Antibodies against *Anaplasma phagocytophilum*

Human Granulocytic Anaplasmosis (HGA) was first recognized in the United States (Chen et al. 1994) and is the most common tick transmitted disease after Borreliosis. Causative agent of this emerging zoonosis is the rickettsial species *Anaplasma phagocytophilum*, a Gram-negative obligate intracellular pathogen infecting mammalian hosts worldwide. It is endemic in 42 countries with an overall case fatality of 5% (Atifi et al. 2015). Pathogenesis of HGA is an issue of global concern as the number of cases is continuously increasing due to global warming, increases in recreational outdoor activities, and worldwide trade (Atifi et al. 2015; Wang et al. 2013). In certain parts of Asia patients are even considered to develop more frequently a serious form of the disease concomitant with an increased fatality rate (Wang et al. 2013).

Manifestation of HGA includes mostly non-specific flulike symptoms. Therefore, patients are often initially misdiagnosed with a mild viral infection. Five percent of the patients develop life-threatening complications and delay in treatment may result in severe illness and even death (Atifi et al. 2015). *A. phagocytophilum* has a complex life cycle and develops within ticks typically belonging to the *Ixodes persulcatus* complex. It requires evasion of the immune system in order to persist in the mammalian host. *A. phagocytophilum* invades and replicates within neutrophils by employing an array of mechanisms to subvert their bactericidal activity. Concurrent infection of *A. phagocytophilum* with other tick-borne pathogens, transmitted by the same vector, have been reported (Atifi et al. 2015).

The immunodominant major surface protein 5 (Msp5) has been used for diagnosis of *Anaplasma* in mammals since several years (Palmer et al. 1994). During biological transmission, the 20-kDa protein is expressed in the salivary glands of infected ticks (Knowles et al. 1996). Visser et al. (1992) suggested that it is an important protein in the *Anaplasma* life cycle.

Commonly recognized by antibodies in HGA patient sera is also the p44 protein (Ijdo et al. 1998). It is a member of the outer membrane protein superfamily (OMP1/ Msp2/ p44), which are regarded important virulence factors of *Anaplasma* pathogens (Chávez et al. 2012; Park et al. 2003). The protein is thought to allow the bacterium to adhere to the host cell and avoid host immune surveillance (Ijdo et al. 1998; Wang et al. 2013). Presently it is a very well-known serodiagnostic protein (Gaowa et al. 2014).

The major outer membrane protein A (OmpA) is a peptidoglycan-binding lipoprotein promoting endocytosis of the bacterial cells. OmpA is critical for entry and infection of mammalin host cells (Kahlon et al. 2013; Ojogun et al. 2012).

DIARECT’s *Anaplasma phagocytophilum* antigens Msp5, OmpA and p44 are produced in the baculovirus/insect cell expression system and *E. coli*, respectively.

Figure: SDS-PAGE of two independent lots of *A. phagocytophilum* (Ap) p44 and OmpA. The molecular weight of protein standards included in the size ladder (L) are indicated on the left.

<table>
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<tr>
<th>Ordering Information</th>
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<tr>
<td>45600</td>
<td><em>Anaplasma phagocytophilum</em> Msp5 0.1 mg</td>
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<tr>
<td>45601</td>
<td>1.0 mg</td>
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<tr>
<td>45800</td>
<td><em>Anaplasma phagocytophilum</em> OmpA 0.1 mg</td>
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<tr>
<td>45500</td>
<td><em>Anaplasma phagocytophilum</em> p44 0.1 mg</td>
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<tr>
<td>45501</td>
<td>1.0 mg</td>
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References:
Chen et al. (1994) J Clin Microbiol. 32: 589–595
Knowles et al. (1996) J Clin Microbiol. 34: 2225-2230
Visser et al. (1992) Infect Immun. 60: 5139-5144
Wang et al. (2013) PLoS One. 8 (10): e78189

In some countries the use of certain antigens in diagnostic tests may be protected by patents. DIARECT is not responsible for the determination of these issues and suggests clarification prior to use.