(1)

HUMORAL RESPONSES. (fig 11.16)

Differences between Primary & Secondary humoral responses.

	Primary Response	Secondary Response
(1)	The main responding cell population involved in Naive B cells.	The responding cell population of sec. Res. is Memory B cell.
(2)	After Ag exposure, a lag period of 4-7 days is generally observed.	lag period in Sec response is shorter may range 1-3 days.
(3)	Peak Ab response would be observed in 7-10 days.	Peak Ab response is observed in 3-5 days.
(4)	With properties of Ag. Primary res. differs but it is lower in magnitude as compare to Sec. res.	Sec. response is 100-1000 times higher in terms of Ab productn than Pri. resp.
(5)	IgM is predominant isotype produced early in resp.	Sec. response involve IgG isotype predominantly.

(6) Antibodies generated in pri Response have lower affinity.	Sec. response result in Ab production of higher affinity.
(7) Ag. either TD / TI are those against which pri. Response is observed.	Antigens aginst which sec. response is observed are Thymus dependant Ag. only.

In Vivo - Sites for induction of Humoral responses - (fig 11-18).

Inside the host body activation and differentiation of B cells occurs in defined anatomic location whose structures pose certain restrictions on the kind of cellular interactions that can occur.

When Ag enters in the body, it becomes concentrated in various peripheral Lymphoid organs. Blood-borne Ag is filtered by spleen, whereas Ag

from tissue spaces get filtered by lymph nodes.

- A lymph node is an extremely efficient filter capable of trapping more than 90% of any Ag carried into it by afferent lymphatic vessel.
- Ag and/or Ag-Ab complexes enter either alone or with Ag-transporting - DC or (Langerhans cells) macrophages.
- As it percolates down it will encounter DCs in paracortex or macrophages scattered throughout lymph node or follecular DCs - in follicles and germinal centers.
- The Ag sp. T & B cells within lymph node migrate through their respective areas of lymph node. (paracortex & cortex respect.) to arrive at the boundary between these areas where they interact to form T-B conjugates
- On Ag-mediated B cell activation, small foci of proliferating B cells form

at the edges of T cell rich zone.
These B cells differentiate into IgM & IgG secreting Plasma cells.
Similar events take place in spleen.

- few days later of formation of foci within Lymph nodes, few activated B cells & few TH cells migrate to primary follicles which then develop into secondary follicles, that provides special microenvironment for interaction between B cells, Activated TH cells & follicular DCs.
- Activated B cells with some activated TH may migrate towards the centre of secondary follicle forming Germinal Center
- Germinal centers arise within 7-10 days after initial exposure to thymus dependent ag.

Three imp B cell differentiation events take place here Affinity maturation
Class switching
formation of Plasma & Memory Cells.

(5)

Difference between Memory B cells & Plasma cells that are generated in Germinal Centers.

	Naive B cells.	Memory B cells.
(1)	Membrane marker immunoglobulin observed on Naive B cells are IgM & IgD only.	On memory B cells along with IgM IgG / IgA / IgE may exist (unsure about presence of IgD).
(2)	Naive B cells have low levels of complement receptors.	complement receptors on Memory B cells are higher in number.
(3)	Spleen is main location of Naive B cells.	Memory B cells exist in BM, lymphnode, spleen.
(4)	Naive B cells are of short lived.	Memory B cells are long lived cells.
(5)	Display receptors of lower affinity	High affinity receptors are displayed by memory B cells.
(6)	Low levels of ICAM-1 are observed on Naive B cells.	High level of ICAM-1 are observed on Memory B cells.