附件1： 中英文资助领域描述

中文资助领域描述

一、诊断技术（计划资助13项左右）

（一）真正即时诊断技术

通过材料科学、微流控技术等领域的科学进展，开发无需复杂昂贵设备即可提供快速准确诊断结果的创新解决方案。这种技术可减少对传统诊断设备的依赖，显著降低成本，提高偏远地区和中低收入国家对基本诊断服务的可及性。

无需设备的解决方案（device-less solutions）或低成本便携设备方案（solutions with a very low-cost and portable device）均可申请。主要包括以下方向：研究利用微量流体在微通道内实现实验室流程微型化的检测技术（例如将复杂生化检测集成到芯片上）；推动聚合酶链式反应（PCR）和等温扩增技术（如LAMP、NASBA）适应即时检测（POCT）的创新方法；开发用于提升即时检测灵敏度的纳米材料。

（二）面向全球健康的无创诊断技术

在中低收入国家，针对结核病（TB）、疟疾、贫血、HIV等疾病的诊断技术面临成本高、操作复杂、操作侵入性等问题，需求尚未被满足。无创诊断技术有望解决这些挑战，让诊断更加可及。本项目支持针对结核病、疟疾、贫血等高负担疾病的无创诊断技术研发。

新技术在降低侵入性的同时，需要保证高精度、低成本、易操作，并适用于资源匮乏场景。主要包括以下方向：结合移动医疗、传感器和可穿戴设备的创新应用，如结核病呼气分析、生物气溶胶检测、咳嗽声分析等；疟疾皮肤挥发物检测、透皮检测、声学或热学分析等；贫血光电容积描记术（PPG）、透皮血红蛋白测量设备（利用光吸收/散射特性或微血管床血容量变化）等无创技术；支持多传感器融合检测技术开发。

（三）中低收入国家高负担疾病新型生物标志物发现（如结核病、疟疾、HIV及妊娠早期子痫前期风险预测）

新型生物标志物可为中低收入国家的疾病诊断与筛查提供关键突破点。目标是发现有潜力转化为即时检测技术的生化、遗传、表观遗传或代谢组学特征。研究方向包括但不限于结核病的尿液标志物、妊娠早期子痫前期预测、月经大出血预测、HRP2/3缺失型疟疾检测，志贺氏菌、霍乱、HIV等疾病的早期诊断标志物研发；识别和验证用于疾病早期检测的新生物标志物（支持多重生物标志物联合检测技术开发、验证生物标志物稳定性并建立标准化检测流程）。

（四）样本采集与处理的辅助技术

1. 样本制备装置（无需仪器的样本处理）

样本制备可涵盖一个或多个样本处理过程，如样本净化、过滤、血浆/血清生成、目标物浓缩等。如样本制备与样本采集相结合，则处理步骤（血浆/血清分离、尿液样本净化等）应无缝衔接，并包含在采集工作流程中。如样品制备需要稳定化过程（特别是针对RNA靶标），样本需能在40°C、湿度70%条件下稳定保存至少24小时，无需冷链，且性能与新鲜样本等效（参考TSS 1-用于专业和/或自我检测的HIV快速诊断检测标准，TSS 1 - Human immunodeficiency virus (HIV) rapid diagnostic tests for professional and/or self-testing）。一般无需额外仪器；若必需，设备需满足便携、电池供电、成本低于50美元，操作需简单安全，能够由非专业人员或基层卫生工作者在家庭完成。

2. 结核分枝杆菌样本裂解设备（无需仪器的裂解技术）

新设备必须证明结核分枝杆菌细胞灭活（通过标准生物安全分析协议）和裂解（与机械裂解法相比）的可行性，而不需要可重复使用的仪器。裂解效率需达机械裂解法（如珠磨法、超声波处理）的50%以上，且不损伤目标DNA。裂解产物需能在40°C、湿度70%条件下稳定保存72小时，无需冷链。一般无需额外仪器；若必需，设备需满足便携、电池供电、成本低于50美元，操作需简单安全，能够由非专业人员或基层卫生工作者在家庭完成。

二、疟疾户外蚊媒控制（计划资助10项左右）

（一）新型杀虫剂活性成分，以及用于空间散发器或空间驱避剂的新型挥发性活性成分（例如，对蚊媒有效的新化学类别和现有类别的类似物）。

（二）创新的户外蚊媒控制配方和递送系统，驱动种群下降的平台（例如，诱捕和杀灭装置，也包括显著改进一代缺陷的第二代诱因糖饵Attractive Targeted Sugar Baits, ATSB）。

（三）新型内共生菌阻断按蚊中的疟原虫传播（例如，新型沃尔巴克氏菌株或其他内生物质），以及与内生菌感染或工程蚊媒相关的蚊虫饲养、运输和释放方法的改进和创新。

（四）用于病媒监测、媒介样本收集和其他户外媒介控制用途的下一代设备，例如，按蚊采样改进方案（例如图像识别、检测识别叮咬率、疟原虫感染率等），可替代HLC的诱捕器，低成本可大规模生产的蚊种识别智能诱捕器，嵌入科技元件的耐用幼虫源控制方案（tech-enabled Larval Source Management, LSM）。

优化和改进当前普遍用于其他蚊虫、病媒或农业害虫的媒介控制策略、技术或工具，将其用于疟疾媒介控制中。评审小组将优先考虑概念验证阶段的研究，或者解决当前产品挑战的补充技术和补充产品，而不是更上游的学术研究。具有以下特点的提案将被优先考虑：

1. 有公共卫生应用潜力的概念和产品（而非纯消费属性和商用领域）

2. 影响蚊虫种群、蚊虫-人类交互或感染性的产品和概念，或产品之间的组合

除非提出具有颠覆性、变革性的创新和改进，否则以下列出的现有产品和方法不在范围内：

1. 药浸蚊帐

2. 室内喷洒

3. 户外大规模群体喷洒

4. 传统气味诱捕器

英文资助领域描述

**Area 1: Diagnostics (~ 13 projects)**

**1. True Point-of-Care Diagnostics**

Innovative diagnostics solutions that provide accurate and rapid diagnostic results without the need for complex and expensive devices, by leveraging scientific advancements in material science, microfluidics, and, etc. By eliminating the dependency on traditional diagnostic devices, this approach significantly reduces costs and enhances accessibility to essential diagnostic services in remote areas and low-and-middle-income countries.

* Device-less solutions or solutions with a very low-cost and portable device will both be considered
* Research testing techniques utilizing small volumes of fluids within microchannels that can enable miniaturization of laboratory processes, allowing complex biochemical assays to be performed on a chip
* Techniques that advance Polymerase Chain Reaction (PCR) and isothermal amplification methods (e.g., LAMP, NASBA) that can be adapted to POCT
* Development and use of nanomaterials in POCT that elevate sensitivity

**2. Non-invasive Diagnostics for Global Health**

Current diagnostics for diseases such as Tuberculosis (TB), malaria, anemia, HIV, and other conditions in low- and middle-income countries (LMICs) often face lack of access due to its high-cost, complex maintenance & operations, and intrusive characteristics. The emergence of non-invasive diagnostic technology has high potential of addressing these challenges and making diagnostics more accessible. We aim to support the research and development of such non-invasive diagnostic technologies for high-burden diseases such as tuberculosis, malaria, and anemia.

* Technologies that eliminate the need for invasive procedures while maintaining high accuracy, low-cost, and easy-to-use in low-resources settings
* Leverage innovations in mobile health, sensors, and wearables to detect key conditions. Some examples:
  + TB: breath analysis, Bioaerosols, cough sound, etc.
  + Malaria: skin volatile, transdermal detection, acoustic, thermal analysis, etc.
  + Anemia: non-invasive technologies such as photoplethysmography and Transcutaneous device to measure hemoglobin level. Devices that can utilize light absorption and scattering properties to measure hemoglobin levels non-invasively or measure blood volume changes in the microvascular bed of tissue.
* Detection can be achieved by composite measurement using multiple sensors and input.

**3. New biomarker discovery for high-burden diseases in LMICs such as TB, Malaria, HIV, and preeclampsia risk detection in early pregnancy**

Novel biomarkers can make essential pivot points for disease diagnostics and screening in LMICs.

* Identify biochemical, genetic, epigenetic, or metabolomic signatures that can be translated into point-of-care tests
* Indications would include but not limited to urine markers for TB, early prediction of pre-eclampsia in early pregnancy, heavy menstrual bleeding prediction, Malaria with HRP2/3 deletion, Shigella, Cholera, HIV, etc.
* Identify and validate new biomarkers for early detection of diseases
* Multiplexed biomarker detection that enlists a comprehensive profile
* Biomarker stability and standardization protocols research

**4. Adjunct Technologies for Sample Collection and Processing**

**(1) Sample Preparation Devices (Instrument-free sample processing)**

Sample preparation solutions could include single or multiple sample processing aspects such as sample clean up, filtration, plasma/serum generation, analyte concentration, etc.

* If sample preparation is integrated with sample collection, the processing step (e.g., plasma/serum separation, urine sample clean up) should be seamless and included in the collection workflow.
* If sample preparation includes stabilization, specifically for RNA targets, solutions should enable sample stabilization for at least 24 hours or more at temperatures up to 40°C and humidity up to 70% without the need for cold chain. The samples must also meet performance equivalence to fresh samples (**[TSS 1](https://apps.who.int/iris/bitstream/handle/10665/251857/9789241511742-eng.pdf?sequence=1)**[- Human immunodeficiency virus (HIV) rapid diagnostic tests for professional and/or self-testing](https://apps.who.int/iris/bitstream/handle/10665/251857/9789241511742-eng.pdf?sequence=1)).
* Ideally, no additional instruments should be required to complete the steps. However, if any are necessary, they must be compact, easily transportable, battery-powered, and cost-effective (under $50 USD).
* The solution must be simple and safe enough to be performed at home by a lay user or by a low-level health care worker.

**(2) Sample Lysis Devices (Instrument-free lysis) for TB lysis**

* Novel devices must demonstrate feasibility of MTB cell inactivation (by standard biosafety analysis protocols) and lysis (as compared to mechanical lysis via bead beating or sonication) without the need for a reusable instrument. (<https://academic.oup.com/cid/article/78/5/1313/7596605>).
* The solution must break open the MTB cells (>50% lysis efficiency compared to mechanical lysis via bead beating or sonication) without damaging target DNA.
* The resulting lysate must be stable for up to 72 hours at temperatures up to 40°C and humidity up to 70% without the need for cold chain.
* Ideally, no additional instruments should be required to complete the steps. However, if any are necessary, they must be compact, easily transportable, battery-powered, and cost-effective (under $50 USD).
* The solution must be simple and safe enough to be performed at home by a lay user or by a low-level health care worker.

**Area 2: Malaria Vector Control (~ 10 projects)**

**1. Research on novel active ingredients of insecticides, and novel volatile active ingredients for use in spatial emanators or spatial repellents** (e.g. new chemical classes and analogues of existing classes with efficacy against mosquitoes)

**2. Research on innovative outdoor mosquito vector control formulations and delivery systems, platforms to drive populations down** (e.g., lure and kill, including 2nd generation ATSB)

**3. Novel endosymbionts blocking *Plasmodium* transmission in *Anopheles***(e.g., novel strain of Wolbachia or others), **and improved approaches for rearing, transporting, and releasing modified mosquitoes**

**4. Next generation devices for monitoring, vector sample collecting, and other outdoor vector control use cases** (e.g. traps showing improved sampling of anopheline mosquitoes, replacements for HLC, low-cost manufacturable smart traps that identifies species, durable tech-enabled LSM)

Refining and optimizing current vector control strategies, techniques or tools that are employed more generally for the control of other mosquitoes, disease vectors or agricultural pests that may have a fit within the malaria vector control context. The panel will consider research at the proof-of-concept stage in preference to more upstream academic research, or complementary technologies / products to address challenges of current products. Of particular interest are;

* Products and concepts that are scalable for public health impact.
* Products and concepts that affect mosquito populations, mosquito-human interactions, or infectivity or combinations of these.

Existing products and vector control approaches listed below are out of scope unless a disruptive, transformational innovation is proposed which promises to overcome the current barriers to wide scale use and cost-effectiveness of the approach.

* ITNs
* IRS
* Swarm spraying
* Traditional odour baited traps