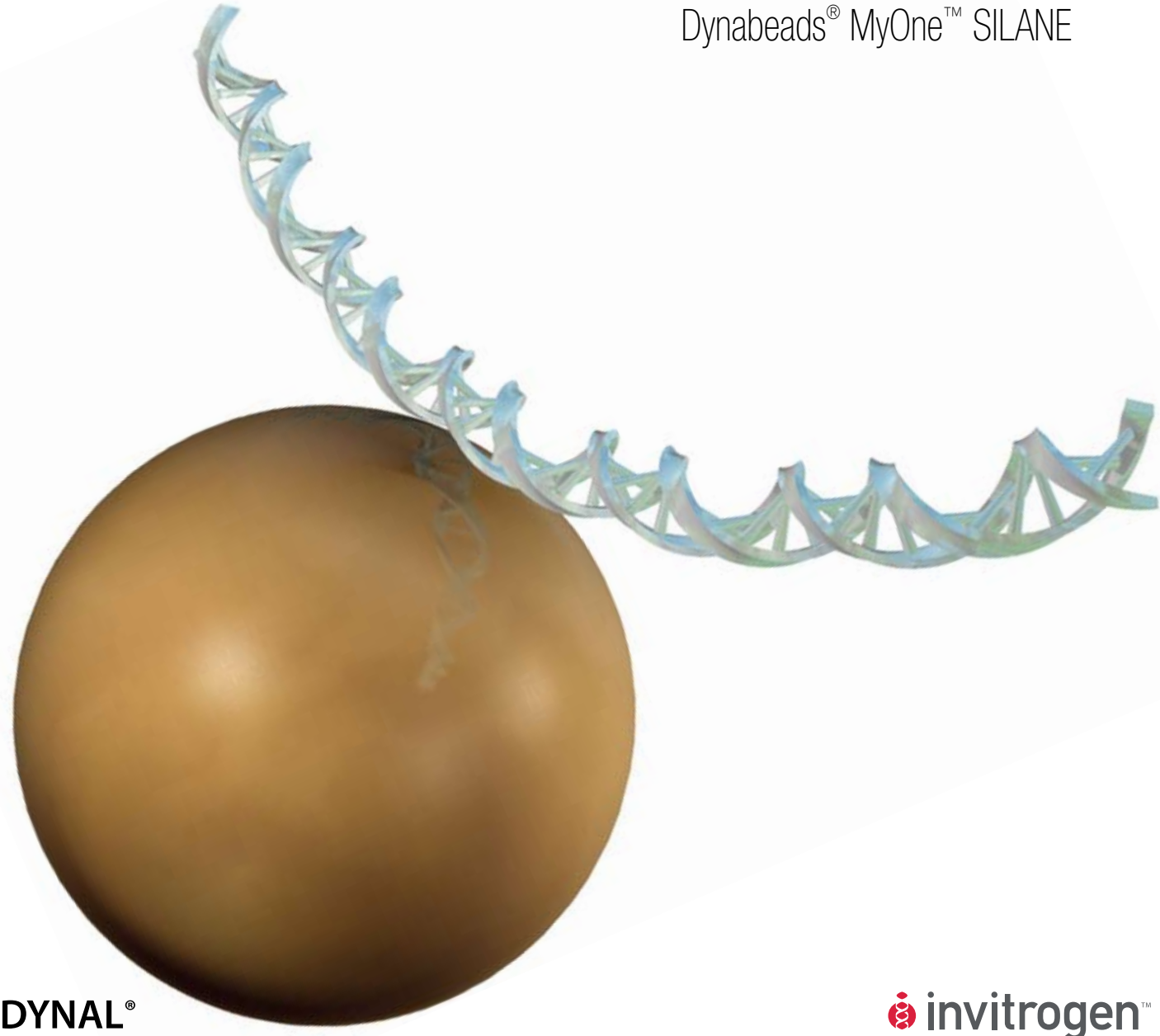
Magnetic Separation Technology

Powering reliability for nucleic acid capture

Dynabeads® MyOne™ SILANE



DYNAL®
invitrogen bead separations

invitrogen™

Nucleic acid capture

Dynabeads® magnetic separation technology

→ Rapid and automatable protocols

→ Absolute consistency reduces assay variability

→ One bead, numerous possibilities for nucleic acid capture

Dynal® was founded in 1986, and is built on the Norwegian invention of bead-based magnetic separation technology. The making of spherical polystyrene magnetic beads of exactly the same size allowed researchers to get results that were previously unattainable.

Dynabeads® are well established as the gold-standard magnetic separation method, and are integrated in more than 25,000 automated assay platforms worldwide. Their quality is renowned in academia as well as in the diagnostic industry, and they meet important criteria for OEM use in biotech and IVD. The attraction is simply *magnetisk*!*

A new solution for sample preparation

Methods for nucleic acid capture by adsorption to a silica-like surface have been around for decades. Magnetic particles are now the material of choice with system manufacturers, as magnetic separation is easy to adapt to automated processes.

Invitrogen's Dynal® division has developed a new solution for rapid and reliable nucleic acid capture. Dynabeads® MyOne™ SILANE are uniform, monosized magnetic beads, 1 µm in diameter (Figures 1 and 2). They are composed of highly cross-linked polystyrene combined with evenly distributed magnetic material and an optimized silica-like surface chemistry.

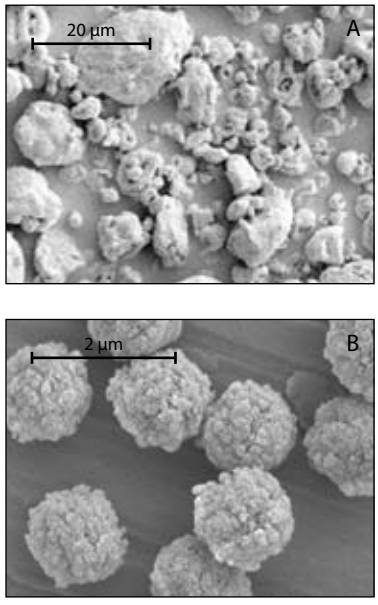


Figure 1—No compromises on reproducibility. **A.** Magnetic particles from other suppliers often have a random size and surface area. **B.** Dynabeads® MyOne™ SILANE are monosized 1 µm magnetic beads with a large and well-defined surface area, which translates to highly reproducible results in your applications.

* *Magnetisk* is the Norwegian word for magnetic.

Their small size and defined surface area offer excellent reaction kinetics. These new Dynabeads® have an increased magnetic strength compared to the traditional Dynabeads® portfolio (Figure 3). This ensures rapid magnetic mobility and efficient isolation even in viscous samples. Combined with a low sedimentation rate, these qualities make the beads particularly well suited for automated molecular applications.

Dynabeads® MyOne™ SILANE offer enhanced performance beyond the capabilities provided by alternative magnetic separation systems. The product has been developed to meet the high requirements of solid-phase sample preparation for diagnostic and biotech OEM customers.

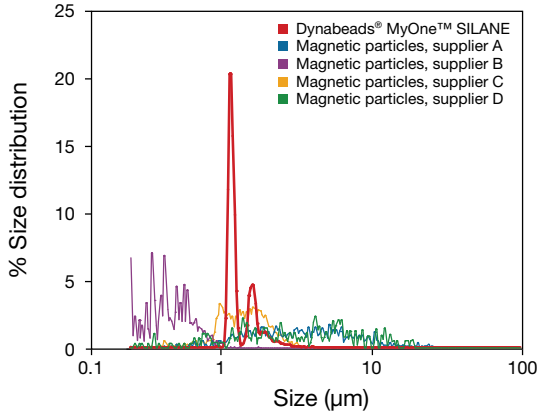


Figure 2—Dynabeads® are monosized. The graph shows size frequency distribution of Dynabeads® MyOne™ SILANE (red) and magnetic particles from four alternative suppliers, as analyzed by flow particle image analysis on a Sysmex FPIA-3000 (Malvern Instruments Ltd.). The second peak for Dynabeads® at 2 µm represents doublets. Monosized Dynabeads® ensure optimal, predictable behavior in automated systems. Minimal variation within and between lots allows for standardized and reproducible processes.

One bead, numerous possibilities

The protocol is simple, scalable, and automatable (Figure 4). Due to their versatile silica-like surface chemistry, the Dynabeads® serve as a flexible platform product for capture of nucleic acids:

- → Genomic DNA (Figures 5 and 6)
- → Viral DNA/RNA (Figures 7, 8, and 9)
- → Total RNA
- → Other nucleic acids (e.g., bacterial DNA)

Dynabeads® are compatible with a variety of buffer systems (Figure 10). Specific buffers and protocols are available for selected applications. We are eager to help further optimize buffers and protocols on an OEM level, to meet the needs of your specific assay.

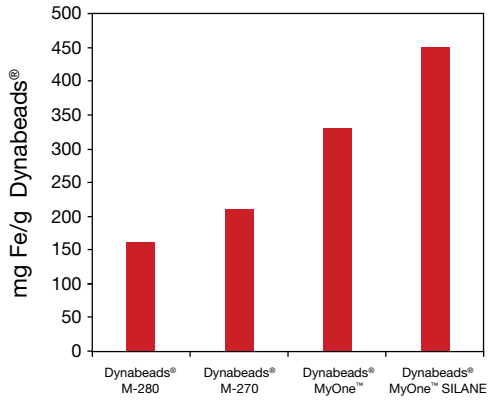


Figure 3—More iron means shorter assay times. Dynabeads® MyOne™ SILANE have an increased iron content compared to the traditional Dynabeads® portfolio (MyOne™, M-270, and M-280). The tightly controlled bead size and iron content ensure consistent high performance and high magnetic mobility. Combined with a slow sedimentation time, this allows for shorter assay times and improved capture efficiency even in highly viscous samples.

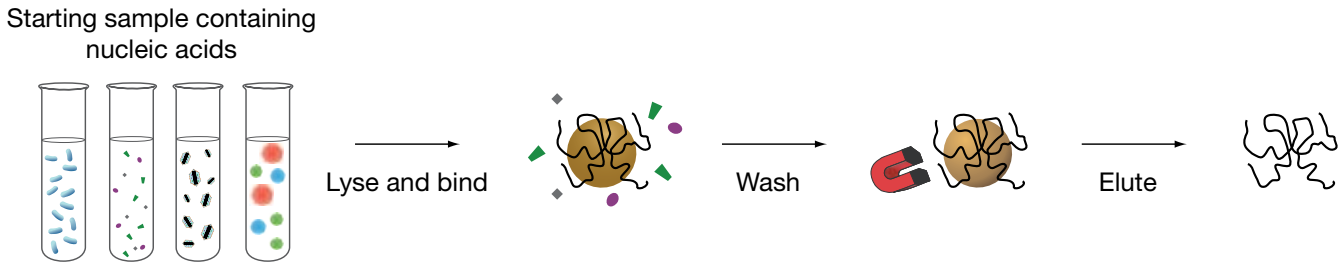


Figure 4—Quick and automatable magnetic separation protocol. The illustration shows the simple steps (lyse, bind, wash, and elute) of the automatable protocol for nucleic acid capture from a variety of biological samples using Dynabeads® MyOne™ SILANE.

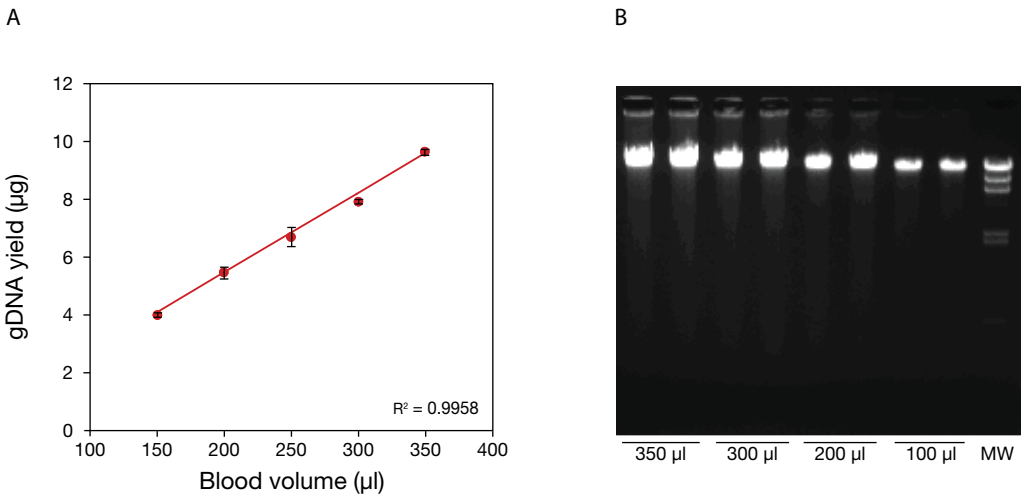


Figure 5—Linear yields and high integrity of genomic DNA from blood. **A.** gDNA was isolated from varying amounts of human whole blood (150–350 µl) containing known numbers of WBCs. Yield was measured spectrophotometrically. **B.** The isolated gDNA is of high integrity. 10 µl (1/10th) of the gDNA isolated from different starting volumes of blood (100–350 µl), was loaded onto the gel. MW: molecular weight marker (λ DNA ladder).

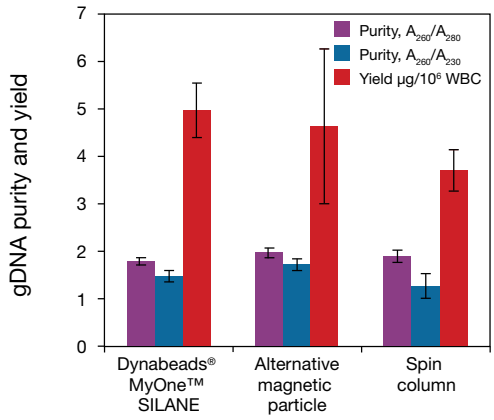


Figure 6—Benchmarking yield and purity. gDNA was isolated from whole blood following respective suppliers' protocols. Dynabeads® and the alternative magnetic particles provide comparable high yields (µg/10^6 WBC). Dynabeads® consistently show good yield and purity with a high level of reproducibility.

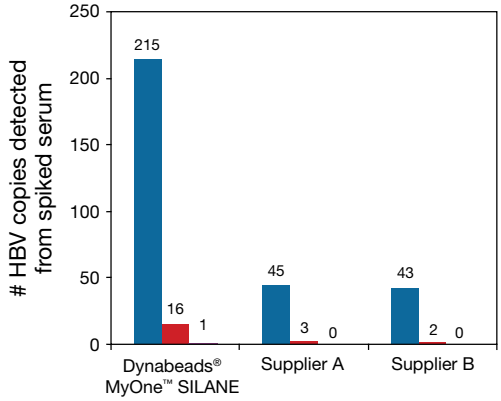


Figure 7—Sensitive detection of HBV virus. Known amounts of HBV were spiked into 200 µl serum samples: 4,000 (blue), 400 (red), and 40 (black) copies. The isolated HBV DNA was eluted in 100 µl, of which 10 µl was used for qPCR. Only Dynabeads® MyOne™ SILANE enabled HBV detection in the most dilute samples.

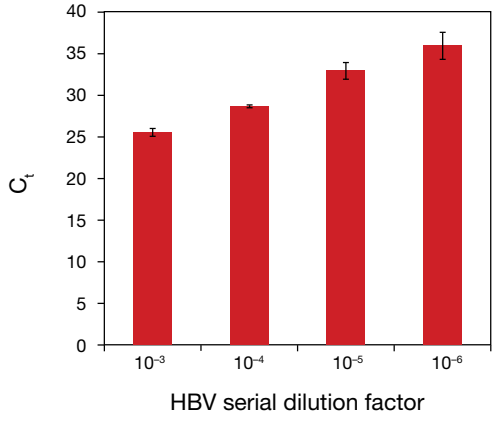


Figure 8—Linear scalability of HBV isolation procedure. HBV DNA was isolated from patient serum heavily infected with HBV, using the Dynabeads® SILANE Viral NA Kit automated protocol on a Precision System Science platform. The isolated HBV DNA was analyzed using quantitative PCR.

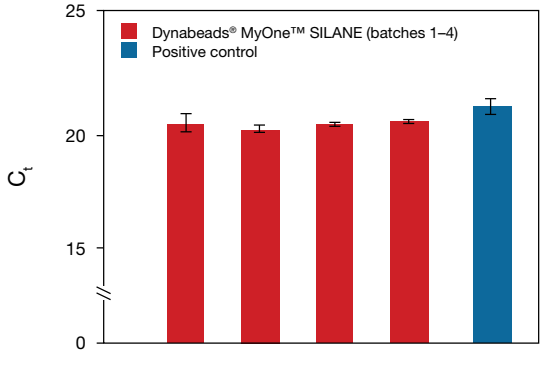


Figure 9—Sensitive and reproducible isolation of lentivirus RNA. Dynabeads® MyOne™ SILANE (4 different batches) were used to isolate lentivirus RNA from spiked human plasma samples. The extractions were done on an automated iPrep™ Purification Instrument (Invitrogen). Positive control: manual extraction using the PureLink™ Viral RNA/DNA Mini Kit (Invitrogen). Following reverse transcription and qPCR analysis, outstanding reproducibility is seen across all batches.

Dynabeads® make good business sense

Dynabeads® MyOne™ SILANE hold reputable Dynal® high standards, with unique batch-to-batch reproducibility. Quality is built into the product during comprehensive R&D and process development. Here are some of the many advantages offered:

- → One bead suitable for all nucleic acid sample preparations (using application-specific buffers and protocols)
- → Higher reproducibility than with magnetic particles from alternative suppliers
- → Superior sensitivity, allowing for low detection limits
- → Predictable binding capacity
- → Highly consistent dynamic range
- → Excellent integrity and purity of isolated nucleic acids
- → Flexible sample, reaction, and elution volumes
- → Quick protocols with reduced manual handling
- → Integration of sample preparation into open and closed automated systems

Inspired by the Norwegian invention of bead-based magnetic separation technology and driven by your needs and challenges, we are committed to delivering absolute consistency and to offering the safest choice for nucleic acid capture. It's simply *magnetisk*!

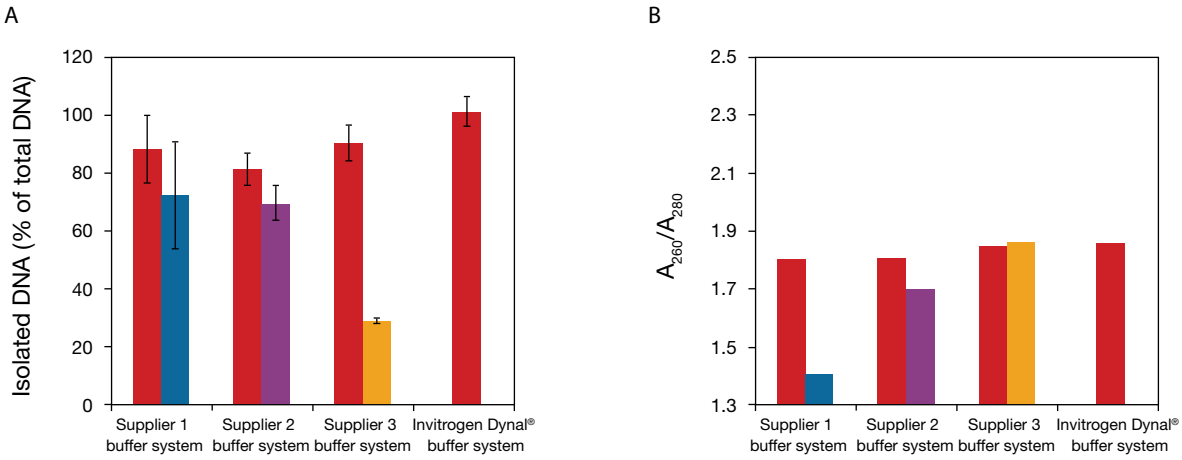


Figure 10—Dynabeads® can be used with different buffer systems. The graphs show **(A)** specific yield and **(B)** purity (A_{260}/A_{280}) of DNA isolated using alternative magnetic particles and buffer systems. Human serum (100 µl) spiked with 5 µg of λ DNA ladder was used as a model system. Yield and purity were measured spectrophotometrically. Comparable results are seen with an RNA ladder (not shown). Dynabeads® MyOne™ SILANE (red) outperforms the alternative magnetic particles (blue, purple, and yellow). Note that Dynabeads® MyOne™ SILANE give better yield and purity than other suppliers' separation products in their buffer systems.

Ordering Information

Product	Quantity*	Cat. no.
Dynabeads® MyOne™ SILANE Manufactured under validated production processes. Can be supplied in bulk quantities.	5 ml (40 mg/ml)	370-02D
Dynabeads® SILANE Viral NA Contains Dynabeads MyOne™ SILANE and specific buffers optimized for sensitive isolation of viral DNA/RNA from human serum/plasma samples.	96 isolations	370-11D
Dynabeads® SILANE Genomic DNA Contains Dynabeads MyOne™ SILANE and specific buffers optimized for predictable isolation of gDNA from human whole blood.	96 isolations	370-12D

*Alternative product formats are available.

Dynabeads® for specific capture of nucleic acids

A comprehensive range of Dynabeads® for specific capture of nucleic acids is also available, with different bead sizes and surface functionalities. Some Dynabeads® are precoated with streptavidin, allowing for capture of biotinylated nucleic acids in a wide variety of protocols. Other Dynabeads® have a specific surface chemistry for coupling of nucleic acids (e.g., hybridization probes/primers) and/or other ligands.

Custom development

We are able to work with our customers to further optimize buffers and protocols and to develop, improve, or automate nucleic acid capture. Validation and customization on an OEM level are also available.

If you would like to discuss a potential collaboration or OEM agreement, please contact us by email at ivd@invitrogen.com.

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