Hand-powered centrifuge

Country of origin | United States of America

Health problem addressed
Anemia is a widespread condition, especially in the developing world, where it contributes to such problems as high maternal and child mortality. A diagnostic method that does not require electric power would make anemia diagnosis easier in low-resource settings, allowing medical personnel to identify anemia and proceed with treatment.

Product description
The hand-powered centrifuge comprises a salad spinner with a customized insert. The insert features combs arranged in two concentric circles. The inner circle is elevated above the outer circle, such that a capillary tube placed through the teeth of both combs is held at the proper angle (70 degrees) for blood centrifugation.

Product functionality
The healthcare worker using the device would place tubes into the insert, close the lid on the salad spinner, and then operate the spinner for 10 minutes. At the end of this time, they would remove the tubes and use the reader card for the device (virtually identical to reader cards for conventional hematocrit centrifuges) to estimate the patient's hematocrit.

Developer's claims of product benefits
There are several options currently available for anemia diagnosis in developing regions. Electric centrifuges can be used when electrical power is available. The WHO has created a color scale that can be used for a visual estimation of hemoglobin levels without the use of electric power. Clinical personnel can also attempt a symptomatic diagnosis. For developing regions with poor or no access to electricity, this device's non-reliance on electric power makes it a significant improvement over electric centrifuges. However, the device still relies on an objective measurement of hematocrit, removing the subjectivity associated with symptomatic diagnosis and diagnosis using the WHO color scale, both of which show large variations in effectiveness between different caregivers.

Operating steps
Obtain blood sample from patient. Use capillary tube to draw up part of sample. Place tube through teeth of one comb in each circle of combs. Place lid on salad spinner. Operate salad spinner for 10 minutes. Remove lid. Take out capillary tube, and use the reader card in the manual to estimate the patient's hematocrit.

Development stage
Studies have been conducted in a laboratory setting regarding the centrifuge's usefulness in spinning down blood samples. The technology does not compact the RBCs to the same extent as an electronic centrifuge, but it was found that the extent of the plasma/RBC separation is consistent (with 17.6% trapped plasma in the cell portion) when the device is used according to the instructions. This allows for repeatable and accurate measurements of hematocrit using the technology.

Future work and challenges
The device has not been commercialized yet. The aim is to partner with a commercial manufacturer of salad spinners to design and manufacture an insert to hold the capillary tubes for mass production, and to commercialize and scale up dissemination of the hand-powered centrifuge.

User and environment
User: Technician, nurse
Training: None
Maintenance: After each use, the inside of the device should be wiped with an antiseptic

Environment of use
Settings: Rural, urban, primary (health post, health center), secondary (general hospital)
Requirements: The facility needs the equipment and personnel to obtain small volume blood samples (finger pricks are adequate), and the infrastructure to properly dispose of the biohazardous waste generated by sample collection.

Product specifications
Dimensions (mm): 53 x 14 x 3
Weight (kg): 0.001
Consumables: Capillary tubes for blood samples
Life time: 1 year
Shelf life: 2 years
Retail Price (USD): N/A
List price (USD): 30
Other features: Portable, reusable
Year of commercialization: N/A
Currently sold in: N/A

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