# 用指甲床自拍检测贫血的APP

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论文标题：Smartphone app for non-invasive detection of anemia using only patient-sourced photos

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用指甲床自拍检测贫血的APP。《自然-通讯》论文Smartphone app for non-invasive detection of anemia using only patient-sourced photos近日介绍了一个检测贫血的智能手机App，通过分析手机拍摄的指甲床照片能检测贫血，估算血红蛋白水平。这一方法有望取代当前贫血诊断和监控所依赖的实验室血液检测。



图1：智能手机app用于非侵入性检测贫血的示例。图源：Robert Mannino

全球受贫血影响的人数超过20亿。现用于检测血红蛋白水平的临床方法不仅需要专用设备，还要在侵入性、准确性、基础设施要求和成本之间进行取舍。这些在农村和资源匮乏地区都是问题，而贫血在这些地方也最为普遍。

美国埃默里大学的Wilbur Lam和同事开发的算法能通过分析指甲床照片的颜色和技术元数据，计算血液中的血红蛋白浓度。运用这一方法，嵌入App的算法只需要手机而不需要任何其他设备就能运作。一项由100人参与的临床评估显示，该App估算血红蛋白浓度的灵敏度和准确率与现有贫血检测诊断工具几乎一样高。对4名参与者展开的进一步评估显示，App作为监测工具的准确率也很高。




图2：智能手机app用于测量血红蛋白(Hgb)的实施。图源：Mannino等

作者认为，该App可以在缺乏专用设备和专业人员的地区实现贫血筛查，让贫血患者用不到1分钟的时间对自己的血红蛋白水平进行远程监控。不过，仍需对更多参与者展开进一步研究，以确定这一方法的诊断准确率足够高，足以取代基于血液的贫血检测。

摘要：We introduce a paradigm of completely non-invasive, on-demand diagnostics that may replace common blood-based laboratory tests using only a smartphone app and photos. We initially targeted anemia, a blood condition characterized by low blood hemoglobin levels that afflicts >2 billion people. Our app estimates hemoglobin levels by analyzing color and metadata of fingernail bed smartphone photos and detects anemia (hemoglobin levels <12.5 g dL − 1) with an accuracy of ±2.4 g dL − 1 and a sensitivity of 97% (95% CI, 89 – 100%) when compared with CBC hemoglobin levels (n = 100 subjects), indicating its viability to serve as a non-invasive anemia screening tool. Moreover, with personalized calibration, this system achieves an accuracy of ±0.92 g dL − 1 of CBC hemoglobin levels (n = 16), empowering chronic anemia patients to serially monitor their hemoglobin levels instantaneously and remotely. Our on-demand system enables anyone with a smartphone to download an app and immediately detect anemia anywhere and anytime.

阅读论文全文请访问：http://t.cn/Ey0BWUv

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- 5-year impact factor: 13.691
- Immediacy index: 1.829
- Eigenfactor ® score: 0.92656
- Article Influence Score: 5.684
- 2-year Median: 8

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