Serology of COVID-19 infection

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What is known about COVID-19 serology

- Antibody response to all viral proteins
- NP and S specific IgM and IgG Abs are produced 2-4 days post-infection
- IgM titer dropped 3-4 weeks post-infection
- Presence of IgM indicates the acute phase of infection
- IgG remained at high titer weeks post-infection
- Possibility of Ab detection earlier than clinical symptoms onset and PCR positivity
- Production of neutralizing Abs against S-RBD
- Approval of neutralizing effect of Abs by serotherapy

Role of antibody testing in PCR negative patients

Days of onset	RNA negative	Ab positive in RNA negative
≤3 days	7	2
4-7 days	28	15
8-14 days	57	56
≥15 days	30	30

Questions and ambiguities about COVID-19 serology

- Reinfection in recovered patients?
  - Specific Ab may not be induced in all recovered patients
  -Durability of specific Ab is not known
  - Serum level of neutralizing Ab is unknown
  - Requirement for titration of neutralizing Ab for patients serotherapy
- Does RBD-specific Ab confer complete and long-lasting protection?
- Disease chronicity in some patients (children, immunodeficient subjects)

Our ongoing project on COVID-19

- Synthesis of different RBDs according to sequence mutations of the S gene of **COVID-19**
- Development of S-RBD specific monoclonal antibodies
- Epitope mapping of the monoclonal antibodies by overlapping peptides spanning the RBD (PePscan project)
- Structural characterization of the monoclonal antibodies
- Functional characterization of the monoclonal antibodies
  - Binding to recombinant human ACE2 protein
  - Binding to ACE2 expressed on target cells

- Evaluation of functional inhibitory activities using

  Psuedovirus-infected susceptible cells

  Cross-neutralizing potency against **COVID-19** isolated from Iran
- Inquiring of possible enhancing effects (ADE)
- Inquiring of possible toxicity effects.
- Assessment of viral neutralization by selected monoclonal antibodies in an animal model (passive immunotherapy)
- Construction of preventive vaccine using fusion protein containing FC-RBD in an *in vivo* mouse model of **COVID-19** infection.