

Proteomics

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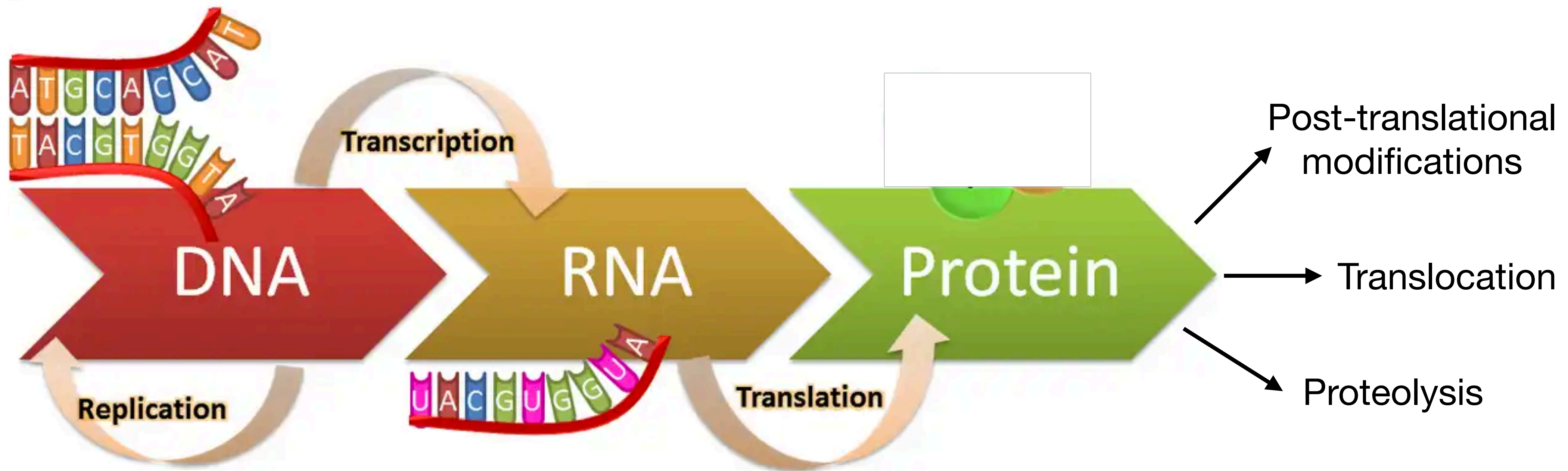
Proteomics defines the study of proteins in the cells

Proteomics = Proteins + omics

omics = study

Identification and analysis of entire protein content

Central Dogma



One gene is not equal to one protein

Genome

all genes in an
organism

Transcriptome

all transcripts in
an organism

Proteome

all proteins in
an organism

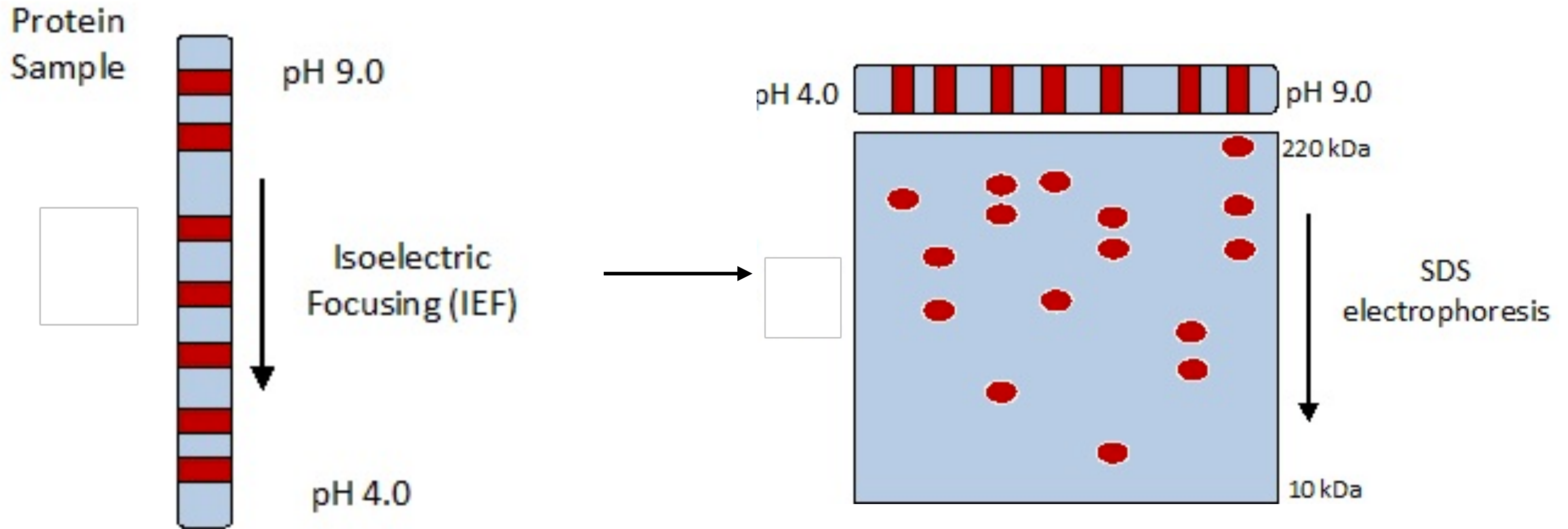
alternate splicing
mRNA editing
alternate promoters

proteolysis
post-translational modifications

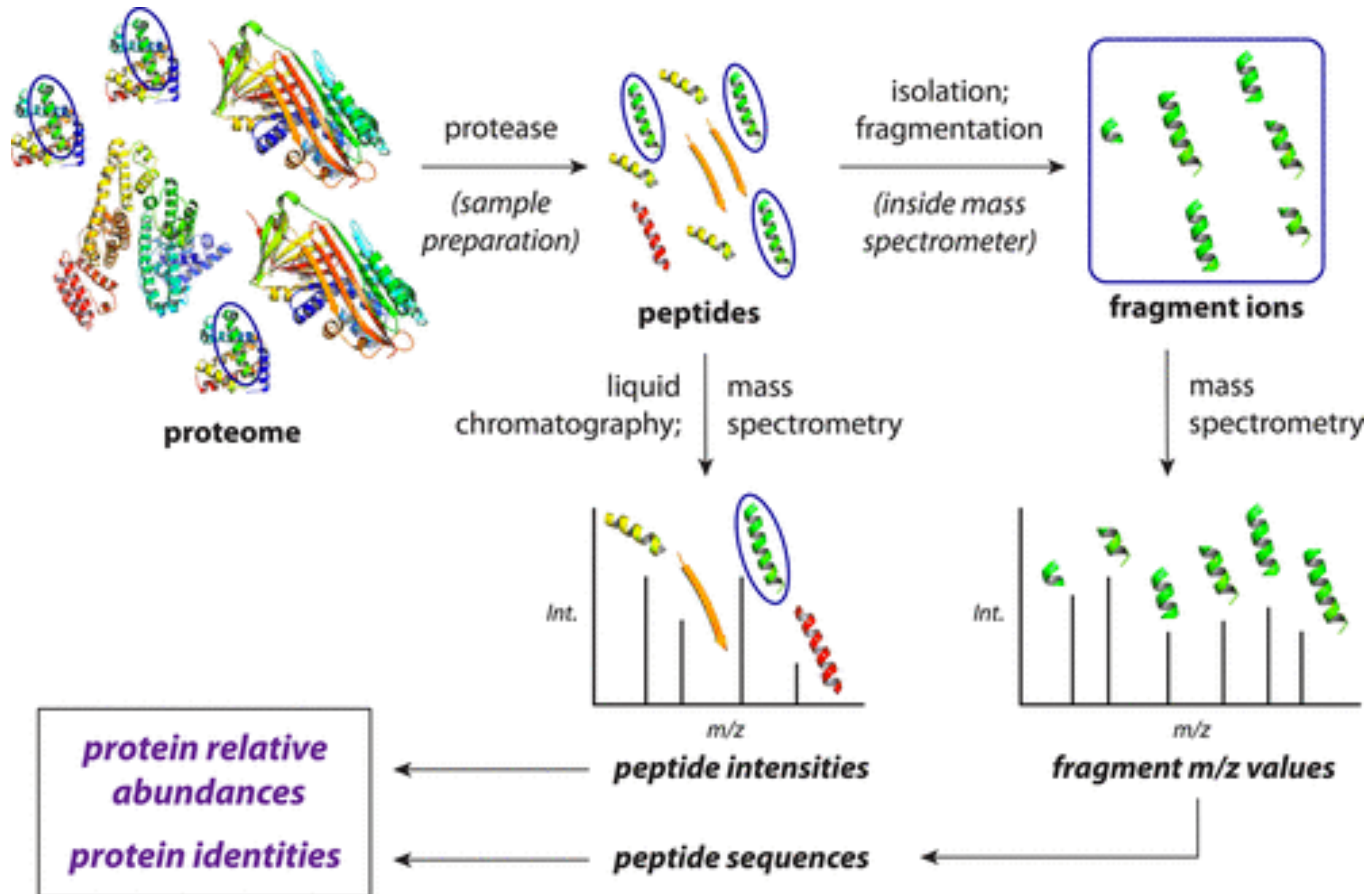
Proteomics can tell a lot of things

- protein identification
- protein function
- protein expression levels
- post-translational modifications
- protein localization and compartmentalization
- protein-protein interactions

Old proteomics using 2D Gel Electrophoresis



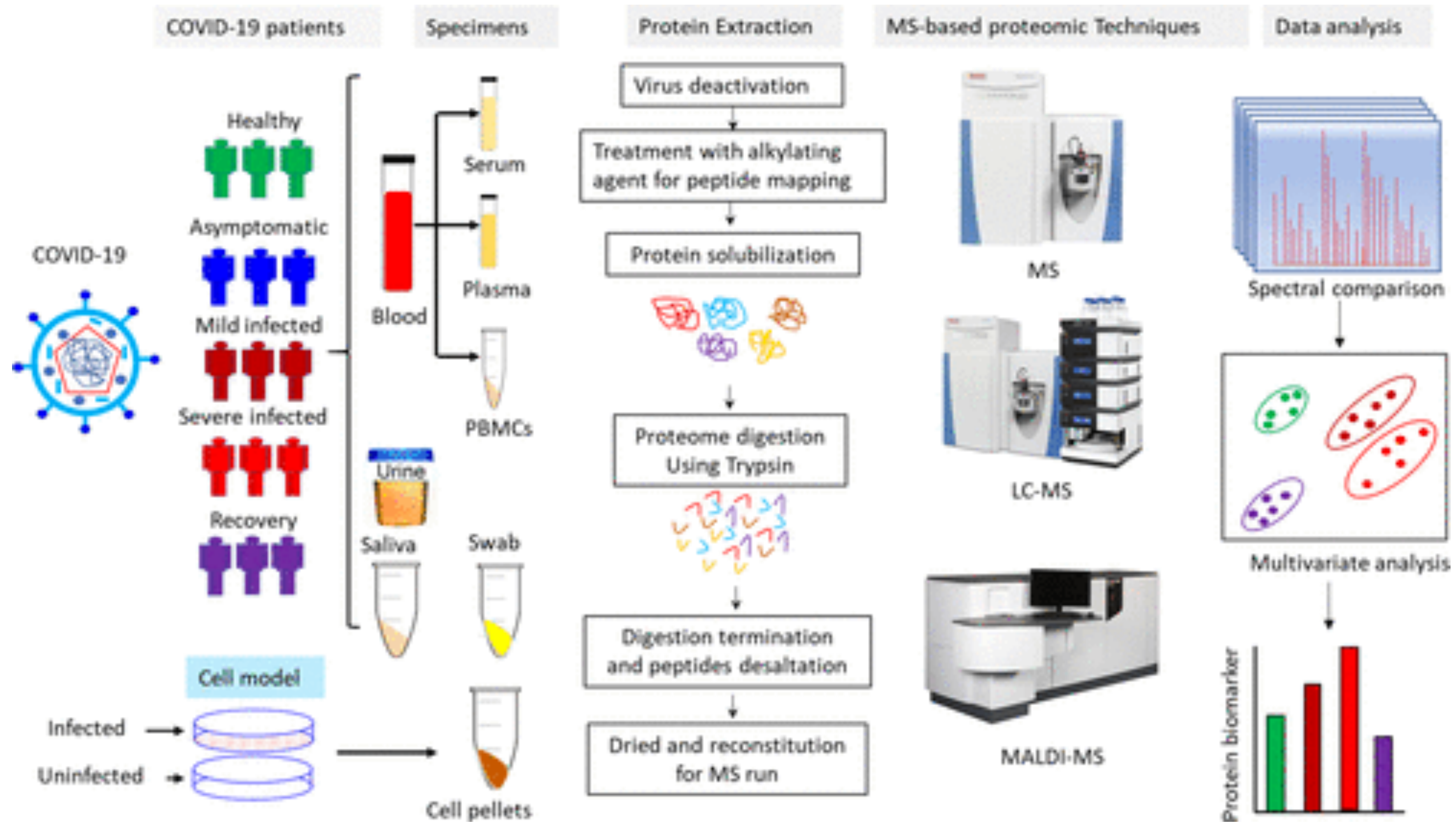
New generation proteomics uses mass spectrometry



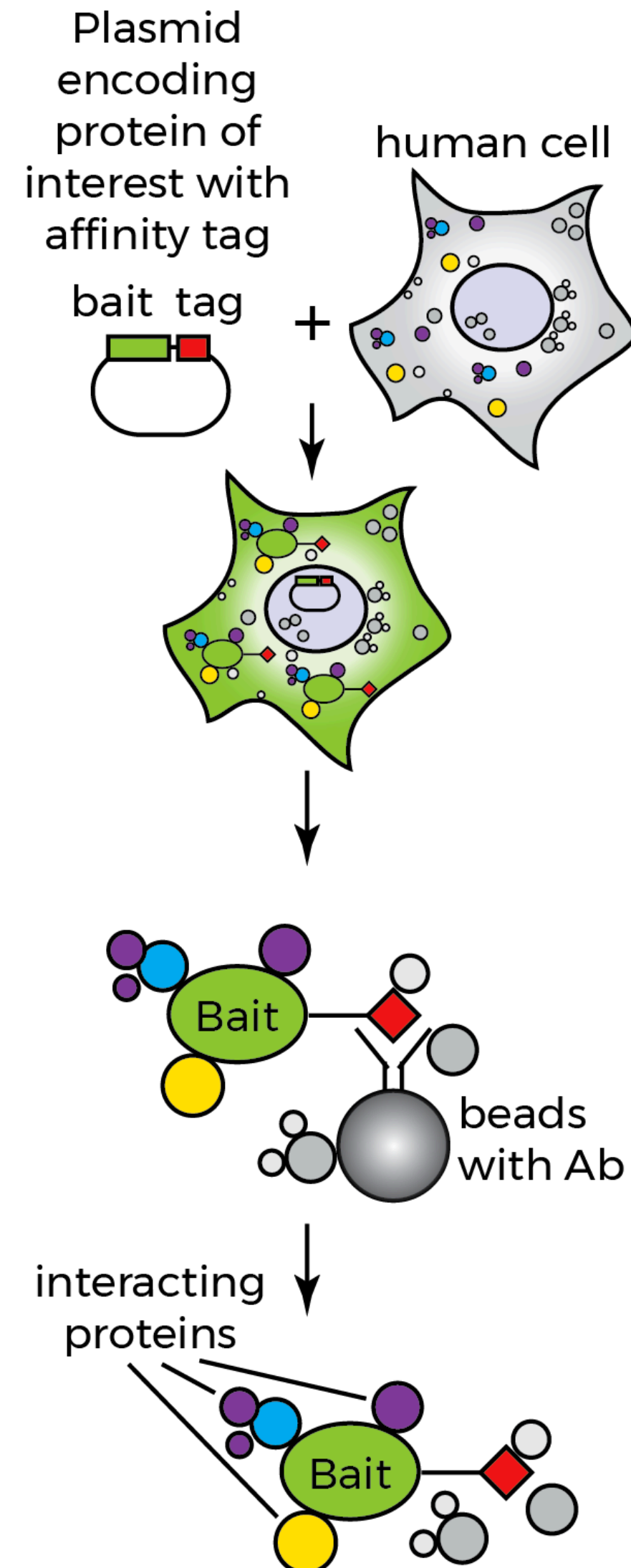
Applications of Proteomics

- Characterize protein - molecular weight and structural information
- Protein fingerprinting, Peptide mass fingerprinting - gives a set of peptides characteristic of protein.
- Identification of disease related biomarkers -diagnostic tool

Identification of disease biomarkers



Identifying interactions of a favorite protein



Transfect tagged protein of interest

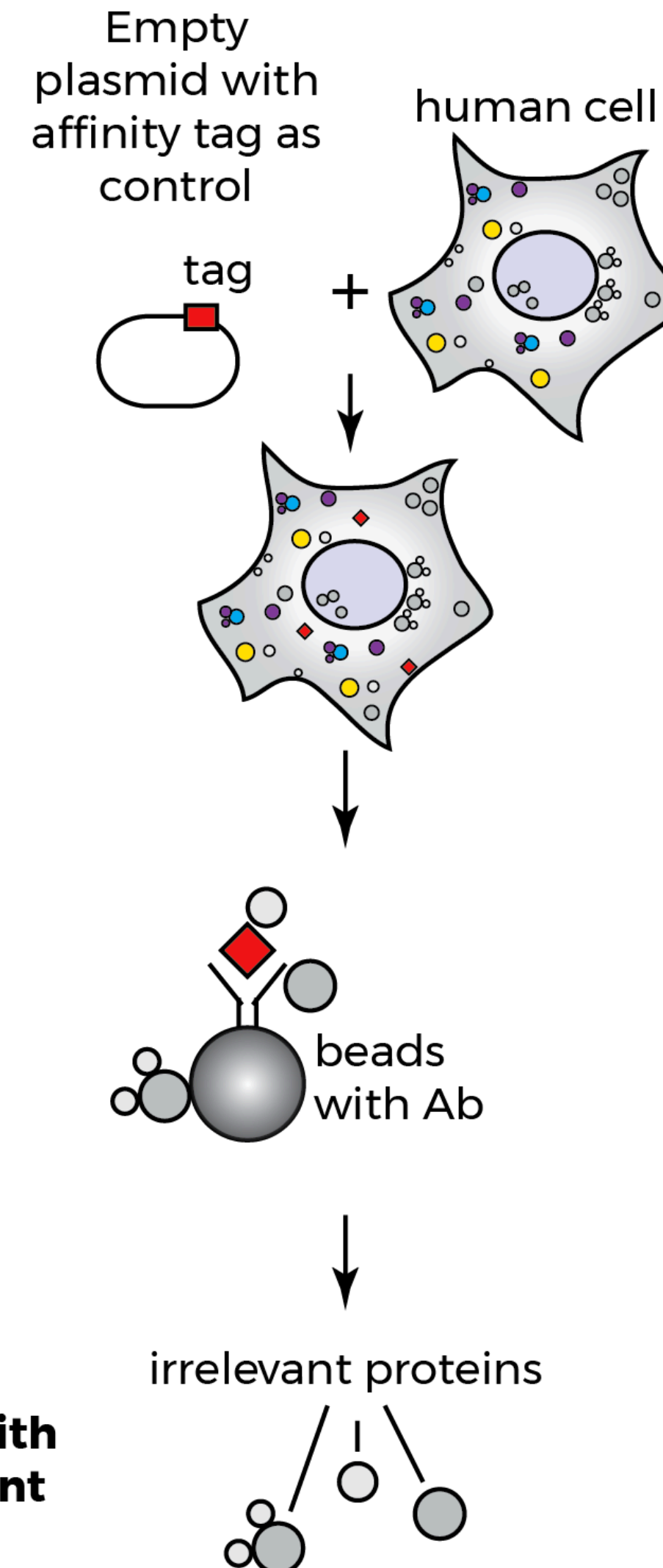
Express protein of interest

Cell lysis

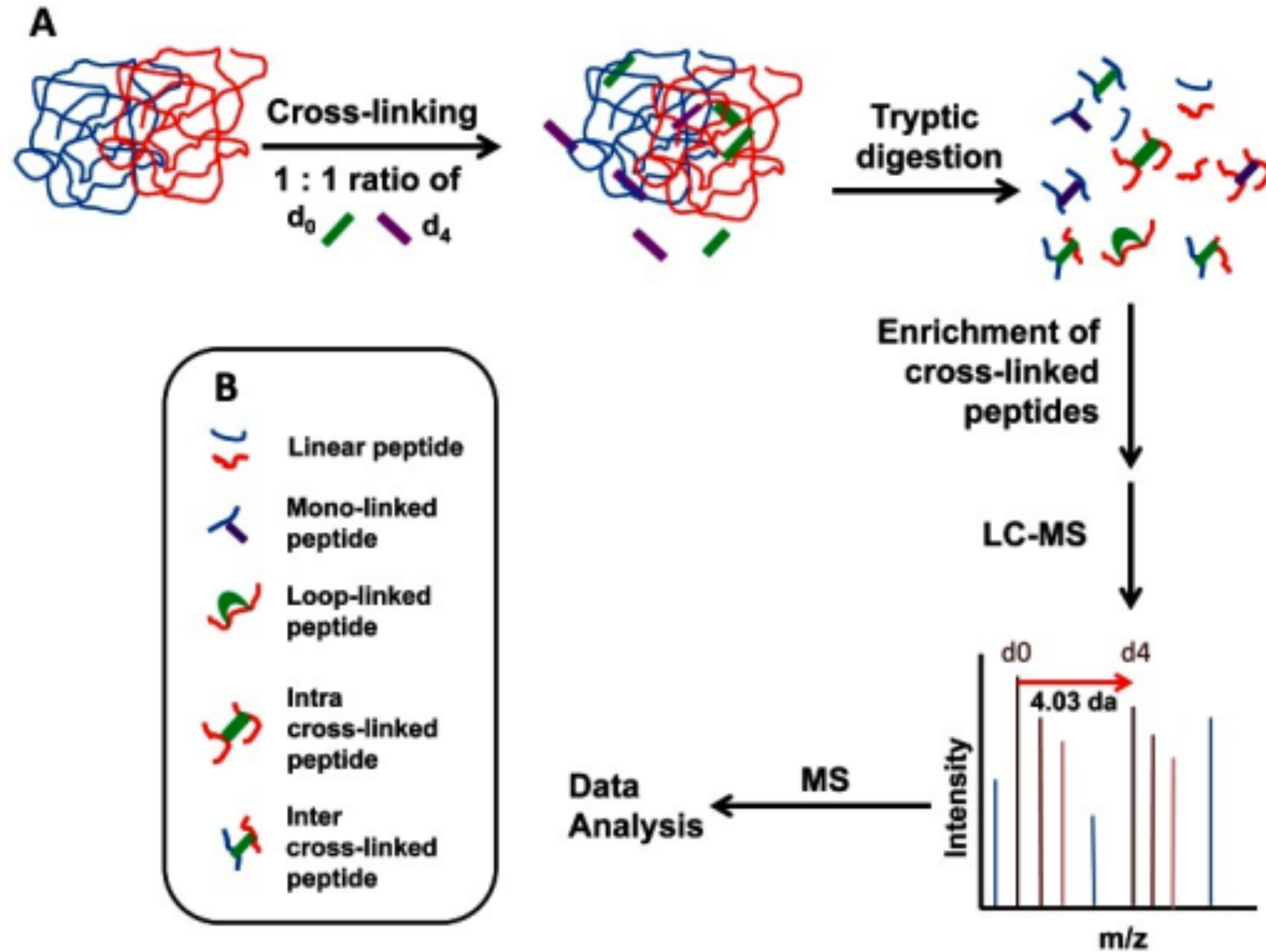
Add beads to capture tag

Elution of bound proteins

Identify proteins with LC-MS measurement



Identification of protein-protein interaction



Other Applications

- Evaluating food and safety -
 1. verifying the purity of goat and donkey milk to avoid cow antigens
 2. differentiating natural from added enzymes in low quality food products.
 3. detect the addition of soy proteins in meat products.
- In agriculture
 1. compare resistant (flood, pest, harsh conditions, increase yield) with susceptible ones.