Semisynthetic artemisinin
Cross-sector partnership to stabilize the antimalarial drug supply

MALARIA
sickens more than 200,000,000 and kills more than 620,000 people each year, most of them children under five in sub-Saharan Africa. Malaria can be effectively prevented, diagnosed, and treated using a combination of available tools. The World Health Organization (WHO) recommends artemisinin-based combination therapies (ACTs) as the first-line treatment for infection with the most deadly form of malaria. Globally, demand for ACT treatments has increased exponentially, jumping from 11.2 million courses in 2005 to 331 million in 2012. Artemisinin is the starting material for synthesis of major active pharmaceutical ingredients used in ACTs.

PUBLIC-PRIVATE PARTNERSHIP helps stabilize the artemisinin supply chain and prevent future shortages.

With funding from the Bill & Melinda Gates Foundation, partners set out to develop a new pharmaceutical manufacturing process to produce commercial volumes of high quality, non-seasonal, and affordable artemisinin to supplement the plant-based supply.

FROM THE LAB TO THE FACTORY FLOOR
Commercial production launched at Sanofi’s plant in April 2013.

WHO prequalification for semisynthetic artemisinin and artemesunate achieved in May 2013.

2014 production capacity = 50–60 metric tons per year (1/3 of the global need).

First drug manufactured with semisynthetic artemisinin intermediate, expected to enter market in 2014.

MARKET FOR ARTEMISININ (2005–2014)
Fluctuating prices complicate supply planning

From glucose to artemisinin
Manufacturing innovation promotes a steady supply of artemisinin for ACTs

From seed to ACT: ~10 months
Agricultural method
CULTIVATION & EXTRACTION
Comparable price: $380–$420/kg

FROM LAB TO FACTORY FLOOR
Semisynthetic method
FERMENTATION & PHOTOCHEMISTRY
ARTESININ DERIVATIVES
Artesunate (WHO prequalified)
Artemether
Dihydro-Artemisinin

COMPANION DRUGS
Lumefantrine (A-L)
Amodiaquine (AS-AQ)
Mefloquine (AS-MQ)
SP (AS-SP)
Piperaquine

Artemisinin imports into India

2. According to an email from Neel Lakhani, Clinton Health Access Initiative (April 2014).
3. Artemisinin price range per kilogram
4. Current cost of semisynthetic artemisinin at $380 to $420/kg is comparable to the historical average cost of high-quality botanical production.
5. Source: PATH

The world’s supply of artemisinin, currently derived from the sweet wormwood plant, Artemisia annua, is volatile due to a number of factors, resulting in price volatility and periodic shortages.