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Popular Article

# Single Intradermal Tuberculin testing

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***Abstract***

Single Intradermal tuberculin test is one of the standard diagnostic tools for detection of tuberculosis and paratuberculosis. It has sensitivity of 68-95% and specificity of 96-99%. It generally involves measurement of the swelling at injection site after 72 hours post injection. It is used at base of tail i.e., caudal skin also called as common fold test in United States, Canada, and New Zealand whereas at cervical skin fold on lateral aspect of the neck in Europe and United Kingdom. It is used primarily for detection of carriers in flock and

## Introduction

Single intradermal tuberculin test is one of the indirect and standard diagnostic tools for detection of tuberculosis and paratuberculosis. It is generally based on the principle of delayed hypersensitivity. It involves intradermal injection of bovine tuberculin purified protein derivate (PPD) or human **tuberculin into** a skin fold of a specific location (caudal skin also called as common fold test in United States, Canada, and New Zealand whereas at cervical skin fold on lateral aspect of the neck in Europe and United Kingdom). and measurement of thickness of swelling after 72 hours (Radostits et al.2007). This technique has been used primarily for detection of tuberculosis in humans after detection of element 'tuberculin' by isolating it from tuberculosis bacilli. After this, it was applied in bovine and found that thermal response is present in animal as a result of injecting 0.2-0.5 ml tuberculin subcutaneously.

It was earlier done by double intradermal technique, i.e., injecting second dose of tuberculin after 48 hours of first tuberculin dose. This technique was utilized for developing Stormont test but later on, this technique was found ineffective and replaced by single intradermal comparative testing (SICT). (Monaghan et al. 1994).

It could be a valid alternative to the more invasive traditional techniques to correct large bone defects.

Cartilage has limited capacity for regeneration, and when lesion is limited to the articular cartilage only and does not extend to the underlying bone, it fails to heal spontaneously leading to the osteoarthritis, lameness, and permanent disability. Intra-articular implantation of uncultured bone marrow derived nucleated cells

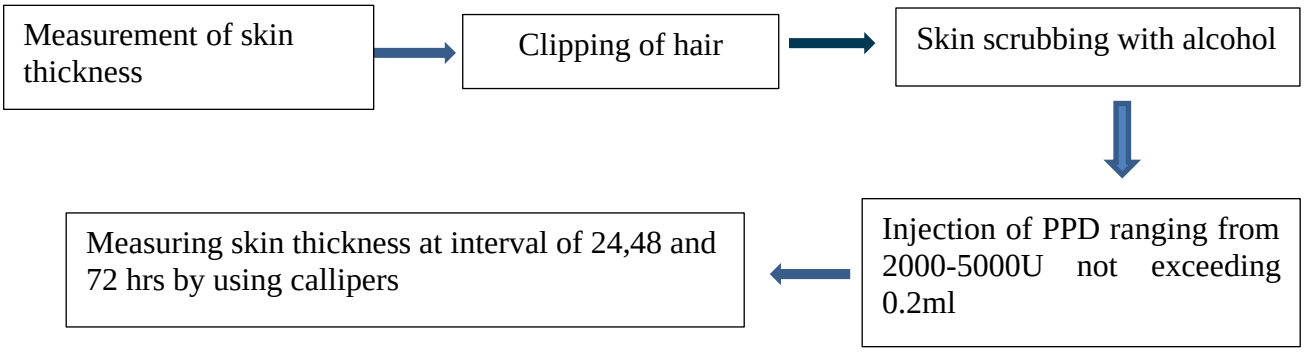
Platelet-rich plasma (PRP) is an autologous product that concentrates a large number of platelets in a small volume of plasma. PRP accelerates endothelial, epithelial, and epidermal regeneration, stimulates angiogenesis, enhances collagen synthesis, promotes soft tissue healing, decreases dermal scarring, enhances the hemostatic response to injury, and reverses the inhibition of wound healing caused by glucocorticoids. The high leukocyte concentration of PRP has an added antimicrobial effect and carries no risk of transmitting infectious disease. PRP is obtained following the centrifugation of whole blood, yielding a product highly concentrated with platelets. The α-granules within the concentrated platelet solution contain growth factors and proteins vital to the coagulation cascade which, upon activation, may aid in the regeneration of tissues. To combat the catabolic environment of joints affected by OA, PRP counteracts cartilage erosion by inhibiting the catabolic cytokines of IL-1β and TNF-α and by promoting factors associated with cartilage matrix synthesis including fibroblast growth factor, transforming growth factor-β (TGF-β), insulin-like growth factors and others cytokines.

Based on above existing problems of hip dysplasia and the role of uncultured bone marrow mono-nucleated cells (BMNCs) and activated platelets a total of ten clinical cases of dogs diagnosed for mild to moderate form of hip dysplasia were one time treated with a combination of (4.5 ± 0.07) x $10^6$) autologous BMNCs and activated platelets mixed together and implanted under ultrasound guidance in the affected hip joint as therapy in canine hip dysplasia. The BMNCs were isolated in 5ml bone marrow isolated from the iliac crest and mono-nuclear cells were isolated from bone marrow by centrifuging on lymphocyte isolation density gradient media. This protocol for treatment was planned with the hypothesis that bone BMNCs contain mesenchymal stem cells and activated platelets have growth factors that may further help in the proliferation and differentiation of BMNCs cells implanted in the joint. So, one-time treatment of such conditions with cell therapy may be useful to overcome the complications related to conventional treatment. All treated cases were recovered completely and the last two years of follow-up, not showed any complications, further no supplementation and treatment related to hip dysplasia have been given to the animals.

SICT involves simultaneous injecting two separate antigens intradermally at different side of neck with 12cm distance apart. After 72 hours, difference in swelling at both sides are compared. It can help in differential diagnosis between vaccination against Johne's disease and tuberculosis.

This test is based upon principle of delayed hypersensitivity reaction as a result of interaction

between the injected antigen, antigen presenting cells and T cells (cell mediated). These reactions are not induced by circulating bodies but by the sensitized T cells which on contact with specific antigen release lymphokines and exert biological effects on lymphocytes, inflammatory cells and tissue cells. This technique is performed as shown below:




There are different approaches to performing single intradermal tuberculin testing, such as single intradermal tuberculin testing involving administration of bovine PPD at the caudal fold of the tail skin in the US, Canada and New Zealand, while the cervical skin fold in Europe. Single thickness is measured after 72 hours using callipers. Another approach involves a single intradermal comparison test (SICT), which involves the simultaneous administration of bovine and avian tuberculin at two different sites, either on the same site or one on either side spaced 12 cm apart. After 72 hours, the results of both antigens are compared. The Johnin test is one of the applications of the intradermal tuberculin test with an antigenic difference, i.e., H. Mycobacterium paratuberculosis. It is slightly modified by intravenous injection of the Johnin's agent, and a 1.5 °C rise in temperature is considered a positive reaction. It can also be done by demonstrating the in vivo cell-mediated reactivity of IFN-released from bovine white blood cells in whole blood cultures incubated with PPD-tuberculin (Wood et al. 1991).

Reference value in animals (bovine, ovine & canine)

| Species | Site of SID | Reference value of skin thickness in positive animals |
|---|---|---|
| **Pigs** | Base of the ear | 5-10mm |
| **Horses** | Not reliable | - |
| **Bovine** | Cervical region of neck or caudal base of tail | 4mm or more |
| **Sheep and Goats** | Anal fold and inside of thigh | 5mm |

**Interpretation and Clinical Significance**

- Presence of hard or oedematous swelling in caudal fold of the tail after 72 hours are considered positive reaction in caudal fold test.
- Increase in skin thickness by 4mm in bovine PPD intradermal administration as compared to skin thickness resulting from avian PPD is considered positive reaction in SICT and animal is considered reactor.
- There may be presence of other clinical signs like extensive edema, exudation, pain in lymphatic glands in case of positive ones in bovines.
- In swine thickness of 5 mm or more considers as positive reaction. while the skin thickening exceeding 10 mm or more shows superficial necrosis and sloughing.
- In horses, these tests should be used with caution as it may cause anaphylactic reaction in these species.
- In bovines and small ruminants, skin thickness 5mm or more is considered positive.

## Conclusion

The detection of infected animals depends largely on the use of the intradermal tuberculin test. All animals older than 3 months should be tested and positive reactors discarded according to local legislation. Suspect reactors are retested at intervals appropriate to the test used. A careful clinical examination of all animals should be performed at the initial test to ensure that there are no advanced clinical cases leading to negative reactions to the test. Doubtful cases and animals likely to have reduced susceptibility, particularly old cows and those that have calved within the last 6 weeks, can be tested with one of the specific sensitivity or serological tests described previously, or retested later. The Single Comparative Intradermal Test (SCIT) should be used when M. avium infection is expected or when there is a high incidence of reactors in a flock that shows no clinical signs of the disease.

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