise, the use of cells and tissues that can be non-invasively sampled (e.g., menstrual fluid, vaginal swabs) as biomarkers for female health are in their infancy. By integrating these technologies into female-specific diagnostics, we can accelerate a shift toward precision medicine in women's health, bridging critical diagnostic gaps and enabling more timely, targeted care across the female lifespan.

While there is growing enthusiasm around the integration of innovation and technology in healthcare, their application to women's health—*beyond fertility*—remains critically underdeveloped. A wide spectrum of conditions and life stages in women stand to benefit from the deployment of advanced biosensors, wearables and digital health tools. For example, continuous monitoring of hormonal fluctuations could shed light on hormone-sensitive disorders such as migraines, mood disturbances and sleep irregularities. The ability to integrate real-time data streams—*including hormone levels, sleep patterns, physical activity, and glucose variability*—may offer unprecedented insight into the dynamics of female aging and the personalized effects of therapeutic interventions.

Moreover, technological advances could enable more objective measurement of complex, often poorly understood symptoms like chronic pelvic pain, allowing for improved diagnosis and targeted treatment. Non-invasive or minimally invasive diagnostics could transform the way uterine conditions such as endometriosis and fibroids are identified— reducing reliance on surgery or biopsies. Tools that quantify the physiological impact of environmental and psychosocial exposures (e.g., stress, air pollution, endocrine disruptors) could illuminate how these factors influence women's health across the lifespan. Similarly, continuous bone health monitoring would support earlier detection of osteoporosis and facilitate faster evaluation of treatment efficacy. Expanding these technological capabilities into core areas of women's health is essential to closing the innovation gap and addressing decades of clinical and research neglect.

Broad Research Priorities

Franklin Factor is seeking innovations and technologies that can be deployed in both clinical and research settings to provide continuous, real-time assessments of environmental exposures, physiological changes and biological responses. We are particularly interested in innovations that leverage biosensors, wearables and other devices to monitor critical physiological, environmental, hormonal and health-related parameters. We also strongly encourage platforms that enable rigorous, scalable biomarker discovery, particularly those that can identify non-invasive indicators of health and disease specific to the female body. These innovations will play a critical role in deepening our understanding of the complex interactions underlying the many diseases and conditions that disproportionately burden women, enabling earlier interventions and more precise, personalized care throughout the female lifespan. Innovations may emerge from academic, clinical or industry settings. **We encourage applications from both non-profit and for-profit entities committed to transforming female health through innovation and technology**.

By investing in technology centered in female health, this initiative aims to bridge critical gaps in research and clinical care that will lead to improved outcomes across the lifespan for women

Specific Research Priorities

- Proposals should be focused on female populations
- Applications focused on use of technology in specific conditions that impact women only (e.g., endometriosis, menopause, premenstrual dysphoric syndrome, postpartum depression, menopause) and/or impact women more frequently (e.g., migraines, osteporosis, pelvic floor dysfunction, autoimmune disorders, dementia) and/or impact women differently (e.g., cardiovascular conditions) are encouraged
- Studies in pregnant women are acceptable if the focus is on optimizing maternal health; proposals focusing specifically on postpartum health are encouraged
- Both early-stage and established entities are encouraged to apply.
- Interdisciplinary teams and collaborations between academia and industry are highly encouraged to drive innovation and translational potential
- Franklin Factor welcomes proposals for early-stage, pilot or proof-of-concept projects
- Projects may be in the initial phases of development and do not require extensive preliminary data, provided the proposed work is compelling and aligned with the program's aims
- Proposals that are limited in scope, designed for a rapid execution cycle or intended as a quick-turn pilot should be clearly framed as one-year efforts with budgets consistent with the effort and timeline
- Projects proposed for >1 year should have clear achievable metrics and milestones for the requested timeline

Topic Areas of Interest

- Hormonal and Physiological Monitoring: development of non-invasive or minimally invasive devices to continuously monitor hormonal fluctuations and physiological shifts relevant to dysmenorrhea, postpartum depression, premenstrual dysphoric syndrome, perimenopause, menopause, migraines and musculoskeletal disorders
- Monitoring and treatment of pain: development and/or validation of devices that detect pain associated with female disorders (e.g. endometriosis, fibroids, adenomyosis) as well as other diseases that disproportionately impact women (e.g. IBS, IBD, interstitial cystitis)
- Pelvic Floor Health Monitoring: wearable or implantable devices that assess pelvic floor muscle strength, dysfunction and response to treatment for pelvic floor disorders related to dysmenorrhea, interstitial cystitis, endometriosis, fibroids and postpartum recovery
- Environmental exposures: development of biosensors and laboratory assays to detect chemical, pollutant, and endocrine disruptor exposures that affect female health from post-pubescence to later life
- At-Home Blood Testing with microsamplers: creation of minimally invasive microsampling devices for self-administered blood collection, enabling more continuous monitoring of hormonal levels, environmental exposures, bone and metabolic health
- Non-Invasive Menstrual and Vaginal Fluid Diagnostics: advancement of diagnostic tools utilizing menstrual effluent and vaginal swabs for early detection and monitoring of endometriosis, PCOS, reproductive tract infections and pre-malignant or malignant lesions of the reproductive tract

- Next-Generation Hormonal and Metabolic Panels: development of comprehensive, multi-analyte laboratory panels to assess ovarian function, hormonal balance, and metabolic risks across life stages and health conditions, including dysmenorrhea, PMDD, infertility, PCOS and menopause
- Female-Specific Laboratory Assays: creation of standardized laboratory-based or at-home assays to provide uniform screening for hormonal, metabolic, inflammatory, microbial and environmental biomarkers that support risk stratification and personalized prevention and treatment strategies
- Next-Generation Therapeutic Devices: exploration of neuromodulation and bioelectric therapies to modulate pain pathways and reduce inflammation associated with endometriosis and chronic pelvic pain
- Localized, Non-Invasive Drug Delivery Systems: development of novel intravaginal rings, implantable devices, biodegradable patches or other targeted drug delivery platforms designed for long-term, precise treatment of reproductive health conditions
- Advanced Imaging: development of novel imaging techniques, ideally office based or at-home, for identifying and diagnosing specific female conditions (e.g., neuroimaging for migraines or menopause associated cognitive dysfunction, endometriosis-related pain, osteopenia and osteoporosis)
- Female-Centered Tools and Devices for Optimized Care: development of innovative clinical tools or medical devices specifically designed to improve the diagnosis, monitoring and treatment of women across healthcare settings (e.g., redesigned speculums for enhanced comfort and usability, instruments tailored to female anatomy, pelvic floor assessment tools and smart surgical instruments adapted for gynecologic procedures); both foundational redesigns and novel engineering approaches are encouraged

Research Design Priorities

- Responsive applications must focus on female-only populations
- Proposals validating technology in female populations, specifically studying women with and without specific conditions are highly encouraged
- Proposals can focus on conditions that impact women more frequently, present differently in women and/or only impact women
- Use of currently available technology/devices is acceptable; proposals may focus on adaptation, optimization, or novel application for female-specific health
- Collaborations between academic, clinical and industry partners are strongly encouraged
- Clinical expertise in the women's health area being studied is required**,** either directly within the applicant team or via formal collaborations

Research that is not Considered Responsive

- Proposals only using animal models
- Analyses of existing data without proposed validation studies in a prospective study
- Proposals focused on comparisons between men and women

References and Resources for Franklin Factor: Link