MagGenome Technologies, headquartered in Cochin, India, began operations in 2014. It was incubated in SciGenom Labs for a period of one year and is now a registered independent company from 2015. MagGenome started operations from the new facility at Perungudi, Chennai in 2018. As a startup, MagGenome is primarily focused on the development of magnetic nanoparticles based products. The current initiatives include developing nucleic acid extraction kits using our patented magnetic nanoparticles-based technology. The company has developed DNA extraction kits under the brand name “XpressDNA™” and affinity resins under the brand name “XpressAffinity™”. MagGenome will also focus on other applications of magnetic nanoparticles in near future for providing solutions in the areas of diagnostics, therapeutics and environmental remediation.
Magnetic nanoparticle based DNA extraction technology from MagGenome

XpressDNA™ nucleic acid extraction technology from MagGenome provides an easy and flexible magnetic nanoparticles-based method that allows extraction of genomic DNA from a variety of biological sources. The XpressDNA™ protocol is designed to extract high molecular weight DNA which is free of protein, RNA and PCR inhibitors. The sample once digested and lysed, is mixed with a solution containing magnetic nanoparticles, upon which the DNA is captured on its surface. The captured DNA is then washed with alcohol based wash buffers to remove the contaminants before being dissolved in the elution buffer. The kit also requires the use of a magnetic separator (MagNa Stand) which allows processing of several samples simultaneously during the washing and elution steps. MagNa Stand is made of rare earth magnets that provide effective magnetic strength to process different volumes used in the kit protocol.

Figure 1: Workflow of XpressDNA™ Technology

XpressDNA™ Tissue / Cell Line Kit

XpressDNA™ Tissue/Cell line kit is suitable for extraction of high quality genomic DNA from fresh, frozen and ethanol preserved mammalian tissues, fish tissues, and cell lines.

Figure 2: Consistent DNA yields compared to other extraction methods. Genomic DNA was extracted from different animal tissues such as heart, brain, kidney, liver, spleen, muscle, rat tail and fish fin (Lane L2 - L8) using XpressDNA™ Tissue / Cell Line kit and evaluated on 0.8% agarose gel. Lane L1:1kb DNA ladder.
Figure 3: High yields of pure DNA from ethanol preserved fish tissues. Genomic DNA was extracted from ethanol preserved fish tissues using XpressDNA™ Tissue / Cell Line kit. Lane L: 1 kb DNA ladder; Lanes E1 - E6: DNA from six different samples.

Figure 4: Genomic DNA extraction from cell lines. Genomic DNA was extracted from CHO cell lines using XpressDNA™ Tissue/Cell line kit. Lanes 1-3 represent DNA isolated from 0.5 x 10⁶ cells, 1 x 10⁶ cells and 1.25 x 10⁶ cells respectively.

Figure 5: High purity DNA for downstream applications. DNA extracted using XpressDNA™ Tissue / Cell Line kit was used in PCR amplification reactions. (A) - DNA from four different fresh tissues were amplified using two different primer sets COI and Cyt b, respectively. (B) - DNA from six different ethanol preserved tissues were amplified using COI specific primers. L:100 bp ladder.
Muscle Tissue-1

M1  M2  M3  L  M4  M5  M6
XpressDNA™ kit  Competitor kit

Muscle Tissue-2

M1  M2  M3  L  M4  M5  M6
XpressDNA™ kit  Competitor kit

Figure 6: Comparison of XpressDNA™ Tissue/Cell line kit with a competitor kit (spin column). DNA was extracted from muscle tissues using XpressDNA™ Tissue/Cell Line kit and competitor kit which uses the spin column technology. L: 1kb ladder, M1-M3: genomic DNA extracted from muscle tissue of two different species muscle tissue -1 and 2 using XpressDNA™ kit and M4-M6 using the competitor kit.

XpressDNA™ Tissue/Cell line kit allows efficient and reliable extraction of genomic DNA from a wide variety of tissue samples. This kit allows processing of 10-60 mg tissue, depending on the type of tissue and performs consistently than traditional extraction methods, producing high quantities of pure DNA. The purity ratio for extracted DNA are in the range of 1.7 - 1.8(260/280) and 1.8 - 2.0(260/230). Genomic DNA with high purity can be extracted in large quantities from a variety of cell lines as well. The starting material can be 0.25-0.5x 10⁴ cells or even lower. The DNA thus extracted is suitable for downstream applications such as PCR, restriction enzyme digestion, Sanger Sequencing, NGS analysis, etc.
The XpressDNA™ Blood kit provides a simple and quick system to isolate high quality genomic DNA from blood, whether fresh or aged. The XpressDNA™ technology provides an easy and flexible magnetic nanoparticles based method that allows the extraction of high quantities of pure DNA as evident from the 260/280 ratio and the agarose gel electrophoresis. The purity ratio of DNA ranges from 1.75 - 1.8 (260/280) and 1.8 - 2.0 (260/230). DNA extracted using XpressDNA™ Blood kit is amenable for all downstream applications such as PCR, Real time-PCR, Restriction digestion, Sanger sequencing and NGS.

XpressDNA™ Blood kit guarantees extraction of high quality genomic DNA in better yields compared to other commercially available kits from a starting blood volume of 0.2 - 0.4 ml. The kit can be used for extraction of DNA from:

- Fresh, frozen or aged blood
- Blood stored in different storage vials (EDTA, citrate, heparin, fluoride)
- PBMCs
- Umbilical cord blood
- Blood clot

**Figure 7:** High yields of pure DNA from blood. Genomic DNA was extracted from 400 μl of fresh human blood using XpressDNA™ Blood kit. Lane 1: 1 kb ladder, Lanes 2-5: DNA extracted using XpressDNA™ Blood kit.

**Figure 8- Genomic DNA extracted from different sample sources using XpressDNA™ Blood kit.** A: Peripheral blood mononuclear cells (PBMCs) were purifed from whole blood following the Ficoll gradient method. Genomic DNA was extracted from peripheral blood mononuclear cells. Approximately 1x10⁶ cells were taken for DNA extraction. L: 1kb ladder, 2&3: genomic DNA from two different PBMC samples. B: Genomic DNA extracted from 100 mg of blood clot. L: 1kb ladder, 1-5: genomic DNA from five blood clots. C: Genomic DNA extracted from 100 μl of eight umbilical cord blood samples (1-8). L: 1kb ladder.
Figure 9: PCR amplification of Jak2 from genomic DNA extracted using XpressDNA™ Blood kit. Lane 1: 100bp ladder, Lane 2: Positive control, Lane 3 & 5: PCR product from DNA extracted using XpressDNA™ Blood kit, Lane 4: Negative Template control.

XpressDNA™ Saliva kit guarantees good yield of high quality genomic DNA from a starting volume of 0.5 ml. The protocol is well optimized for DNA extraction from 0.5-1 ml saliva.

Figure 10: Genomic DNA extraction using XpressDNA™ Saliva kit and comparison with spin column based competitor kits. A: Genomic DNA extracted from 0.5 ml of human saliva. 1-4 represents genomic DNA extracted from saliva samples from four healthy individuals. B: Genomic DNA extracted from human saliva using two competitor kits which use spin column method. 1-2: Genomic DNA extracted using competitor kit A and 3-6: using competitor kit B. C: PCR amplification of the DNA extracted using XpressDNA™ Saliva kit using LCO1490/H-CO2198 primers. The amplicon size is 650 bp.
XpressDNA™ Bacteria kit provides a simple and efficient magnetic nanoparticle based platform for genomic DNA extraction from both gram positive and gram negative bacteria. Bacterial diversity is the major challenge in genomic DNA extraction and hence more than hundred different bacterial strains were used for the XpressDNA™ Bacteria kit validation purpose. XpressDNA™ Bacteria kit meets the following criteria:

- High quantity and high quality genomic DNA
- Reproducibility and robustness
- Non toxic and easy storage of kit reagents

**Figure 11: Agarose gel electrophoresis of genomic DNA extracted from gram positive bacteria using XpressDNA™ Bacteria kit.**

B1: *Bacillus megaterium* B2: *Enterococcus faecium*
B3: *Staphylococcus saprophyticus* B4: *Lactobacillus fermentum* B5: *Pediococcus acidilactici* B6: *Bacillus subtilis* B7: *Lysinibacillus xylanilyticus* B8: *Staphylococcus hominis* L: 1kb Ladder

**Figure 12: Agarose gel electrophoresis of genomic DNA extracted from gram negative bacteria using XpressDNA™ Bacteria kit**

Figure 13: Quality of genomic DNA extracted using XpressDNA™ Bacteria kit. Data shown below were collected from different experiments of the same bacterial strain (*Lysinibacillus fusiformis*) showing consistency in the purity of genomic DNA extracted.

![Graph of gDNA Purity: 260/280 Ratio vs Days](image)

Figure 14: PCR amplification of genomic DNA using 16S rDNA primers. Genomic DNA extracted using XpressDNA™Bacteria kit was used in PCR amplification. Amplicon size -1.5 kb, L:1kb Ladder NC: Negative control B1: *Bacillus megaterium* B2: *Enterococcus faecium* B3: *Staphylococcus saprophyticus* C1: *Acinetobacter pittii*

![A. XpressDNA™ Bacteria kit and B. Competitor spin column kit](image)

Figure 15: Comparison of the performance of (A) XpressDNA™ Bacteria kit with (B) commercially available spin column based kit. Genomic DNA was extracted from gram positive (G+) and gram negative (G-) bacteria. L: 1kb ladder.

The genomic DNA extracted using XpressDNA™Bacteria kit is compatible for all downstream applications such as:

- PCR and RT-PCR
- Restriction Digestion
- Sequencing
XpressDNA™ Plasmid kit allows rapid and efficient purification of plasmids from fresh cultures of gram negative bacteria with an OD>1. The plasmid DNA is extracted using the XpressDNA™ magnetic nanoparticles-based technology. The process of plasmid purification using the XpressDNA™ Plasmid kit would be finished within 20-25 minutes. The work flow is depicted in Figure 16. The method allows the isolation of low, medium and high copy number plasmids with high purity and negligible genomic DNA contamination.

**Figure 16: Workflow of plasmid purification by XpressDNA™ Plasmid Kit.**

**Figure 17: Representative AGE profiles of plasmids isolated using XpressDNA™ Plasmid kit.**

Lanes 1-2: pST; Lanes 3-4: pUC 19; Lanes 5-6: pCR 2; Lanes 7-8: pBR322; Lane 9: pUVR. M-1 kb ladder
Figure 18: Quality of isolated plasmid in terms of 260/280 ratio using nanodrop.

Extracted plasmids are suitable for use in downstream applications including restriction enzyme digestion, PCR, cloning, transformation, sequencing and transfection.

Figure 19: Restriction enzyme Digestion
pBR322 and pUC19 extracted using XpressDNA™ Plasmid kit were subjected to restriction digestion using EcoR1. Lane1: uncut pBR322; Lane 2: cut pBR322; Lane 3: uncut pUC19, Lane 4: cut pUC19.

Figure 20: Bacterial Transformation
pBR322 extracted using XpressDNA™ Plasmid kit was used to transform competent DH5α cells.

The plasmid DNA purified by XpressDNA™ Plasmid Kit is compatible with downstream applications including PCR and sequencing.
XpressAffinity™ Immobilized Proteins

**TECHNOLOGY**
- **Affinity Ligands**: Immobilization of affinity ligands (Protein A,G,L, glutathione etc.) on magnetic nanoparticles
- **Enzymes**: Immobilization of enzymes on magnetic nanoparticles
- **Antibodies**: Immobilization of antibodies on the surface of magnetic nanoparticles
- **Vaccines**: Nanoparticles as adjuvants for vaccines

**OPPORTUNITIES**
- **For purification of antibodies, Fabs and Fusion proteins**
- **Immense industrial, research and environmental applications**
- **Immuno-precipitation, Cell separation**
- **Cold chain solutions, Sustained release systems**

**Advantages of XpressAffinity™ technology**
- Cost effective production
- Very high efficiency and stability
- Process can be applied to large sample volumes
- High binding capacity
- No columns or centrifugation required

**XpressAffinity™**
- **Protein A** - Magnetic Nanoparticles
- **Protein G** - Magnetic Nanoparticles
- **Protein A/G** - Magnetic Nanoparticles
- **Glutathione** - Magnetic Nanoparticles
- **Custom immobilization of proteins**

**Antibody purification from serum, cell culture supernatant or ascites using XpressAffinity™ Protein A, G or A/G Nanoparticles**

1. **Resuspend** Protein A, G or A/G nanoparticles
2. **Incubate** with sample which contains antibody
3. **Magnet** - assisted isolation of antibodies bound to Protein A, G or A/G and removal of other proteins
4. **Elution** of pure antibodies with the elution buffer

www.maggenome.com
Immunoprecipitation using XpressAffinity™ Protein A, G or A/G Nanoparticles

1. Incubate the lysate with primary antibody against the protein of interest
2. Protein A, G or A/G Nanoparticles are added to the antigen-antibody complex
3. Magnet-assisted isolation of antigen-antibody complex bound to protein
4. Elution of antigen-antibody complex or direct boiling in SDS PAGE sample buffer followed by western blotting

Immuno precipitation / Co-immuno precipitation with Protein A-MNP

Composition of performance of Protein A-magnetic nanoparticles in IP/Co-IP with two commercially available agarose based Protein A beads.

XpressAffinity™ Glutathione - Magnetic Nanoparticles

Purification of GST-tagged fusion proteins using XpressAffinity™ Glutathione-Nanoparticles

1. Incubate the lysate with glutathione nanoparticles
2. GST-tagged fusion protein binds to glutathione nanoparticles
3. Magnet-assisted isolation of GST-tagged proteins and removal of non-specific proteins
4. Elution of GST tagged proteins with excess glutathione
# Ordering Information

To view full product details or to order the kits visit www.maggenome.com/products or www.maggenome.com/support

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The supporting documents such as Kit Instruction Manual, Quick Reference Guide, Certificate of Analysis and MSDS are available and can be downloaded from our website:

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