



Contextual Investigation: Monoclonal Antibodies

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ABSTRACT

Monoclonal antibodies (MAb) are antibodies that are indistinguishable in light of the fact that they were created by one kind of insusceptible cell, all clones of a solitary parent cell. The goal of medication focusing on is to convey medications to a particular site of activity through a carrier system. In chemotherapy, cytotoxic medications slaughter carcinogenic cells yet in addition harm typical cells. Monoclonal antibodies produced against explicit antigen, when conjugated to cytotoxic medications, can specifically convey medications to malignancy cells while limiting harm to ordinary cells. Of all the carrier system available, monoclonal antibodies are gaining importance because of their high specificity. There are four basic steps are involved in the production of a monoclonal antibody which are discussed in the following review. Monoclonal antibodies overall address an imperative advancement in clinical medicine therefore purpose of review is to study monoclonal antibodies among all available documents and put forth its brief information to researcher's.

Keywords: Carrier System, Chemotherapy, Monoclonal Antibodies.

INTRODUCTION


The goal of medication focusing on is to convey medications to a particular site of activity through a carrier system. In chemotherapy, cytotoxic medications slaughter carcinogenic cells yet in addition harm typical cells. Monoclonal antibodies produced against explicit antigen, when conjugated to cytotoxic medications, can specifically convey medications to malignancy cells while limiting harm to ordinary cells. Of all the carrier system available, monoclonal antibodies are gaining importance because of their high specificity.

The fundamental issues right now connected with foundational medicate organization are: even biodistribution of pharmaceuticals all through the body; the absence of medication explicit proclivity toward a neurotic site; the need of an enormous absolute portion of a medication to accomplish high neighborhood fixation; vague toxicity and other antagonistic reactions because of high medication dosages.

Medication focusing on, for example dominating medication collection in the objective zone autonomously on the technique and course of

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medication organization, may resolve a considerable lot of these issues. Medication focusing on is characterized as particular medication conveyance to explicit physiological locales, organs, tissues, or cells where a medication's pharmacological exercises are required. Currently, the chief plans of medication focusing on incorporate direct use of a medication into the influenced zone, detached medication focusing on (unconstrained medication amassing in the territories with broken vasculature, or Enhanced Permeability and Retention-EPR-impact), 'physical' focusing on (in light of anomalous pH esteem or potentially temperature in the neurotic zone), attractive focusing on (or focusing of a medication immobilized on paramagnetic materials under the activity of an outer attractive field), and focusing on utilizing a particular 'vector' atoms. With medicate focusing on the medication is connected reversibly to a pharmacologically inactive and biodegradable Carrier atom.

The conjugate conveys the medication at the objective site. Medication focusing on may utilize both inactive and dynamic frameworks. In latent focusing on, the circulation of the medication transporter complex is confined to the slim bed (first request focusing on). Dynamic focusing on alludes to endeavors to build the conveyance of medications to an objective using explicit cooperation's at target destinations where a medication's pharmacological exercises are required.

These connections incorporate antigen-antibody and ligand-receptor authoritative. On the other hand, physical signals, for example, attractive fields and temperatures that are remotely applied to the objective locales might be used for dynamic focusing on. Conveyance to a preselected intracellular organelle (for example lysosome) is known as third request focusing on. Despite the fact that the guideline of medication focusing on is basic yet primary issue is finding a transporter particle that convey the medication to the objective site. Another issue is conjugation of the medication with transporter atoms. Target site acknowledgment turned out to be progressively down to earth with the revelation that the cell surface has numerous receptors and with the advancement accomplished in the improvement of monoclonal antibodies.

The following factors and requirements are important when considering the development of a drug-monoclonal antibody complex or conjugate for drug targeting.

1. The recognition site for the monoclonal antibody should be located on the surface of the Cell.

2. The antibody should have tumor tissue specificity.
3. The extent of localization of the antibody at the target site.
4. Biodistribution of the drug-antibody conjugates in the body relative to that parent antibody.
5. Stability of the drug-antibody conjugates in blood.
6. The host toxicity to conjugate so conjugate must be biodegradable and non-Immunogenic. [1-5]

STRUCTURE OF ANTIBODIES

An antibody is characterized as an immunoglobulin (glycoprotein) equipped for explicit blend with the antigen that caused its creation in a powerless creature. They are delivered in light of the attack of outside atoms in the body. Antibodies exist as at least one duplicates of a Y-formed unit, made out of four polypeptide chains. Every Y contains two indistinguishable duplicates of a substantial chain, and two indistinguishable duplicates of a light chain, named as such by their relative sub-atomic loads. The head of the Y shape contains the variable area, which is the antigen restricting site. The amino corrosive arrangement in the tips of the "Y" changes extraordinarily among various antibodies. This variable locale, made out of 110-130 amino acids, give the antibody its explicitness for restricting antigen.

The variable district incorporates the finishes of the light and overwhelming chains. Rewarding the antibody with a protease can sever this locale, delivering Fab or part antigen restricting that incorporates the variable closures of an antibody. The steady district decides the component used to crush antigen. The light chains of any antibody can be delegated either a kappa (κ) or lambda (λ) type (in view of little polypeptide auxiliary contrasts); notwithstanding, the substantial chain decides the subclass of every antibody. Another piece (known as Fc section) has no antigen restricting limit and crystallizable, the structure of Fc part is the equivalent for all the antibodies, yet the structure of Fab section differs from antibody to antibody. [5-8]

MONOCLONAL ANTIBODIES

Monoclonal antibodies (MAb) are antibodies that are indistinguishable in light of the fact that they were created by one kind of insusceptible cell, all clones of a solitary parent cell. Given any substance, it is conceivable to make monoclonal antibodies that explicitly tie to that substance; they would then be able to serve to distinguish or decontaminate that substance. This has become a significant instrument in natural chemistry, sub-atomic science and medication.

Conventional heterogeneous antiserum varies from animal to animal and contain undesirable nonspecific or cross reacting antibodies (known as polyclonal antibodies). Expulsion of antibodies with undesirable determination from a polyclonal antibody readiness is a tedious undertaking including rehashed adsorption strategies. An elective methodology is to produce unadulterated (monospecific) clones of plasma cell in vitro from which monoclonal antibodies (MAb) with single antigen explicitness can be disconnected. [1,10,11]

PRODUCTION OF MONOCLONAL ANTIBODIES

There are four basic steps are involved in the production of a given monoclonal antibody-

Immunization: Inoculation of creatures with immunogens was performed by infusing microgram or milligram amounts of immunogens blended in with an adjuvant (aluminum salts) for emulsification, intradermally or subcutaneously at numerous locales over and over at various occasions. The serum, of creature was measured for the overall centralization of antibodies of wanted explicitness at different time spans. At the point when the centralization of antibodies was seen as about ideal, the creature was yielded and the spleen which contains enormous no. of plasma cell was separated into single splenocyte by mechanical or enzymatic technique.

Screening of mice for Antibody Production:

After several weeks of immunization checked whether titre was too low or high. If titre was low then BOOST (Pure antigen) and if titre was High BOOST (Pure antigen) after 2 weeks.

Cell fusion: Splenocytes were then blended with the myeloma cells in appropriate culture medium. This blend was presented to high fixation (for example half PEG) for brief timeframe and combination was continuing over some undefined time frame.

Use myeloma cell that have-

- Lost the capacity to blend hypoxanthine-guanine-phosphoribosyl transferase (HGPRT) protein.
- This enzyme enables cells to synthesize purines using an extracellular source of hypoxanthine as a precursor. Customarily, the nonappearance of HGPRT isn't an issue for the cell since cells have another pathway that they can use to combine purines. Nonetheless, when cells are presented to aminopterin (a folic corrosive simple), they can't utilize this other pathway and are currently completely subject to HGPRT for endurance.

- Lost the capacity to incorporate any antibody atoms of their own (so as not to deliver a hybridoma creating two sorts of antibody particles).
- The first property is exploited by transferring the cell fusion mixture to a culture medium - called HAT medium because it contains:
 - hypoxanthine
 - aminopterin
 - The pyrimidine thymidine

The rationale:

- Unfused myeloma cells can't develop on the grounds that they need HGPRT.
- Unfused ordinary spleen cells can't develop uncertainly in view of their constrained life expectancy. Be that as it may,
- Hybridoma cells (created by effective combinations) can develop uncertainly on the grounds that the spleen cell accomplice supplies HGPRT and the myeloma accomplice is eternal.

Mouse has been utilized for creation of monoclonal antibody discharging hybridoma on the grounds that few billion cells can be acquired from a mouse spleen. The utilization of HGPRT cells (that can't develop in HAT medium) guaranteed that solitary hybridoma is chosen. Following 7-10 days of culture in the HAT medium barely any wells contain bunch of suitable cells. Each group speaks to clonal development of hybridoma. After HAT choice single cell are moved and refined in isolated wells to guarantee the monoclonality of the emitted antibody. Wells containing feasible groups are then screened for antibody creation and antibody positive clones are subculture at low cell densities, again to guarantee clonal virtue in each microwell. [9-12]

Selection and of the clones for monoclonal antibody particularity:

When unadulterated clones of antibody-discharging hybridomas were acquired, they should be screened for the ideal antibody explicitness. Choice of hybridoma cells in HAT medium was typically trailed by screening of hybridomas for emission of antibodies of the ideal explicitness. After combination, the cell might be moved to HAT medium in tissue culture jars. After a suitable brooding time, all cell will be hybridomas. The supernatant of every hybridoma culture can be examined for specific antigen particularity in different manners.

Two techniques are every now and again utilized ELIS and RIA. Both were effectively adjusted to mass screening with 96-well plates. In both measure, antigen that responded with the ideal antibody was bound to the base of 96-well plates

and washed to evacuate unbound antigen. Supernatant from every hybridoma all around was added to isolate well and brooded for proper timeframe. On the off chance that the example of supernatant contains the ideal antibody it will remain related with the well as unbound material is washed off. In ELISA, this antibody was then distinguished by an immunoconjugate comprising of two segments covalently connected to one another. One compartment was an antibody explicit for an epitope in the steady area of the principal antibody (mouse Fc or mouse Y chain) the subsequent part was a compound, for example, basic phosphatase or pony radish peroxidase. After another washing step, dry substrate changed over into shaded substrate by the protein of the resistant conjugate was included. After a fitting hatching the enzymatic response was halted and the optical thickness of each very much was resolved at individual greatest with the particular colorimeter known as 'plate reader'.

In RIA the counter isotope antibody was radiolabeled, bound name can be identified by including the wells independently in a gamma counter or the whole plate can be presented to X-beam film.

In the event that the ideal monoclonal antibody was explicit for a cell film particle, immunofluorescent strategies can be utilized for screening. [5-8]

Cloning of Hybridoma Cell Lines by "Restricting Dilution" or Expansion:

Single cell discharging wanted antibody are disconnected from positive societies and proliferated into cell lines, either by Mouse Ascites Method (in vivo strategy) or tissue culture (in vitro).

Ascites creation in mice: In this technique hybridoma cell are infused into the peritoneal cavity of histocompatible mice. The mice are pretested by I.P. infusion to aggravate the peritoneal hole and molded condition that encourages the development of plain tumor. The liquid delivered can contain a high conc. of monoclonal antibody 3-15 mg/ml, and 3-5 ml or more can be collected per mouse. The first MAb endorsed by FDA for therapeutics use OKTS, is delivered by ascites.

This technique has following disadvantage

- I. It is exorbitant.
- II. It isn't dependable; item is debased with low degree of ordinary mouse immunoglobulin just as other mouse protein.
- III. Virus can be presented.
- IV. Human hybridomas require unique immunodeficient mice.

- V. The antibody yield in ascites is regularly lower than murine hybridomas

Vitro fermentation: Fermentation is a generally acknowledged technique for the creation of MAb in light of the issue related with ascites delivered MAb. This technique has certain focal points-

1. There is no pollution with typical mouse immunoglobulin.
2. This procedure is financially savvy particularly as serum necessity and culture medium are diminished. This can be legitimately scaled up from little pilot bioreactor to exceptionally enormous creation scale.
3. There is less tainting.
4. Human MAb can be created however at low level (0.1-0.5 mg/ml).

ADVERSE EFFECTS OF MONOCLONAL ANTIBODY THERAPY:

Monoclonal immune response treatment for malignant growth may cause symptoms, some of which, however uncommon, can be intense. When all is said in done, the more typical symptoms brought about by monoclonal counter acting agent drugs include:

- Allergic responses, for example, hives or tingling
- Flu-like side effects, including chills, weariness, fever and muscle a throbbing painfulness
- Nausea
- Diarrhea
- Skin rashes

Uncommon, however increasingly genuine reactions of monoclonal counter acting agent treatment may include:

- Infusion responses. Serious sensitivity like responses can happen and, in not many cases, lead to death. They may get medication to obstruct an unfavorably susceptible response before start monoclonal neutralizer treatment. Imbuement responses generally happen while treatment is being controlled or before long.
- Dangerously low platelet tallies. Low degrees of red platelets, white platelets and platelets may prompt genuine difficulties.
- Heart issues. Certain monoclonal antibodies may mess heart up, including cardiovascular breakdown and a little danger of coronary episode.
- Skin issues. Injuries and rashes on your skin can prompt genuine diseases now and again. Genuine injuries can likewise happen on the tissue that lines your cheeks and gums (mucosa).

- Bleeding. A portion of the monoclonal immunizer drugs are intended to prevent disease from forming fresh blood vessels. There have been reports that these meds can cause dying.
- Low levels of magnesium, potassium, or calcium in your blood, which can cause genuine medical issues.
- Immediate responses to the mixture including windedness, wheezing, raspiness, blacking out, tipsiness, obscured vision, queasiness, or chest torment or weight. [2-5]

Hindrance of tumor corruption factor: Tumor putrefaction factor (TNF) is a significant expert fiery cytokine with a wide scope of jobs in invulnerability. Hostile to TNF monoclonal antibodies (infliximab and adalimumab) have been a development in the treatment of rheumatoid joint pain, ankylosing spondylitis, incendiary entrail infection and psoriasis/psoriatic joint inflammation. In spite of the fact that etanercept is likewise generally used to repress TNF in rheumatoid joint pain, it's anything but a monoclonal counter acting agent. It is a solvent TNF-receptor-IgG Fc combination atom.

In Crohn's sickness, infliximab is helpful for inciting and keeping up clinical reduction, shutting fistulae (enterocutaneous, perianal, rectovaginal) and for lessening steroid reliance.

Restraint of lymphocyte traffic: Different sclerosis is probably going to be an insusceptible interceded demyelination in the focal sensory system. The relocation of initiated T cells into the cerebrum and spinal line is believed to be a piece of the pathogenesis. These enacted lymphocytes have antigens called integrins on their surface. Natalizumab, an adapted monoclonal counter acting agent coordinated against alpha integrin, has been concentrated in various sclerosis and Crohn's ailment. Contrasted with fake treatment, natalizumab prompted expanded reduction rates in numerous sclerosis. In Crohn's malady there were higher paces of supported reaction when natalizumab was added to standard treatment.

Forestalling organ dismissal: Allogeneic transplantation can possibly succeed if safe dismissal of the unite by the host can be controlled. Host T cells, and the cytokines/cytokine receptors that actuate them. They are key focuses for control. The monoclonal antibodies basiliximab and daclizumab (focusing on T cell initiation) are as compelling as customary immunosuppressive medications in forestalling organ dismissal.

Daclizumab, for instance, is viable in certain patients with psoriasis.

B cell consumption: Rituximab is a monoclonal counter acting agent that objectives an atom (CD20) on the outside of B lymphocytes. The principle utilization of rituximab is in oncology particularly in B cell lymphomas. B cell consumption utilizing rituximab has additionally been effectively utilized in various other immune response intervened conditions including cryoglobulinemia, Wegener's granulomatosis and bullous pemphigoid. After single patterns of rituximab, coursing developed CD20+ B cells are instantly lost from the flow, yet serum groupings of pathogenic immune response may not be intensely decreased.

Use in skin issues: The pathogenesis of psoriasis includes various safe instruments including the actuation of T lymphocytes and the arrival of incendiary cytokines, for example, TNF. Inhibitors of TNF can actuate an improvement in numerous patients with moderate to extreme plaque psoriasis. For instance, a fake treatment controlled preliminary of infliximab imbuelements indicated that following 50 weeks 61% of patients had a 75% improvement in their psoriasis. This reaction might be continued after treatment discontinuance.

Efalizumab is a monoclonal counter acting agent that objectives part of the lymphocyte works related antigen-1 (LFA-1) on T cells. This antigen has jobs in both T cell initiation and movement so authoritative to it can improve moderate to serious psoriasis.

Use in forestalling apoplexy: At the point when a monoclonal immune response ties to the glycoprotein IIb/IIIa receptor on the platelet surface it disturbs the last basic pathway of platelet actuation and accumulation. Abciximab, an illusory monoclonal immune response that obstructs this receptor, effectively diminishes myocardial areas of dead tissue in patients with intense coronary disorder who are having angioplasty.

Use in unfavorably susceptible ailments: Unfavorably susceptible eosinophilic aggravation is driven by cytokines, for example, interleukin-5 (IL-5) so these atoms are reasonable focuses for monoclonal antibodies. Sadly, hostile to IgE and against IL-5 treatments have neglected to convey on their helpful guarantee. Against IgE antibodies, for example, omalizumab have been utilized with some accomplishment in the treatment of hypersensitive issues, for example, asthma, skin inflammation and in raising resistance to certain food allergens. [6-9]

MONOCLONAL ANTIBODIES APPROVED FOR THERAPY:

Table 1. Examples of FDA approved therapeutic monoclonal antibodies						
Antibody	Brand name	Approval date	Type	Target	Indication	
<u>Abciximab</u>	ReoPro	1994	Chimeric	inhibition of <u>glycoprotein IIb/IIIa</u>	<u>Cardiovascular disease</u>	
<u>Adalimumab</u>	Humira	2002	Human	Inhibition of <u>TNF-α signaling</u>	Several <u>auto-immune disorders</u>	
<u>Alemtuzumab</u>	Campath	2001	Humanized	<u>CD52</u>	<u>Chronic lymphocytic leukemia</u>	
<u>Cetuximab</u>	Erbix	2004	Chimeric	<u>Epidermal growth factor receptor</u>	<u>Colorectal cancer, Head and neck cancer</u>	
<u>Certolizumab pegol</u>	Cimzia	2008	Humanized	inhibition of <u>TNF-α signaling</u>	<u>Crohn's disease</u>	
<u>Daclizumab</u>	Zenapax	1997	Humanized	<u>IL-2Rα receptor (CD25)</u>	Transplant rejection	
<u>Efalizumab</u>	Raptiva	2002	Humanized	<u>CD11a</u>	<u>Psoriasis</u>	
<u>Infliximab</u>	Remicade	1998	Chimeric	inhibition of <u>TNF-α signaling</u>	Several <u>autoimmune disorders</u>	
<u>Muromonab-CD3</u>	Orthoclone OKT3	1986	Murine	<u>T cell CD3 Receptor</u>	Transplant rejection	
<u>Rituximab</u>	Rituxan, Mabthera	1997	Chimeric	<u>CD20</u>	<u>Non-Hodgkin lymphoma</u>	

MONOCLONAL ANTIBODIES USED TO TREAT CANCER

Two sorts of monoclonal antibodies are utilized in malignant growth medicines:

- Naked monoclonal antibodies are those with no medication or radioactive material appended to them.
- Conjugated monoclonal antibodies are those joined to chemotherapy tranquilize, radioactive molecule, or a poison (a substance that harms cells).

Stripped monoclonal antibodies

Stripped MAbs are the most generally utilized MAbs as of now. In spite of the fact that they all work by joining themselves to explicit antigens, they can be useful in various ways.

Markers for devastation

Some exposed MAbs connect to malignant growth cells to go about as a marker for the body's safe framework to annihilate them. Antibodies now being used in this gathering include:

Rituximab (Rituxan): Rituximab is utilized to treat B-cell non-Hodgkin lymphoma and some different ailments. It is a monoclonal counter acting agent against the CD20 antigen, found on B cells. It works, to a limited extent, by naming cells with the goal that the invulnerable framework can assault them.

Ofatumumab (Arzerra): Ofatumumab is another immune response against the CD20 antigen. It is utilized for the most part to treat constant lymphocytic leukemia when different medicines are not, at this point compelling.

Alemtuzumab (Campath): Alemtuzumab is an immune response against the CD52 antigen, which is found on both B cells and T cells. It is utilized to treat a few patients with B-cell interminable lymphocytic leukemia.

Actuation blockers

Some bare MAbs don't generally connect with an individual's own invulnerable framework. Their belongings originate from their capacity to join to

the particular antigens that are working pieces of malignancy cells or different cells that help disease cells develop, and prevent them from working. These MABs are likewise alluded to as focused treatments. Instances of FDA-endorsed MABs of this sort include:

Trastuzumab (Herceptin): Trastuzumab is an immunizer against the HER2/neu protein. A lot of this protein is available on tumor cells in certain malignancies. When HER2/neu is enacted, it enables these cells to develop. Trastuzumab prevents these proteins from getting dynamic. It is utilized to treat bosom malignancies that have a lot of this protein.

Cetuximab (Erbix): Cetuximab is an immune response against the EGFR protein, which is available in huge sums on some tumor cells and encourages them develop and partition. Cetuximab hinders the enactment of EGFR. It is utilized to regard some progressed colorectal malignant growths just as some head and neck diseases.

Panitumumab (Vectibix): This MAB additionally focuses on the EGFR antigen. It is utilized to treat a few instances of cutting edge colorectal malignant growth.

Bevacizumab (Avastin): Bevacizumab focuses on the VEGF protein, which is ordinarily made by tumor cells to pull in fresh blood vessels to take care of their development. Bevacizumab joins to VEGF, which squares it from motioning for fresh blood vessels to frame. This MAB is utilized alongside chemotherapy to treat some colorectal, lung, bosom, and kidney diseases, just as glioblastomas (a sort of cerebrum tumor). It is being read for use against different malignant growths.[4]

SECOND GENERATION MONOCLONAL ANTIBODIES:

Second generation counter acting agent (chimeric antibodies) are being created by novel biotechnological strategies so as to improve entrance of conjugates into tissue. A promising chimeric counter acting agent is comprised of mouse-human antibodies in which the variable district of mouse monoclonal antibodies is connected to the human IgG1 steady areas. These chimeric antibodies have less mouse antigenic determinants as their consistent locales are encoded by human qualities along these lines, they are far less immunogenic than mouse monoclonal antibodies.

Mouse variable district in these acculturated antibodies can likewise incite a counter acting agent reaction in human in this way chimeric

antibodies containing just mouse CDRs of mouse immune response along with human structure locales, so the antibodies hold human B-strand system with just the hyper variable circles of mouse birthplace.

Another conceivably helpful biotechnological approach is the generation of bispecific F(ab) piece involving two Fab sections, one separated from an enemy of CD3 monoclonal immunizer and the other from an enemy of P-glycoprotein (the protein answerable for the wonder of various medication opposition in tranquilize obstruction disease cells) monoclonal counter acting agent. This bispecific counter acting agent (F(ab) improved the authoritative of the neutralizer and expanded the cytotoxicity of human fringe blood mono nuclear cells to p-glycoprotein positive kidney malignant growth cells.

A refined immune response has fragments of outside determined amino acids blended among variable area sections of human-inferred amino corrosive deposits and the adapted variable substantial and variable light spaces are connected to overwhelming and light steady areas of human birthplace.

Refined antibodies will be antibodies from non-human species whose protein successions have been altered to expand their closeness to counter acting agent variations created normally in people. The procedure of "acculturation" is generally applied to monoclonal antibodies produced for organization to people (for instance, antibodies created as hostile to disease drugs).

Another advancement is designed monoclonal antibodies since when mouse monoclonal antibodies utilized in high fixation they are perceived as a remote a summon counter acting agent reaction. Utilization of human monoclonal antibodies has been hampered by specialized troubles. In this manner designed immune response got from recombinant DNA innovation is presently utilized. [8-10]

CONCLUSION

Monoclonal antibodies overall address an imperative advancement in clinical medicine. Due to their expense and strategy for association they will all in all be put something aside for when standard meds have failed to motivate a response. Notwithstanding the way that these meds are outstandingly highly targeted, adverse effects do occur and clinicians should think about the threat of hypersensitivity reactions and infection. Drug monoclonal safe reaction is at present encountering clinical trial. A critical piece of the composing

available shows that 'conjugation' of drug doesn't adversely development. One productive application is in the treatment of prescription overdose using drug specific Fab fragment. Other effective application incorporates the usage of second-generation monoclonal antibodies, especially bispecific and humanized antibodies, harmful development imaging and monoclonal antibodies

as test tests. The future may see combinations of monoclonal antibodies being used to all the almost certain target complex contamination structures. Well balanced monoclonal antibodies are not less than life saving nectar for many patients, hence detailed study and more research needed for monoclonal antibodies. [1-12]

REFERENCES

- 1) Jain NK. Progress in controlled and novel drug delivery system. First edition 2004, CBS publisher and distributors. New Delhi. 320-323.
- 2) World Health Organization. International Nonproprietary Names (INN) Working Group Meeting on Nomenclature for Monoclonal Antibodies, Geneva, October 2008, INN Working Document 08.242.
- 3) General policies for monoclonal antibodies" (PDF). World Health Organization.2009 http://www.who.int/medicines/services/inn/General_policies_for_monoclonal_antibodies_2009.pdf. Accessed: Mar 27, 2010.
- 4) Le Doussal JM, Gruaz-Guyon A, Martin M, Gautherot E, Delaage M, Barbet J. Targeting of indium 111 I-labeled bivalent haptens to human melanoma mediated by bispecific monoclonal antibody conjugates: imaging of tumors hosted in nude mice. *Cancer Res.* 1990; 50:344-52.
- 5) Ward R. Experimental and clinical pharmacology. Antineoplastic antibodies - clinical applications. *Aust Prescr*2003; 26:141-3.
- 6) Andrew GP, Jill CF. Antibody-Drug Conjugates for the Treatment of Non-Hodgkin's Lymphoma: Target and Linker-Drug Selection. *Cancer Research*2009; 69:2358.
- 7) Hiroshi K, Hideya K. Monoclonal Antibody-Mediated Drug Targeting to Choroidal Neovascularization in the Rat. *Investigative Ophthalmology and Visual Science.* 2001;42: 2664-2672.
- 8) White CA, Weaver RL, Antonio J, Grillo- Lopez. Antibody- targeted immunotherapy for treatment of malignancy. *Ann Rev Med* 2001; 52: 125-45.
- 9) Multani PS, Grossard ML. Monoclonal antibody-based therapies for hematological malignancies. *J Clin Oncol* 1998; 16:3691-710.
- 10) Vyas SP, Khar RK. Targeted & Controlled Drug delivery, 2004; CBS publisher & distributors, 521-523.
- 11) David C, Blakey N. Drug targeting with monoclonal antibodies. *J Acta Onco*1992; 31:91-93.
- 12) Victoria FR. Antineoplastic Immunoconjugates and Immunotoxins. *Am J Pharm Educ* 2004; 64:197-204.